Implications of Risk-Based Pricing for Affordable Homeownership and Community Reinvestment Goals

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ABSTRACT

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(Under the direction of Dr. Raphael Bostic, Dr. David Guilkey, Dr. Roberto Quercia, Dr. William Rohe, Dr. Michael Stegman)

This dissertation examines the community reinvestment lending activities of prime lenders during the period of subprime industry growth. For the purposes of this dissertation, community reinvestment lending is defined to encompass the lending programs and products used by regulated lenders to meet their obligations under the Community Reinvestment Act (CRA). While a substantial and growing literature scrutinizes the subprime market, far less attention has been given to the development of community reinvestment lending by prime institutions. Each of the essays in this dissertation explores a different aspect of the interaction of community reinvestment lending with the subprime market. The first essay examines borrowers’ substitution of community reinvestment mortgages for FHA and subprime products during the period 1998-2006. The second essay examines the role of equity extraction in community reinvestment borrowers’ refinancing behavior, showing that the desire to extract equity combines with income constraints to create an economic rationale for subprime refinancing among a small set of borrowers. Lastly, the third essay documents the role of mortgage brokers in the refinancing decisions of community reinvestment
mortgage borrowers, concluding that origination through a mortgage broker increases the likelihood of a transition into a higher-cost refinancing product.
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CHAPTER 1: INTRODUCTION AND OVERVIEW

Introduction

The current economic fallout from subprime foreclosures carries the potential to remake the American housing finance system. Already, the flow of credit to subprime originations has nearly ceased, the spillover of problematic subprime industry practices has landed Fannie Mae and Freddie Mac in conservatorship, and the federal government has invested hundreds of billions of dollars in failing banks and financial institutions. While these developments largely reflect temporary characteristics of the current economic situation, the policy response and the ensuing discussions leave the future of the housing finance system—particularly the affordable housing finance system—unclear. As the market settles, a diversity of low- and higher-cost products are likely to reappear. However, the shape of the affordable mortgage market and the nature of federal housing policy may be fundamentally altered in the process.

While a growing literature scrutinizes the subprime market and its operation, far less attention has been given to the implications of subprime lending for alternative market segments. In particular, little is known about the implications of subprime lending for existing efforts to expand access to credit to underserved borrowers and neighborhoods. Given the concentration of subprime loans in low-income and minority communities, the dramatic growth of the subprime industry likely implied increased competition and
interaction between subprime lenders and existing lending programs. However, nearly no research examines these interactions, resulting in little evidence to inform policy.

This dissertation explores these issues with respect to the community reinvestment lending activities of prime lenders, where community reinvestment lending is defined to encompass the lending programs and products used by regulated lenders to meet their Community Reinvestment Act (CRA) obligations. Given the discretionary nature of CRA regulations, no clear standards exist for defining the population of loans originated for CRA credit. As a result, the evidence presented in this dissertation is specific to the sample of CRA mortgages purchased through the Community Advantage Program (CAP).

Each of the essays in this dissertation explores a different aspect of the interaction between CAP lending and the subprime market. The first essay examines borrowers’ substitution of community reinvestment mortgages for FHA and subprime products during the period 1998-2006. The second essay examines the role of equity extraction in community reinvestment borrowers’ refinancing behavior, showing that the desire to extract equity combines with income constraints to create an economic rationale for subprime refinancing among a small set of borrowers. Lastly, the third essay documents the role of mortgage brokers in the refinancing decisions of community reinvestment mortgage borrowers, concluding that origination through a mortgage broker increases the likelihood of a transition into a higher-cost refinancing product.

This introductory section presents the context for these analyses, reviewing the development and growth of both CRA-related lending programs and the subprime industry. The first section discusses the evolution of CRA—as well as lenders’ strategies for compliance with CRA—in addition to presenting the Community Advantage Program itself.
The second section then discusses the broader changes to the surrounding market, focusing on the growth of the subprime industry. Lastly, the final section contextualizes the CAP program within the surrounding market, outlining the context for this dissertation and presenting abstracts of the individual essays.

**CRA Lending and the Community Advantage Program (CAP)**

The Community Reinvestment Act of 1977 (CRA) established an affirmative obligation for depositories to meet the credit needs of all neighborhoods in the communities in which their branches are located. This legislation exhorted lenders to create access to mortgage credit in underserved 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 their communities, but recognizes that the extent of such lending will depend upon the context of individual lenders’ operations (Barr 2005). Amendments in 1989, 1995, and 1999 retained this basic approach to CRA oversight, but strengthened the tools available to CRA examiners and the public (Litan et.al. 2001).

In practice during the 1990s, many lenders approached compliance by creating targeted lending programs tailored to the needs of low- and moderate-income borrowers and communities. Technological advances in mortgage underwriting led many lenders to experiment with flexible underwriting and the relaxation of traditional qualification requirements. 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. Similarly, lenders commonly relaxed credit history,
payment-to-income, and reserve requirements, using the associated mortgage products as part of their strategy for CRA compliance (Avery, Bostic, and Canner 2000).

Unfortunately, little is known either about the role of community reinvestment lending in meeting the credit needs of underserved 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 underserved neighborhoods (Apgar and Duda 2003; Barr 2005; Haag 2000). However, an absence of quality data has resulted in relatively little empirical research on the community reinvestment market.

One of the unfortunate consequences of CRA’s discretionary examination structure is that no clear standards exist for defining and identifying CRA-related lending activities. Similarly, lenders’ treatment of community reinvestment portfolios is often determined by unobservable decisions related to the institution’s strategy for CRA compliance. The analysis performed by the Joint Center for Housing Studies (2002) offers the most detailed examination of CRA lending to date, but also illustrates the difficulties inherent in identifying this market segment.

The Community Advantage 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. Because flexible underwriting characteristics commonly prevent sale into the conventional secondary market, the CAP program purchases fixed-rate purchase mortgages
with loan features that require lenders to hold them in portfolio. 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. Moreover, Self-Help’s purchasing decisions target loans
originated through the CRA-related lending activities of participating lenders.

The resulting CAP portfolio reflects the purchasing activities of Self-Help, and thus is
not specifically designed to create a representative cross-section of the community
reinvestment mortgage market. 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 all cases,
participating lenders originate and service the loans under contract with Self-Help, while
Self-Help securitizes the loans and retains recourse (effectively creating a traditional outlet
for otherwise illiquid loans).

While no clear standards exist for defining community reinvestment mortgages, 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 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.

As a result, analysis of the CAP portfolio is reflective of a broad array of CRA-related lending activities, but must be considered within the context of the CAP program. Riley and Ru (2009) present descriptively compare the CAP sample to the sample of homeowners in the Current Population Survey that meet the CAP purchasing criteria. Their analysis finds few major demographic differences between the CAP sample and the comparison group of homeowners. However, the construction of a comparison group relies on the CAP purchasing criteria, which may not perfectly align with the population targeted by CRA.

Given these limitations to generalizeability, the CAP nonetheless offers the richest available source of information on CRA mortgages, offering a unique opportunity for analysis. The research in this dissertation therefore examines the experiences of CAP borrowers, offering evidence on their origination and refinancing behaviors. The specific interpretation of findings, as well as the potential for extrapolation, is discussed in greater detail within the individual essays.

**Background and Context: Risk-based Pricing and Subprime Industry Growth**

The development of CRA lending occurred during a period of change within the broader mortgage market. This section reviews the changes in the nature and structure of the broader mortgage market, offering insight into the changing context of CAP lending. In particular, the growing evidence with respect to the interaction of subprime lenders with underserved borrowers and communities is reviewed at length, as this literature offers insight
into the operation of the subprime market during the period of CAP origination and refinancing.

The Development of Risk-based Pricing and Subprime Lending:

The same technological advances that led to the development of flexible underwriting characteristics also created the foundation for the development of risk-based pricing. Where applicants previously faced an approve/deny decision for a few standard mortgage products, the development of risk-based pricing and subprime lending created multiple options with varying prices and terms. For higher-risk borrowers who might previously have been denied access to credit, subprime lenders offer higher-cost credit with relaxed underwriting requirements. As a result, the development of these higher-cost options reduced the number of borrowers denied credit, but dramatically increased the variation across borrowers in the cost of available credit (see Temkin, Johnson, and Levy 2002).

This shift occurred as an outgrowth of advances in lenders’ abilities to quantify default risk using an applicant’s previous credit history. By the late 1980s, advances in computing and data management allowed the national credit bureaus to efficiently collect and store extensive data on individuals’ previous payment histories (Hunt 2002). Lenders applied this information both through automated underwriting models specific to individual products and through the use of generic credit history scores. First, lenders developed a variety of automated underwriting systems specific to individual mortgage products. Incorporating many of the standard underwriting variables, these models attempted to quantify the relative risk of each borrower. In most cases, lenders integrated these models into the underwriting process, also developing procedures for originators to use discretion in
overriding the automated models. Empirical evaluations suggest that the resulting automated underwriting procedures substantially improved upon traditional underwriting methods, lowering lender losses (Gates, Perry, and Zorn 2002).¹

Second, the Fair Isaac Corporation used credit bureau data to develop generic credit history scores, which measure a borrower’s credit performance across all open lines of credit. Precisely defined, a generic credit history score predicts the likelihood that a consumer will become delinquent on any of their open credit lines within 18 to 24 months. Lenders quickly applied these scores to mortgage underwriting, finding that the generic credit history scores are strongly associated with the likelihood of mortgage default (Avery et.al. 1996). Together, the development of credit scoring and automated underwriting substantially improved lenders’ abilities to segment borrowers according to lending risk, providing the foundation for the development of risk-based pricing.²

Risk-based pricing initially emerged through the appearance of relatively small subprime lenders that were willing to experiment with higher-cost lending products (Canner, Passmore, and Laderman 1999).³ Concurrent with the development of credit scoring and automated underwriting, expansion of the credit card industry left many households with sizeable consumer debts. Declining interest rates and solid home appreciation during the

¹This conclusion is tempered by the discussion in Temkin, Quercia, and Galster (2000). Following interviews with practitioners and industry executives, they conclude that the benefits of automated underwriting for underserved households may be more complicated than generally believed. The authors suggest that systematic review is necessary to understand how automated underwriting is applied by loan originators.

²Recent attention to credit scoring has shown that these improvements are limited by the presence of numerous mistakes and missing data in credit bureau files (Avery et.al. 2000, 2003; Avery, Calem, and Canner 2004).

³As subprime lending emerged through independent subprime lenders, prime lenders used credit scores to experiment with new products that relaxed the down payment or debt-to-income requirements. For instance, many prime lenders offered ‘affordable mortgage products’ to borrowers with good credit, but insufficient assets to make a traditional down payment (Quercia 1999; Quercia et.al. 2002). Researchers examining households’ abilities to access homeownership credit these products in part with relaxing the wealth constraint as an obstacle to homeownership (Barakova et.al. 2003; Rosenthal 2002).
early 1990s created a financial incentive for households that could secure a lower interest rate to refinance their mortgages. Households with substantial consumer debts could also use the refinancing process to pay down consumer debts with home equity, effectively trading high-cost consumer debt for low-cost mortgage debt and a single monthly payment. The Tax Reform Act of 1986 further encouraged this trade by eliminating the tax advantaged status of interest on consumer debt. Many of the earliest subprime lenders specialized in originating these higher-cost refinance loans for households with impaired credit (Temkin, Johnson, and Levy 2002).

As the subprime lending industry expanded, lenders developed a diverse range of mortgage products, including many options with flexible or non-traditional features. Subprime lenders also quickly expanded into the home purchase market. Where subprime loans accounted for less than 5 percent of the total mortgage origination volume in 1994, they grew to make up 20 percent of the total mortgage market by 2005. The set of both home purchase and refinancing products also expanded to encompass a wide variety of mortgage instruments. Where fixed-rate mortgages remain the staple of prime mortgage lending, the standard subprime mortgages through the end of 2007 were the 2/28 and 3/27 adjustable rate mortgages (ARMs). Additionally, most subprime lenders offer ARM variations that include balloon payments, flexible payment schedules, and hybrid structures that allow low introductory ‘teaser’ rates (Gramlich 2007).

The proliferation of subprime lending consequently created a varied and changing context for the CAP program. In particular, CRA lending programs increasingly competed with subprime lenders and mortgage brokers offering hybrid ARMs and other non-traditional mortgage products to lower-income borrowers. While this type of subprime lending
dramatically expanded access to mortgage credit for lower-income borrowers and
communities, it accounted for a relatively small proportion of the subprime industry.
Moreover, the diversity of product types and population groups within the subprime market
complicates any direct comparison between community reinvestment lending and broader
subprime industry.

Instead, the subprime industry can be conceptually broken down into several
segments. Focusing solely on purchase mortgages, a preliminary distinction is between Alt-
A products and the B&C lending that constituted the traditional subprime market. Offering
reduced documentation of income, Alt-A mortgages quickly became the product of choice
for investors speculating on new development in hot housing markets. Where Alt-A
borrowers typically held a financial profile similar to prime borrowers (excepting the need
for reduced income documentation), the typical subprime borrower did not meet prime
underwriting guidelines for credit history or income/assets. The remaining subprime B&C
mortgages can be further separated by borrower characteristics. While subprime borrowers
by definition were higher-risk, high-income borrowers with poor credit history are
conceptually distinct from low- and moderate-income borrowers in traditionally underserved
neighborhoods.

The implication is that the borrowers targeted by CAP and similar CRA-related
lending programs represent only one segment of the population served by subprime lending.
Moreover, these borrowers received a variety of different subprime products and cannot be
easily identified within a single non-prime market segment. The analysis in this dissertation
often relies on relatively broad measures of subprime lending, which are inclusive of the
diverse range of borrowers and products within the subprime industry. These measures
therefore include the segment of the borrowers targeted by CRA-related lending activities, but may overlook the discussed distinctions between this set of borrowers and alternative segments of the subprime market. In each case, the specific measures and their interpretation are addressed in the context of the analysis.

Subprime Lending and the Institutional Structure of the Mortgage Market

These changes in the context surrounding the CAP program also included fundamental changes in the institutional structure of the mortgage market. While the subprime industry developed through the appearance of a large number of independent lenders, the larger mortgage market segmented the origination, servicing, and investment functions. Lending institutions increasingly specialized in individual components of the mortgage finance process. This process began with the development of a secondary market, separating the loan origination and servicing functions from the financing and investment functions. Where banks previously held originated loans in their portfolio and carried the full risk of default and prepayment, in the current market it is not uncommon for a loan to be originated by one entity, serviced by a second, securitized by a third, and owned by a multitude of investors with shares of the associated securities.

The willingness of Wall Street and non-conventional secondary market purchasers to buy subprime mortgage products stimulated the growth of the subprime market. By the early 1990s, over half of all mortgages were securitized and sold into the secondary market, freeing lenders of the need to collect deposits as a funding source for mortgage loans (Inside Mortgage Finance 2003). Sale into the secondary market quickly became a natural outlet for subprime loans, whose risk could be spread across a large number of investors. This
increased specialization created substantial benefits for lenders through increased liquidity and diversified risk (Temkin, Johnson, and Levy 2002). However, the separation of loan originators from the default risk associated with their lending decisions requires incentive structures that reward originators for efficiently screening loans.

In the prime market, Fannie Mae and Freddie Mac developed standardized purchasing requirements and instituted recourse procedures through which loans with early delinquencies are returned to the originator. Private purchasers and many subprime lenders adopted similar policies, effectively creating institutional structures that encourage rational mortgage market operation. However, a much higher proportion of subprime loans are originated through mortgage brokers (Temkin, Johnson, and Levy 2002), who are often compensated through yield spread premiums—which reward brokers for inflating the interest rate (and subsequently a borrower’s monthly debt burden). This issue is discussed in greater detail in the next section.

A second element of mortgage market modernization occurred as mergers consolidated the market into a small number of large financial institutions. This process eliminated many small lenders, replacing them with branch locations of major banks and thrifts. Relaxed state-level restrictions along with the approval of interstate branching allowed banks to expand beyond their previous activities, expansion that many banks achieved through the acquisition of smaller entities. Between 1993 and 1997, 2,839 banking institutions were acquired through merger or acquisition, whereas only 431 new institutions began operations (Avery et.al. 1999). Similarly, banking organizations originating more than 50,000 home purchase loans accounted for 47 percent of all originations in 2000, compared to 11 percent in 1993 (Apgar and Duda 2003).
This process extended to the subprime market, as financial institutions increasingly sought to compete for profitable subprime borrowers. In contrast to the emergence of subprime lending through a diverse set of small institutions, the subprime market that emerged from the 1990s centered around the activities of a handful of lenders. The volume of subprime B&C lending increased from $65 billion in 1995 to $332 billion in 2003, with the market share of the top 25 lenders increasing from 40 percent in 1995 to 93 percent in 2003 (Chomsisengphet and Pennington-Cross 2006). In this process, many banks and thrifts acquired subprime lending operations, but structured these acquisitions to minimize exposure to regulatory oversight. In other cases, independent subprime lenders expanded their operations while remaining outside the jurisdiction of regulators (Gramlich 2007).

Subprime Lending and Federal Policy Goals

In the context of the previous discussions, much of the recent literature on the subprime industry is relevant both to the achievement of federal policy goals and to the operation of CRA-related lending programs. As a starting point, it is likely that the existence of subprime mortgage options benefits many potential borrowers. For instance, Chinloy and MacDonald (2005) create a theoretical model in which the availability of subprime credit increases access to homeownership for some households, which translates into a social welfare gain.4 Collins, Belsky, and Case (2005) further argue that subprime mortgage options may also help to sustain homeownership for households who desire access to cash-

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4Barakova et.al. (2003) show that wealth played a decreasing role in preventing homeownership entry during the 1990s, with credit history acting as the primary constraint to homeownership. Bostic, Calem, and Wachter (2005) suggest that the impact of credit history as a constraint is likely increasing, as the gap between the credit scores of low-wealth and high-wealth households widened during the 1990s.
out refinancing, but whose credit record prevents them from qualifying for a prime-rate mortgage.

However, these potential benefits must be weighed against increasing concerns over the marketing activities of subprime lenders and the performance characteristics of subprime loans. The remainder of this section presents the issues raised by existing research:

1. Increased Default Risk:

   Even before the recent spike in foreclosures, the use of a subprime mortgage product increased a borrower’s risk of default. Gerardi, Shapiro, and Willen (2007) follow a set of new homeowners in Massachusetts through the duration of their homeownership, estimating that home ownerships financed by subprime mortgages were 6 times more likely to default than home ownerships financed by prime mortgages. Where previous studies have shown elevated default rates over the life of a single mortgage, this study is unique in following homeowners through the entire duration of homeownership. Within 12 years of homeownership, the cumulative default rate associated with subprime credit is 18 percent, compared with 3 percent for prime credit.

   This elevated likelihood of default is particularly acute among hybrid ARMs, in which the borrower is faced with a payment shock when the interest rate resets. As early as 2005, published research documented an elevated default risk among hybrid ARMS (Ambrose, LaCour-Little, and Huszar 2005). In this study, 3/27 hybrid ARMs are shown to exhibit elevated rates of both prepayment and default, with the risk of each type of termination clustered around the payment shock as interest rates reset. The widespread use of hybrid ARMs in the subprime market correspondingly created the spike in foreclosures as
home values declined and homeowners with negative equity could not refinance out of these products (Schloemer 2006). However, subprime originations (Gerardi, Shapiro, and Willen 2007) and the hybrid mortgage structure (Ambrose, LaCour-Little, and Huszar 2005) are also associated with elevated default risk during the period of increasing home values.

This increased default risk among subprime mortgages requires distinguishing between product risk and borrower risk. While the reduced credit quality of subprime borrowers may partially explain the elevated risk of default among subprime loans, much of this risk can also be attributed to the mortgage product itself and to the nature of the origination process. Ding et.al. (2008a) match subprime and community reinvestment mortgage borrowers, showing that the increased risk among subprime loans is attributable to the subprime market’s use of mortgage brokers and ARM products. In contrast, the 30-year, fixed-rate mortgages originated in the community reinvestment market showed greater robustness to a decline in home prices. This basic result suggests that the issue is one of risky mortgages in addition to risky borrowers, a distinction that is often overlooked in discussions of the subprime market.

2. Spatial Segmentation of Prime and Subprime Lending:

Attention to the neighborhood patterns of subprime lending emerged through a series of reports that documented concentrations of subprime loans in lower-income and high-minority neighborhoods (Joint Center for Housing Studies 2000; HUD 2000). Pennington-Cross (2002) also document higher levels of subprime lending activity in cities with worse economic risk characteristics. These suggestive findings are reinforced by subsequent analyses that examine the distribution of subprime loans across neighborhoods within cities.
Using borrower- and tract-level regressions of subprime loan originations, these studies consistently show concentrations of subprime loans in low-income and minority neighborhoods. Calem, Gillen, and Wachter (2004) examine lending patterns in Chicago and Philadelphia, finding significant concentrations of subprime loans in underserved neighborhoods, particularly high-minority neighborhoods. This finding persists even after controlling for credit scores at the census tract level, with credit ratings explaining only between 40 and 50 percent of the association between subprime lending and tract percent African-American.

Calem, Hershaff, and Wachter (2004) report similar findings for seven cities: Atlanta, Baltimore, Chicago, Dallas, Los Angeles, New York, and Philadelphia. In loan-level regressions, tract percent black and tract percent low-income significantly predict subprime lending volumes after controlling for credit scores at the census tract level. While these studies show consistent correlations between income, race, and subprime activity, a potential limitation comes from their classification of subprime loans according to the originating lender. Ding et.al. (2008b) replicates these analyses using the 2004 HMDA data, which for the first time identifies high-cost loans. The authors reach similar conclusions, finding concentrations of subprime loans in lower-income and high-black neighborhoods.

The studies of neighborhood subprime lending patterns also show correlations between subprime lending and neighborhood education level (Calem, Hershaff, and Wachter 2004; Calem, Gillen, and Wacter 2004). These findings resonate with survey evidence that subprime borrowers may be less knowledgeable about their mortgage options and less likely to search for the best terms. In two telephone surveys of mortgage borrowers, Freddie Mac researchers found that subprime borrowers searched less for the best mortgage terms.
Subprime borrowers were more likely to strongly disagree that they ‘got the mortgage that was best for them,’ that they received rates and terms that were fair, and that their lender/broker provided ‘accurate and honest information’ (Courchane, Surette, and Zorn 2004). Furthermore, over 40 percent of subprime borrowers reported responding to an advertisement or sales call that promised a guaranteed loan approval, compared to only 11 percent of prime borrowers (Lax et.al. 2004). These findings raise considerable doubts about the likelihood that borrower search behavior effectively sorts borrowers into the prime and subprime markets. In 2000, Freddie Mac estimated that between 10 and 35 percent of subprime borrowers met GSE purchasing requirements for lower-cost loans. Fannie Mae put their estimate at 50 percent of borrowers in the subprime market (Fishbein and Bunce 2000). When considered together with the findings of spatial concentration, these studies raise concerns about subprime lenders’ targeting and recruitment efforts.

In addition to the possibility of improper sorting into the prime and subprime markets, the greater subprime activity in areas with lower education levels raises the possibility for abusive pricing and terms. Farris and Richardson (2004) examine the spatial distributions of prepayment penalties, a potentially abusive feature included in most subprime mortgages. Limiting their sample to subprime mortgage loans, the authors find that borrowers in rural and in high-minority tracts are more likely to have prepayment penalties included in the terms of their mortgage.

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Lyons, Rachlis, and Scherpf (2007) similarly show that households with less formal education were less knowledgeable regarding the credit scoring process and its relevance to insurance and employment.
3. Predatory Loan Characteristics:

A related issue is the extent of predatory lending within the subprime market. While consumer advocates and consumer interest attorneys have documented clear cases of predatory behavior among subprime lenders, measuring the extent of predatory practices is complicated by disagreements over the definition of a predatory product. Previous work has pointed to aggressive marketing, deceptive sales practices, excessive fees, and faulty underwriting practices. In particular, improper or widespread use of single premium credit insurance, prepayment penalties, and balloon payments have been singled out for their adverse effects on borrowers’ abilities to sustain homeownership. Analyses of the loan origination process have also described sales practices in which originators misrepresent mortgage terms, withhold information about loan pricing, and otherwise steer borrowers toward higher-cost products (Renuart 2004; Carr and Kolluri 2001). Hill and Kozup (2007) examined the loan origination process, concluding that ‘the rules of engagement’ discouraged applicants from asking questions and commonly left borrowers unaware of the actual terms of their mortgage.

These practices have implications for effectiveness of homeownership policies to the extent that they erode the benefits of homeownership for underserved borrowers. First, a number of predatory terms are designed either to inflate the fees collected at origination or to induce the borrower to repeatedly refinance their loan. For instance, subprime lenders commonly included single premium credit insurance in mortgage contracts for multiple

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6 Analyses of predatory behaviors therefore often focus on one or two specific practices or terms of interest. As an example, the Center for Responsible Lending estimated in 2001 that the annual economic cost of equity stripping and rate-risk disparities was $9.1 billion (Stein 2001).

7 We focus here on the implications of predatory lending for fair lending regulation. Readers seeking a full discussion of predatory lending activity should refer to Renuart (2004) and Carr and Kolluri (2001).
years, selling borrowers insurance that required full payment of the insurance premium at origination (often to a subsidiary of the loan originator). The credit insurance premiums, which generally exceeded 15 percent of the loan’s principal, were financed into the loan, with borrowers often unaware of their purchase. This practice effectively ended when revisions to the Home Ownership and Equity Protection Act (HOEPA) included the premiums in loan fee calculations, triggering increased disclosures and consumer protections (Immergluck 2004).

Second, pursuant to the previous discussion of the spatial patterns of subprime loans, the impact of predatory lending activities may be concentrated in lower-income and minority communities. Farris and Richardson’s (2004) analysis of the geographic patterns of prepayment penalties confirm that borrowers in rural and high-minority areas are more likely to have prepayment penalties included in their mortgage terms.\(^8\) The lower levels of borrower search and knowledge of mortgage options in these areas may also make them more vulnerable to predatory lenders. Engel and McCoy (2002) assert that predatory lenders actively seek out lower-income and high-minority areas, particularly those in which households are likely to both need credit and have accumulated substantial home equity.

In response to these concerns, federal legislators and regulators have done little to tighten the regulations affecting lender behavior and loan terms. The revisions to HOEPA are the primary exception, effectively eliminating the presence of single premium credit insurance. In the face of federal inactivity, several states have enacted legislation designed to address several practices. North Carolina, the first state to enact such legislation, requires lenders to document the borrower’s ability to repay and prohibits balloon payments, negative

\(^8\) Fannie Mae estimates suggest that 80 percent of subprime loans carries prepayment penalties in 2002, compared to only 2 percent of prime mortgages (Zigas, Parry, and Welch 2002; cited in Gramlich 2007).
amortization, and several other loan features. Subsequent analyses suggest that this legislation effectively reduced the incidence of the targeted lending activities (Quercia, Stegman, and Davis 2004; Harvey and Nigro 2004; Ernst, Farris, and Stein 2002), although Elliehausen and Staten (2004) dispute the extent to which other lending activities were also affected.

4. Yield Spread Premiums and Broker Incentives:

The use of yield spread premiums to compensate mortgage brokers has been criticized for its potential to create undesirable incentives. As the subprime market consolidated, an increasing number of originations occurred through mortgage brokers and third-party originators (Apgar and Herbert 2006). In most cases, the compensation remunerated to these entities is determined by a yield spread premium, the difference between the interest rate on the originated loan and the par rate that the borrower could otherwise qualify for. As a result, brokers can increase their compensation by either steering borrowers toward subprime products or by inflating the interest rate on subprime loans. Both actions increase the financing costs of homeownership for borrowers. Additionally, by increasing the cost burden faced by borrowers, both actions also increase the risk associated with the resulting loans.

Alexander et.al. (2002) compared loans originated through the third-party channel—primarily broker-originated loans—with other subprime mortgages, documenting the higher risk associated with third-party originations. Loans originated through the third-party channel defaulted at significantly higher levels than other loans. The authors attribute this increased risk to principal-agent problems between the lender and broker, whereby brokers
are not fully held accountable for the performance of loans after origination. Where this increased risk did not initially result in lenders charging brokers higher interest rates, the evidence presented suggests that lenders eventually began pricing third-party channel loans at 50 basis points, on average, above the par rate for other comparable loans.

In this context, the higher rates charged by mortgage brokers cannot be explained unless either brokers offset the increased interest rates with reduced fees or borrowers lacked good information about the prices being offered through other channels. Industry representatives argue that efficient market operation implies that brokers must compensate borrowers through fee reductions or other offsetting compensation. However, the emerging evidence suggests that brokers actively price loans in response to consumer search activity. Woodward (2003) finds that broker fees are lowest on the loans in which the full costs are easiest to evaluate and compare, namely when all fees were rolled into the disclosed interest rate. Brokers also levied roughly $1500 more in fees, on average, to borrowers without a college degree than to borrowers with a college degree. Jackson and Berry (2002) similarly find that brokers levied higher fees on black and Hispanic borrowers, $474 and $580 per loan, respectively. While these types of discriminatory pricing patterns should not appear in competitive markets, White (2004) argues that information asymmetries and costly search prevent borrowers from backing out of broker-originated mortgages once the full costs become clear.

The concerns with pricing abuses by mortgage brokers are compounded by the increasing prevalence of broker originations in the subprime market. Inside Mortgage Finance (2003) estimated that mortgage brokers originated 45 percent of subprime originations in 2003, compared to 30 percent of prime originations. Apgar and Fishbein
(2005) estimated that, in 2005, fully 60 percent of subprime originations occurred through the broker channel, compared with 25 percent for prime mortgages. This increasing prevalence of broker-originated loans is troubling given the direct incentive for brokers to push higher-priced loans. While the evidence on broker practices is still emerging, the existing evidence raises important concerns about the potential for yield spread premiums to encourage aggressive pricing.

5. Unregulated Lenders and Accountability:

A final concern related to increased subprime lending stems from the reduced coverage of regulatory oversight. The increasing prevalence of independent mortgage companies, mortgage brokers, and other non-depository lenders lessened the coverage of both fair lending exams and Community Reinvestment Act regulations. First, fair lending exams apply only to regulated banks and thrifts. While the jurisdictional rules include the majority of prime lenders, subprime lending emerged primarily through lenders structured as independent mortgage companies. In 2005, only around 20 percent of subprime originations were made by supervised entities. Ameriquest, H&R Block, and New Century Mortgage Corporation led the subprime market in the number of loans originated, but all three retained independent status. Conversely, all ten of the largest prime lenders were regulated as either a bank or thrift (Gramlich 2007).

The regulatory coverage of the Community Reinvestment Act has similarly weakened, as fewer mortgages are originated by deposit-taking institutions. Apgar and Duda (2003) estimate that less than 30 percent of originated home purchase loans are now subject to CRA review, with the proportion dropping below 10 percent in some metropolitan areas.
While these figures reflect changes in the institutional structure of the prime market, they also reflect the increased activity of subprime lenders and other entities outside the reach of CRA regulations. When taken together, the reduced coverage of both fair lending exams and CRA regulations substantially weakens the ability of regulators to maintain compliance with federal mandates.

**Community Reinvestment Lending in the Context of Risk-based Pricing**

In the context of these concerns about the operation of the subprime industry, the community reinvestment model of mortgage lending may present a preferable approach to targeted lending activities. Developed during the same time period, community reinvestment mortgage products are structured primarily as 30-year fixed-rate purchase mortgages and underwritten by prime lending institutions that are subject to CRA review. The result is not only that the resulting loans are less sensitive to changes in home prices, but also that the lending model raises fewer concerns about abusive practices and opaque products (Ding et.al. 2008a).

The CAP program offers one model for inducing lenders to expand their community reinvestment lending, demonstrating the viability of such lending programs. The essays in this dissertation add to the evidence on the CAP program, examining its relative role within the surrounding mortgage market. Each essay focuses on a different aspect of the interaction of community reinvestment lending with the subprime market (see abstracts below). The first essay examines borrowers’ substitution of community reinvestment mortgages for FHA and subprime products during the period 1998-2006. The second essay examines the role of equity extraction in community reinvestment borrowers’ refinancing behavior, showing that
a cash-out motivation together with an income constraint create an economic rationale for refinancing into a subprime mortgage. Lastly, the third essay documents the role of mortgage brokers in the refinancing decisions of community reinvestment mortgage borrowers, concluding that origination through a mortgage broker increases the likelihood of a transition into a subprime refinancing product.

When considered together, these essays describe the overlap and interaction of the community reinvestment market with subprime and higher-cost lending. These market segments are shown not to be independent but rather to create a finance system in which homeowners transition between low- and high-cost mortgage products in response to changes in their credit history and current consumption needs. Viewed in this way, the future scope and role of community reinvestment lending is shown to be dependent upon the nature and context of the surrounding mortgage market. The specific policy implications of these interactions are discussed both within the individual essays and in the concluding chapter.

Essay 1 Abstract: Community Reinvestment Lending in a Changing Context.

While a substantial and growing literature scrutinizes the subprime market, far less attention has been given to the development of community reinvestment lending by prime institutions. This article uses a unique demonstration program to examine the role of community reinvestment loans in meeting the credit needs of underserved borrowers. The analysis examines borrowers' substitution of community reinvestment loans for FHA and subprime mortgage products. In the years prior to the expansion of the subprime market, a small portion of community reinvestment loans are found to substitute for FHA originations.
Conversely, a much larger substitution effect is found with respect to high-cost originations during the years of the subprime industry’s growth.

**Essay 2 Abstract: Equity Extraction, Income Constraints, and Subprime Refinancing.**

The rise of risk-based pricing altered the context surrounding targeted lending programs. The growth of the subprime industry not only created competition for purchase mortgage originations, but also introduced refinancing options available to existing borrowers. This chapter focuses on the refinancing decision, following a sample of community reinvestment borrowers through the first years following home purchase. While the majority of refinancing borrowers secured lower-cost prime loans, a minority refinanced into adjustable-rate mortgages and into products with above-prime interest rates. The analysis examines these latter transitions, exploring the extent to which the desire to tap accumulated equity explains the observed refinancing behaviors. The empirical evidence supports the distinction between rate and cash-out refinancing, suggesting that the desire to extract equity offers an economic rationale for transitions into subprime products through refinancing.

**Essay 3 Abstract: Mortgage Brokers and the Refinancing Transaction.**

This study adds to an emerging literature on the lending practices of mortgage brokers during the run-up in home prices prior to 2006. Following a sample of low- and moderate-income borrowers through the first years following home purchase, the analysis identifies differences in the refinancing transaction associated with the use of mortgage brokers and retail lenders. Specifically, the analysis includes measures of the refinancing
process, including whether the lender initiated contact with the borrower, whether the terms of the mortgage changed at closing, and the level of borrower satisfaction in hindsight. Care must be taken in extrapolating from this sample to the broader mortgage market, as all borrowers refinanced out of 30-year fixed-rate purchase mortgages in the Community Advantage Program (CAP). Nevertheless, analysis of this sample offers unique insight into borrowers’ interactions with mortgage brokers during the refinancing transaction. Origination with a mortgage broker, compared with origination through a retail lender, is associated with both a less satisfactory refinancing process and a higher likelihood of refinancing into an adjustable-rate mortgage (ARM).
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CHAPTER 2: ESSAY 1

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

Abstract

While a substantial and growing literature scrutinizes the subprime market, far less attention has been given to the development of community reinvestment lending by prime institutions. This article uses a unique demonstration program to examine the role of community reinvestment loans in meeting the credit needs of underserved borrowers. The analysis examines borrowers’ substitution of community reinvestment loans for FHA and subprime mortgage products. In the years prior to the expansion of the subprime market, a small portion of community reinvestment loans are found to substitute for FHA originations. Conversely, a much larger substitution effect is found with respect to high-cost originations during the years of the subprime industry’s growth.
Introduction

In the past decade, the dramatic rise and fall of the subprime mortgage industry fundamentally altered the scope of the mortgage market in the United States. The appearance and growth of subprime lenders increased both the volume of lending and the diversity of mortgage products available to consumers. A growing literature documents the nature of the resulting subprime industry, describing both the risk characteristics for lenders and the marketing practices used to attract consumers. However, less attention has been given to the evolution of prime lenders’ strategies for compliance with the Community Reinvestment Act (CRA).

In meeting their requirements under CRA, depository lenders subject to CRA review often developed specific lending products and programs targeted to low-income borrowers and underserved neighborhoods (Avery, Bostic, and Canner 2000). For the purposes of this chapter, these CRA-related lending activities are grouped and referred to as community reinvestment lending. Developed during the 1990s, community reinvestment lending sought to expand the availability of mortgage credit for underserved borrowers and neighborhoods, offering 30-year fixed-rate mortgages with near-prime interest rates. In contrast, the subprime industry approached underserved borrowers and neighborhoods with mortgage products that carried elevated interest rates and/or additional fees. In this way, the growth of the subprime market likely implies a changing role for community reinvestment lending in underserved neighborhoods.

This essay examines the overlap and interaction of the prime, subprime, and FHA markets, exploring the extent to which prime lenders’ community reinvestment mortgage products substituted for FHA and subprime originations. As early as 2000, Freddie Mac
estimated that between 10 and 35 percent of subprime borrowers met GSE purchasing requirements for lower-cost loans. Fannie Mae put their estimate at 50 percent of borrowers in the subprime market (Fishbein and Bunce 2000). While these estimates raise concerns about the misclassification of prime-quality borrowers into the subprime market, they also highlight the lack of a clean boundary between the prime and subprime markets. This overlap illustrates subprime lenders’ efforts to compete with prime lenders at the inner margin, in addition to expanding access to credit at the outer margin.

Unfortunately, very little research has directly examined the relative role of community reinvestment lending programs. In part, this gap in the empirical literature is due to the absence of clear standards for defining and identifying CRA-related lending. The explosive growth of the subprime market also overshadowed community reinvestment lending in recent years. However, mounting foreclosures and dwindling originations in the subprime market may return attention to the role of community reinvestment lending in extending credit to underserved borrowers.

This chapter uses a unique demonstration program to examine the extent to which community reinvestment loans substitute for FHA and subprime originations. Specifically, the analysis is specific to community reinvestment mortgages purchased through the Community Advantage Program (CAP). Administered by a large community development financial institution, CAP purchases 30-year fixed-rate purchase mortgages originated through the CRA-related lending activities of prime lenders. Because the resulting portfolio is collected through the purchasing activities of the CAP program, it is not designed to create a representative sample of community reinvestment lending activities. Generalizeability to the broader market is further complicated by the lack of clear standards for defining the
population of community reinvestment loans. As a result, the empirical analysis must be considered within the context of the CAP program.

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, 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, CAP originations substituted at a much higher rate for high-cost loans. These findings are suggestive about the dynamic role of community reinvestment lending in the changing context of the broader mortgage market.

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 underserved 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 underserved 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 underserved 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). Instead, the strength of CRA enforcement has also depended upon the involvement of third-party entities. Local community organizations and advocates play active roles in both identifying poorly performing lenders and in pressuring regulators to apply CRA evaluation scores as a criterion for bank mergers (Immergluck 2004). These groups have effectively 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 prime lenders’ approach to meeting the credit needs of underserved 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 prime lenders, the improvements in lenders’ abilities to observe and quantify risk 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 mortgage credit into low-income and minority
neighborhoods (Ding et al. 2008; 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 underserved 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 underserved
neighborhoods (Apgar and Duda 2003; Barr 2005; Haag 2000). However, an absence of
available data has resulted in relatively little empirical research on the community
reinvestment market.

One of the unfortunate consequences of CRA’s discretionary examination structure is
that no clear standards exist for defining and identifying CRA-related lending activities.
Additionally, lenders’ treatment of community reinvestment portfolios is often determined by
unobservable decisions related to the institution’s strategy for CRA compliance. 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 identifying this
market segment.

The result of these obstacles to empirical analysis has been that little evidence
documentsthe potential role of community reinvestment lending in the broader mortgage
market. In particular, no studies to date have directly examined the overlap and interaction

¹Avery, Bostic, and Canner (2000) also offer a detailed examination of CRA special lending programs
at the institutional level.
of community reinvestment lending with the subprime and FHA markets. Instead, much of the available evidence with respect to the Community Reinvestment Act focuses on the impact of lending agreements, negotiated 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).

**Community Reinvestment Lending and Mortgage Choice**

Competition between the FHA and conventional mortgage segments has been studied extensively in recent past. ² Hendershott, LaFayette, and Haurin (1997) and Pennington-Cross and Nichols (2000) both examine the choice between FHA and conventional loans, and both studies reinforce the importance of financial factors in sorting borrowers between segments. Borrowers are shown to consider down payment constraints, monthly payment constraints, and the cost of mortgage insurance in making their decisions. Pennington-Cross and Nichols (2000) additionally show that credit history moderates product selection, with a higher credit score increasing the likelihood of choosing a conventional mortgage.

Several recent studies update this literature to include subprime product options, similarly documenting the importance of financial factors and credit history. Pennington-Cross, Yezer, and Nichols (2000) analyze the choice between prime, subprime, and FHA

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²This chapter 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).
products for a sample of mortgages originated in 1996. The results reinforce that credit history and other risk characteristics play a strong role in determining the use of subprime mortgages. However, the analysis offers little evidence that wealth and down payment constraints channel borrowers towards subprime mortgages during the period of study. Courchane, Surette, and Zorn (2004) similarly examine the classification of borrowers into the prime and subprime market segments. Their analysis corroborates the relationship between a poor credit history and the use of a subprime product, but also highlights that demographic events such as divorce and unemployment predict the use of subprime credit.

Lastly, LaCour-Little (2007) isolates a sample of low- and moderate-income households to examine the choice between conventional conforming, FHA, subprime, and ‘specially targeted’ mortgage products. Across products, the results are consistent with the previous studies, 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 at the margin of the prime and subprime markets. For instance, An and Bostic (2008b) examine the impact of GSE purchasing requirements on the extent and geographic distribution of subprime lending

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3 The latter ‘specially targeted mortgage program’ reflects a partnership between a national bank and the GSEs.

4 The 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.
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. An and Bostic (2008a) 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.5

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

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5This 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.
sample is not designed to be representative of either low-income borrowers or of CRA lending. 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 CRA 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.\(^\text{6}\)

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 originsations. In all cases, participating lenders originate and service the loans under contract

\(^6\)The 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.
with Self-Help, while Self-Help securitizes and sells the loans while retaining recourse (effectively creating a traditional outlet for otherwise illiquid loans).

While no clear standards exist for defining community reinvestment mortgages, 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 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.

**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 dataset on mortgage originations
available, with 27.5 million applications for home mortgages reported in 2006.\textsuperscript{7} In contrast, the CAP dataset includes 35,925 mortgages originated between 1998 and 2006 and purchased into the CAP program.

The HMDA data for each year is limited to the set of first-lien home purchase mortgage originations. 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:\textsuperscript{8}

\begin{equation}
Y_{it} = C_{it}\gamma + X_{it}\beta + R_t + T_i + \epsilon_{it}
\end{equation}

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, $T_i$.\textsuperscript{9} 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

\textsuperscript{7}The 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.

\textsuperscript{8}Ideally, 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 therefore not possible with available computing resources.

\textsuperscript{9}In the analyses, robust standard errors are used to account for heteroskedasticity.
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 share and number of prime, subprime, and FHA loans. First, analysis with respect to the share of FHA and subprime originations in the tract examines the impact of CAP lending on the relative volume of each of these types of mortgage credit. Second, equation (1) is also estimated with respect to the individual components of the share measures, specifically the number of prime, FHA, and subprime mortgages originated in the tract. Where origination of a CAP mortgage may negatively impact the share measures by increasing the total number of originations in the denominator, this second set of measures isolates the impact of CAP in substituting for FHA and subprime mortgage use. The second specification of the outcome measures—the number of mortgages originated in the tract—is therefore the preferred form, and used in the empirical analyses.

In each of these analyses, FHA loans are identified directly in HMDA, while subprime loans are identified using the list of subprime lenders maintained by HUD. As a result, any impact of CAP on the measure of subprime loans 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 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 the origination of CAP loans. Instead, observed variation in the CAP
measure appears disproportionately as the presence of 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 likely did not seek
out lenders on the basis of CAP participation.\textsuperscript{10} 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.\textsuperscript{11,12} The ability of the resulting specification to isolate the impact
of CAP lending is discussed further with the empirical results.

\textsuperscript{10}As 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.

\textsuperscript{11}The 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.

\textsuperscript{12}Additional 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.
Empirical Analysis

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. Table 2.1 shows the characteristics of these loans for the set of 31,472 mortgages with complete information on borrower and loan characteristics.13 These characteristics confirm the targeted nature of community reinvestment lending.

The median household income among CAP households in the year of origination is $33,645, which amounted to an average of 62 percent of area median income. Recalling the purchasing requirements applied to CAP loans, the income figures shown in Table 2.1 suggest that a large majority of CAP mortgages qualify under the first option—borrower income falls below 80 percent of the area median income. Nearly 90 percent of CAP households have incomes below this threshold. Of the remainder, an additional 5 percent qualify under the second option—a minority borrower with income below 115 percent of area median income—and the remaining 5 percent qualify under the third option—a high-minority or low-income tract with borrower income below 115 percent of area median income.

13While the loan characteristics are summarized for the sub-sample with complete information, the empirical analyses are performed with respect to the full sample of 35,925 borrowers, as loans with missing data on the characteristics in Table 2.1 cannot be identified and excluded in HMDA data.
Table 2.1: Borrower and loan characteristics in CAP, 1998-2006.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Borrower Characteristics:</strong></td>
<td></td>
</tr>
<tr>
<td>Annual household income</td>
<td>$33,645</td>
</tr>
<tr>
<td>Ratio income to AMI</td>
<td>.62</td>
</tr>
<tr>
<td>Black borrower or co-borrower</td>
<td>.18</td>
</tr>
<tr>
<td>Hispanic borrower or co-borrower</td>
<td>.15</td>
</tr>
<tr>
<td>Minority borrower or co-borrower</td>
<td>.39</td>
</tr>
<tr>
<td><strong>Loan Characteristics:</strong></td>
<td></td>
</tr>
<tr>
<td>Origination loan balance</td>
<td>$90,252</td>
</tr>
<tr>
<td>Interest rate</td>
<td>.072</td>
</tr>
<tr>
<td>Front-end ratio: mortgage payment to monthly income</td>
<td>.28</td>
</tr>
<tr>
<td>Back-end ratio: debt to monthly income</td>
<td>.37</td>
</tr>
<tr>
<td>Loan-to-value ratio 100+</td>
<td>.24</td>
</tr>
<tr>
<td>Loan-to-value ratio 97-99</td>
<td>.32</td>
</tr>
<tr>
<td>Loan-to-value ratio 90-96</td>
<td>.29</td>
</tr>
<tr>
<td>Loan-to-value ratio 80-89</td>
<td>.08</td>
</tr>
<tr>
<td>Loan-to-value ratio &lt;80</td>
<td>.06</td>
</tr>
<tr>
<td>Origination credit score &lt;580</td>
<td>.04</td>
</tr>
<tr>
<td>Origination credit score 580-619</td>
<td>.11</td>
</tr>
<tr>
<td>Origination credit score 620-659</td>
<td>.22</td>
</tr>
<tr>
<td>Origination credit score 660-719</td>
<td>.33</td>
</tr>
<tr>
<td>Origination credit score 720+</td>
<td>.30</td>
</tr>
<tr>
<td>N</td>
<td>31,472</td>
</tr>
</tbody>
</table>

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 $90,252 at origination and carried interest rates that averaged 7.2%. Figure 2.1 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).\(^{14}\) 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.\textsuperscript{15} Because CAP loans do not require private mortgage insurance,\textsuperscript{16} the rates shown in Figure 2.1 imply that the pricing of CAP mortgages roughly corresponds to that for prime loans.

The remaining loan characteristics in Table 2.1 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 .28 and .37, respectively, which are near the traditional

\footnotesize
\textsuperscript{15}CAP loans generally carried a 75 basis point credit enhancement.

\textsuperscript{16}The interest rates reported for the prime market by PMMS exclude borrowers’ mortgage insurance payments.
standards of .28 and .36. However, the mean values conceal variation in the distribution of these variables, as 46 percent of CAP mortgages carry front-end ratios that exceed .28 and 56 percent carry back-end ratios that exceed .36. Second, Table 2.1 directly presents the distribution of loan-to-value ratios and credit scores across the portfolio of CAP loans. Eighty percent of CAP mortgages carried loan-to-value ratios of 90 or higher, with 56 percent exceeding 97. Similarly, 70 percent of CAP mortgages carried credit scores below 720, with 37 percent below 660.

The 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. Census 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, the analysis sample includes the 7,691 tracts that include a CAP origination in at least one year.\footnote{Because 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.}

Table 2.2 uses data from the 2000 Census to describe this set of CAP tracts relative to the set of tracts without a CAP origination. Comparison of demographic characteristics across CAP and non-CAP tracts reflects the targeted nature of CAP lending, but also yields few systematic differences. CAP loans tend to be located in tracts with more residents, lower incomes, and lower median home values. However, CAP tracts, on average, also have higher homeownership rates, lower poverty rates, and lower unemployment rates than other tracts.
While these differences offer some evidence that CAP homes tend to be located in lower-income neighborhoods, they do not strongly suggest that CAP tracts systematically differ from non-CAP tracts.

Table 2.2: 2000 Census characteristics for CAP and non-CAP census tracts.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAP Tracts</th>
<th>Non-CAP Tracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>4,940</td>
<td>4,174</td>
</tr>
<tr>
<td>Median household income</td>
<td>$40,056</td>
<td>$43,261</td>
</tr>
<tr>
<td>Ownership rate</td>
<td>66.4</td>
<td>65.6</td>
</tr>
<tr>
<td>Median home value</td>
<td>$99,394</td>
<td>$134,189</td>
</tr>
<tr>
<td>Percent in poverty</td>
<td>13.0</td>
<td>13.7</td>
</tr>
<tr>
<td>Percent unemployed(^a)</td>
<td>6.1</td>
<td>6.5</td>
</tr>
<tr>
<td>Percent with high school degree(^b)</td>
<td>78.7</td>
<td>79.0</td>
</tr>
<tr>
<td>Percent with 4 year college degree(^b)</td>
<td>20.2</td>
<td>22.9</td>
</tr>
<tr>
<td>Percent Hispanic</td>
<td>7.2</td>
<td>10.5</td>
</tr>
<tr>
<td>Percent black</td>
<td>19.3</td>
<td>12.9</td>
</tr>
<tr>
<td>Percent minority</td>
<td>30.7</td>
<td>29.1</td>
</tr>
<tr>
<td>N</td>
<td>7,691</td>
<td>41,103</td>
</tr>
</tbody>
</table>

\(^a\) Of individuals age 16 or older.
\(^b\) Of individuals age 25 or older.

The empirical analysis focuses on the impact of a CAP origination on the distribution of lending across time within the set of CAP tracts. Figure 2.2 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 2.2 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.

Figure 2.2: Mean number of originations per tract by type.

The presence of CAP originations across years differs substantively from the patterns for prime, FHA, and subprime loans. Figure 2.3 shows the distribution of CAP originations across time, plotting the number of originations in each month. While there is substantial variation by month, the largest number of CAP mortgages were originated in the early and middle years of this period, with originations tapering off after 2003.

The measure of CAP lending is defined at the tract level as the number of CAP originations in the tract. Of the 69,219 observations (7,691 tracts x 9 years), only 14,653

---

18The 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.
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. Furthermore, when a positive value is observed, the typical number of originations is one. Seventy-two percent of the observed values are one and 88 percent of the observed values are one or two.

Figure 2.3: Distribution of CAP originations across time.

Table 2.3 presents the first set of analyses with respect to the impact of CAP lending on the presence of prime, subprime, and FHA lending. The first two models show the effect of a CAP loan on the subprime lending share (FHA lending share), which is operationalized

---

19 The 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.

20 As 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.
as the ratio of the number of subprime loans (the number of FHA loans) to the total number of loans originated in the tract. The latter three columns then examine the impact of a CAP loan on the individual components of these measures (e.g. the number of prime, subprime, and FHA loans originated in the tract).

The immediate finding from Table 2.3 is that the origination of a CAP loan is associated with a decrease in both the subprime share and the FHA share. However, this finding is complicated by the analysis with respect to each type of lending. In particular, the presence of a CAP loan is associated with a one-to-one increase in the number of prime loans. This outcome first corroborates the proposition 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, it undermines the use of the subprime and FHA share variables as outcome measures, as the negative estimates may be created entirely by association of a CAP origination with the number of originations in the denominator of the loan share measures.

As a result, the estimates with respect to the number of subprime and FHA originations are used to evaluate substitution across mortgage product types. For the full study period, 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 FHA originations are observed.
Table 2.3: Estimated impacts of CAP lending on the number and share of prime, subprime, and FHA originations.

<table>
<thead>
<tr>
<th></th>
<th>Subprime Share</th>
<th>FHA Share</th>
<th># Prime</th>
<th># Subprime</th>
<th># FHA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>S.E.</td>
<td>Coef.</td>
<td>S.E.</td>
<td>Coef.</td>
</tr>
<tr>
<td># CAP loans</td>
<td>-.002** (.0004)</td>
<td>-.006** (.0004)</td>
<td>1.057** (.195)</td>
<td>-.147** (.044)</td>
<td>.074 (.068)</td>
</tr>
<tr>
<td># Prime loans</td>
<td></td>
<td></td>
<td></td>
<td>.151** (.001)</td>
<td>.032** (.006)</td>
</tr>
<tr>
<td># Subprime loans</td>
<td>1.941** (.068)</td>
<td></td>
<td></td>
<td></td>
<td>-.295** (.018)</td>
</tr>
<tr>
<td># FHA loans</td>
<td>.285** (.052)</td>
<td></td>
<td></td>
<td>-.205** (.003)</td>
<td></td>
</tr>
</tbody>
</table>

(1998 omitted)

Year 1999: .022** (.0012) .009** (.0018) -2.101** (.508) 1.778** (.146) 2.792** (.193)
Year 2000: .038** (.0012) .002 (.0016) -5.882** (.500) 2.933** (.146) 2.480** (.179)
Year 2001: .019** (.0011) .018** (.0017) -2.727** (.467) 2.023** (.147) 3.706** (.193)
Year 2002: .035** (.0011) -.010** (.0016) -3.311** (.473) 2.541** (.146) 1.597** (.184)
Year 2003: .058** (.0011) -.048** (.0016) -1.360** (.554) 3.850** (.146) .375* (.182)
Year 2004: .097** (.0012) -.092** (.0016) -2.714** (.769) 7.453** (.148) -1.632** (.216)
Year 2005: .120** (.0014) -.127** (.0017) -.541 (.975) 10.477** (.150) -3.094** (.284)
Year 2006: .072** (.0012) -.132** (.0018) 13.634** (.805) 3.503** (.151) -5.966** (.238)

Constant: .059** (.0008) .212** (.0013) 46.429** (1.01) -2.397** (.128) 13.946** (.425)
Tract fixed effects*: --** --** --** --** --**

* 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=69,219 observations (7,691 tracts)
*p<.05; **p<.01
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 influence of local market factors. As a result, interpretation of the estimated associations must be performed with care.

Table 2.4 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 2.2, this analysis examines whether CAP’s impact on each market segment differed under alternative market conditions. The estimates shown in Table 2.4 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 small substitution effect with respect to the number of FHA loans. The latter estimate implies that CAP originations, on average, are associated with a reduction of .24 in the number of FHA originations.

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 .42 implies that CAP originations have a substantial effect on the origination of subprime loans. However, the estimates shown in the second panel of Table 2.4 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 .69 and carries a marginally significant t-statistic (t=1.95).

Table 2.4: Estimated impacts of CAP by time period.

<table>
<thead>
<tr>
<th></th>
<th># Prime</th>
<th></th>
<th># Subprime</th>
<th></th>
<th># FHA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>S.E.</td>
<td>Coef.</td>
<td>S.E.</td>
<td>Coef.</td>
<td>S.E.</td>
</tr>
<tr>
<td>Panel 1: 1998-2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># CAP loans</td>
<td>1.047**</td>
<td>(.155)</td>
<td>.020</td>
<td>(.029)</td>
<td>-2.50**</td>
<td>(.076)</td>
</tr>
<tr>
<td># Prime loans</td>
<td>.020**</td>
<td>(.003)</td>
<td>.125**</td>
<td>(.016)</td>
<td>.394**</td>
<td>(.050)</td>
</tr>
<tr>
<td># Subprime loans</td>
<td>.575**</td>
<td>(.108)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># FHA loans</td>
<td>.460**</td>
<td>(.043)</td>
<td>.050**</td>
<td>(.007)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1998 omitted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1999</td>
<td>-.441</td>
<td>(.302)</td>
<td>1.373**</td>
<td>(.050)</td>
<td>1.591**</td>
<td>(.145)</td>
</tr>
<tr>
<td>Year 2000</td>
<td>-2.773**</td>
<td>(.352)</td>
<td>2.415**</td>
<td>(.053)</td>
<td>.844**</td>
<td>(.160)</td>
</tr>
<tr>
<td>Year 2001</td>
<td>-1.218**</td>
<td>(.306)</td>
<td>1.334**</td>
<td>(.052)</td>
<td>2.566**</td>
<td>(.145)</td>
</tr>
<tr>
<td>Constant</td>
<td>48.088**</td>
<td>(.869)</td>
<td>1.234**</td>
<td>(.162)</td>
<td>6.624**</td>
<td>(1.02)</td>
</tr>
<tr>
<td>Tract fixed effects^a</td>
<td>--**</td>
<td>--**</td>
<td>--**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel 2: 2002-2006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># CAP loans</td>
<td>.686</td>
<td>(.351)</td>
<td>-.423**</td>
<td>(.082)</td>
<td>.208</td>
<td>(.113)</td>
</tr>
<tr>
<td># Prime loans</td>
<td>.115**</td>
<td>(.002)</td>
<td>-.017*</td>
<td>(.009)</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Subprime loans</td>
<td>1.338**</td>
<td>(.080)</td>
<td></td>
<td></td>
<td>-.281**</td>
<td>(.021)</td>
</tr>
<tr>
<td># FHA loans</td>
<td>-0.217*</td>
<td>(.112)</td>
<td>-.311**</td>
<td>(.006)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2002 omitted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 2003</td>
<td>2.616**</td>
<td>(.509)</td>
<td>1.317**</td>
<td>(.155)</td>
<td>-.927**</td>
<td>(.170)</td>
</tr>
<tr>
<td>Year 2004</td>
<td>2.956**</td>
<td>(.649)</td>
<td>4.882**</td>
<td>(.158)</td>
<td>-2.603**</td>
<td>(.195)</td>
</tr>
<tr>
<td>Year 2005</td>
<td>6.995**</td>
<td>(.894)</td>
<td>8.024**</td>
<td>(.164)</td>
<td>-3.560**</td>
<td>(.288)</td>
</tr>
<tr>
<td>Year 2006</td>
<td>16.709**</td>
<td>(.845)</td>
<td>.983**</td>
<td>(.166)</td>
<td>-6.285**</td>
<td>(.256)</td>
</tr>
<tr>
<td>Constant</td>
<td>54.663**</td>
<td>(2.03)</td>
<td>4.033**</td>
<td>(.180)</td>
<td>18.302**</td>
<td>(.507)</td>
</tr>
<tr>
<td>Tract fixed effects^a</td>
<td>--**</td>
<td>--**</td>
<td>--**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

^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=30,764 observations in Panel 1 (7,691 tracts).
N=38,455 observations in Panel 2 (7,691 tracts).
*p<.05; **p<.01
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.¹

In order to verify the estimated effects reported in the second panel of Table 2.4, 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. This latter definition is likely preferable, as the line between prime and subprime lenders increasingly blurred over the course of the study period.²

Table 2.5 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 2.4. 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 may be 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

¹The findings in the second panel of Table 2.4 are also tempered by the positive association between the presence of a CAP loan and the number of FHA originations in the tract. The estimate is small and carries a non-significant t-statistic. However, this result is inconsistent with a priori expectations about the impact of CAP lending and the specification of the estimated model.

²As 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.
estimate (the standard deviation is .30), it suggests that the community reinvestment loans originated through CAP may have created access to prime mortgage credit for a majority of CAP households.

### Table 2.5: Estimated impact of CAP on high-cost lending (2004-2006).

<table>
<thead>
<tr>
<th></th>
<th># Low-Cost</th>
<th></th>
<th># High-Cost</th>
<th></th>
<th># FHA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>S.E.</td>
<td>Coef.</td>
<td>S.E.</td>
<td>Coef.</td>
<td>S.E.</td>
</tr>
<tr>
<td># CAP loans</td>
<td>1.017*</td>
<td>(.427)</td>
<td>-.707**</td>
<td>(.299)</td>
<td>.122</td>
<td>(.092)</td>
</tr>
<tr>
<td># Low-cost loans</td>
<td>.101**</td>
<td>(.028)</td>
<td>-.024**</td>
<td>(.007)</td>
<td></td>
<td></td>
</tr>
<tr>
<td># High-cost loans</td>
<td>.278**</td>
<td>(.084)</td>
<td>-1.121**</td>
<td>(.011)</td>
<td></td>
<td></td>
</tr>
<tr>
<td># FHA loans</td>
<td>-.489**</td>
<td>(.141)</td>
<td>-.901**</td>
<td>(.098)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2004 omitted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 2005</td>
<td>-3.541**</td>
<td>(1.30)</td>
<td>14.541**</td>
<td>(.300)</td>
<td>-.512**</td>
<td>(.165)</td>
</tr>
<tr>
<td>Year 2006</td>
<td>-5.532**</td>
<td>(1.07)</td>
<td>11.481**</td>
<td>(.347)</td>
<td>-1.745**</td>
<td>(.147)</td>
</tr>
<tr>
<td>Constant</td>
<td>63.127**</td>
<td>(2.26)</td>
<td>18.729**</td>
<td>(2.35)</td>
<td>13.875**</td>
<td>(.533)</td>
</tr>
<tr>
<td>Tract Fixed Effects(^a)</td>
<td>--**</td>
<td>(2.62)</td>
<td>--**</td>
<td>(2.35)</td>
<td>--**</td>
<td>(2.35)</td>
</tr>
</tbody>
</table>

\(^a\) 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=23,073 observations (7,691 tracts).
*p<.05; **p<.01

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 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. In contrast, the dramatic growth of the subprime market after 2002 appears to have altered 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 development of community reinvestment lending by prime lenders. In large part, this disparity reflects the dramatic growth of the subprime industry, which outpaced the development of the community reinvestment market. However, in the wake of the subprime market’s collapse, community reinvestment lending may provide a primary means for underserved borrowers to access purchase mortgage credit.

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 subprime originations are observed.

When these estimates are considered within the context of the broader mortgage market, they reflect a changing role for community reinvestment lending. Where community reinvestment loans appear to have created access to credit prior to the boom in subprime lending, they subsequently created access to prime credit in the later period. This shift mirrors the policy discussions surrounding the growth of the subprime market, as concerns shifted from fair access to credit towards access to fairly priced credit. The analysis unfortunately does not extend through the collapse of the subprime market. However, sharp declines in high-cost originations and the return of FHA lending suggest that community reinvestment lending may have returned to its pre-2001 role, offering an important tool for creating access to mortgage credit for underserved households.

The relatively stable performance of CAP loans further suggests that such lending provides a useful model for affordable mortgage finance in the coming years. While CAP originations overlapped with subprime lending activities in low-income neighborhoods, the rates of delinquency and default on CAP mortgages remained well below those on subprime mortgages both during the run-up in home prices and after prices began to decline (Ding et.al. 2008). This experience of the CAP program exhibits the success of CRA lending at achieving sustained homeownership. Additionally, the CAP program demonstrates the utility to lenders of a secondary market outlet for CRA loans. In the context of the current crisis, this model offers a blueprint for returning to an affordable housing finance system that both encourages innovation and maintains a commitment to safe and sound lending practices. A

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3 See also Calem and Wachter (1999) for an examination of the loan performance of a community reinvestment lending program in the early years of this market.
4 For a full discussion of CRA modernization, see Chakrabarti et.al. (2009).
revised CRA requires expanded coverage that includes the full spectrum of depository and non-depository lenders. As well, any expansion of CRA lending should be coupled with—and not substituted for—tightened regulation of high-cost originations. Nonetheless, the evidence presented in this chapter suggests that a modernized and expanded CRA offers promise as a central component of the future affordable housing finance system.
Bibliography


CHAPTER 3: ESSAY 2

The Refinancing Transition: Equity Extraction, Income Constraints, and Subprime Refinancing Among CRA Mortgage Borrowers.

Abstract

The rise of risk-based pricing altered the context surrounding targeted lending programs. The growth of the subprime industry not only created competition for purchase mortgage originations, but also introduced refinancing options available to existing borrowers. This chapter focuses on the refinancing decision, following a sample of community reinvestment borrowers through the first years following home purchase. While the majority of refinancing borrowers secured lower-cost prime loans, a minority refinanced into adjustable-rate mortgages and into products with above-prime interest rates.

The analysis examines these latter transitions, exploring the extent to which the desire to tap accumulated equity explains the observed refinancing behaviors. The empirical evidence supports the distinction between rate and cash-out refinancing, suggesting that the desire to extract equity offers an economic rationale for transitions into subprime products through refinancing.
Introduction

The rise of risk-based pricing raises questions about the relative place of targeted lending programs within the broader mortgage market. Where underserved borrowers previously had limited access to mortgage credit, the growing subprime industry expanded both access to credit and the scope of available product options. In doing so, the widespread presence of subprime lenders also altered the context surrounding targeted lending programs. Subprime lenders not only competed directly for purchase mortgage originations, but also offered refinancing options available to existing borrowers. In this way, the subprime market overlapped and interacted with the targeted lending activities of prime lenders.

This chapter examines one specific type of interaction, namely the transition of borrowers from community reinvestment mortgages to subprime loans through refinancing. The empirical analysis follows a sample of community reinvestment mortgage borrowers through the first years following home purchase, documenting transitions from the initial community reinvestment mortgage into higher-cost and adjustable-rate (ARM) refinancing products. The analysis is conducted with respect to a sample of mortgages purchased through the Community Advantage Program (CAP), a secondary-market demonstration program that purchases mortgages originated through the CRA-related lending activities of participating lenders. As such, all of the purchased mortgages are 30-year fixed-rate purchase mortgages with near-prime interest rates. In contrast to the prime market, however, many of these mortgages contain flexible underwriting characteristics such as high debt-to-income ratios, limited down payments, and/or non-traditional credit history.

The empirical analysis examines refinancing behavior within this sample, focusing on the transition of some borrowers into adjustable-rate and higher-cost refinancing products.
While the majority of refinancing borrowers secured lower-cost prime loans, a minority refinanced into adjustable-rate mortgages and into products with above-prime interest rates. Within the CAP sample, 15 percent of borrowers who refinanced received higher-cost mortgage products, defined by an interest rate that exceeds the prime rate by 150 basis points or more. This measure of higher-cost refinancing also overlaps strongly with the use of ARM products, suggesting that both mortgage characteristics are indicative of subprime refinancing within the CAP sample.

The analysis focuses on these transitions out of community reinvestment mortgages, exploring the extent to which the desire to tap accumulated equity explains the observed refinancing behaviors. Refinancing motivated by a desire to secure a lower interest rate (‘rate refinancing’) is hypothesized to be substantively distinct from refinancing motivated by the desire to extract equity (‘cash-out refinancing’). The empirical analysis first separates rate and cash-out refinancing, showing differences in the determinants of each. Second, the impact of equity extraction on borrowers’ refinancing behavior is shown to also influence the choice of refinancing product, as equity extraction alters borrowers’ product options. Specifically, rate refinancers can be expected to select the product with the lowest cost, whereas cash-out refinancers face tradeoffs between the long-term cost of the refinancing product, the monthly payment obligation, and the ability to extract equity in the short-term.

Because the portfolio is collected through purchase into the CAP program, it is not designed to be representative of the affordable mortgage market. Nonetheless, the CAP dataset offers rich data on the community reinvestment lending activities of 15 participating lenders in 22 states. The implication is that this dataset creates a unique opportunity to study

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1 Ideally, this measure would be calculated on the basis of annual percentage rates (APR), rather than the nominal interest rate. Unfortunately, the fees and points paid at origination are not fully observed, preventing calculation of the APR on refinanced mortgages.
refinancing transitions, but must be considered within the context of the CAP demonstration program. With this caveat in mind, analysis of the refinancing behavior of CAP borrowers clarifies the changing nature of the market surrounding community reinvestment lending programs. In particular, it highlights the need to evaluate targeted lending activities with respect to the full homeownership tenure. Where community reinvestment mortgage borrowers previously faced few higher-cost refinancing options, the advent of risk-based pricing dramatically expanded the set of available alternatives. As a result, observing homeownership entry (and mitigating default) is no longer sufficient to ensure low long-term costs of homeownership. A direct implication is that the achievement of policy goals requires understanding the nature of mortgage transitions and their implications for the long-term costs of homeownership.

The Refinancing Decision

Existing research relies primarily on option theory in explaining borrowers’ refinancing decisions. This approach treats the refinancing decision similar to the decision of investors to exercise the call option on other financial products (Deng, Quigley, and Van Order 2000; Foster and Van Order 1984). The financial incentive to prepay is measured in monetary terms, with the value of the call (refinancing) option defined as the difference between the market value of a mortgage at the available interest rate M() and the unpaid balance of the mortgage F(t). With respect to refinancing, this option can be represented as follows:

(1) \( \text{Refinance if: } M(H(t), G(t), r(t), t) - F(t) \geq T_{r(t)} \)
where $M()$ is the value of the current mortgage given the current house value $H(t)$, the current available interest rate $r(t)$, the number of monthly payments remaining $t$, and the difference between the housing services provided by the current home and the borrower’s current housing demand $G(t)$ (Clapp et. al. 2001; Deng, Pavlov, and Yang 2005). $T_{r(t)}$ reflects the transactions costs associated with the refinancing process.

In empirical studies, this incentive to refinance has been defined to be explicitly financial. Borrowers are expected to refinance when the expected financial value of this option is greatest. Deng, Quigley, and Van Order (2000) define the value of the prepayment option as the difference between the financial costs associated with the present mortgage and those of a mortgage at the currently available interest rate:

$$\text{(2)} \quad \text{Call Option}_{t,i} = 1 - \frac{V_{i,m(t)}}{V_{i,r_i}}$$

where

$$V_{i,m(t)} = \sum_{j=1}^{TM_i-k_i} \frac{3 * P_j}{(1 + m(t)/400)^j}$$

$$V_{i,r_i} = \sum_{j=1}^{TM_i-k_i} \frac{3 * P_j}{(1 + r_i/400)^j}$$

The value of each component is summed over the remaining term of the mortgage, where $TM_i$ denotes the number of quarters in the term and $k_i$ denotes the number of elapsed quarters. The value of the call option thus depends both on the difference between the market rate at time $t$, $m(t)$, and the contract rate $r_i$ and on the number of quarters remaining in the loan term.$^2$ This empirical measure has been found to powerfully predict borrower

refinancing behavior, as borrowers seek to secure a lower interest rate (Deng, Quigley, and Van Order 2000; Quercia and Spader 2008).

The inequality defined in equation (1) also offers two additional insights with respect to borrower refinancing behavior. First, the incentive to secure a lower rate will be moderated by any factor that affects the pricing of the mortgages offered to the borrower. Any changes in borrowers’ credit histories and/or loan-to-value ratios will alter refinancing behavior to the extent that they alter the mortgage options available to the borrower. Second, the influence of transactions costs increases as the outstanding balance of the mortgage decreases. Because transactions costs are weighed relative to the benefit of a reduced interest rate, the influence of these costs is greatest for small mortgage amounts.

The Cash-Out Motivation:

In contrast to the option theory framework defined by equation (1), Hurst and Stafford (2004) suggest that the desire to extract equity to smooth consumption constitutes a second motivation for refinancing. Noting the persistence of some refinancing behavior during periods of high and increasing interest rates, the authors define a ‘consumption-smoothing motivation’ for refinancing, whereby the desire to access home equity leads some households to refinance when it is not financially advantageous. This cash-out motivation for refinancing directly explains the presence of refinancing activity during periods when interest rates are high. It also suggests that, in other periods, credit-constrained households may refinance into higher-cost products.

Using a permanent income model with uncertain income, Hurst and Stafford (2004) show that home equity provides an important source of wealth during periods of low realized
income, particularly for households with limited other assets. If the realized income value in a period is sufficiently low, the utility gained from refinancing and using extracted equity to smooth consumption may outweigh the costs incurred from refinancing into a higher-cost mortgage. While previous authors have alluded to the cash-out motivation for refinancing, Hurst and Stafford (2004) formalize the economic motive for such behavior.

This consumption-smoothing motivation for refinancing is distinct from the underlying motivation for rate refinancing. Nonetheless, the factors driving each behavior are not unrelated. Borrowers facing unemployment or other types of income loss can be expected to weigh the relative costs of cash-out refinancing and alternative sources of funds. Cash-out refinancing should therefore be responsive to any factors that determine the interest rate offered to the borrower. For instance, the amount of equity in the home is likely to determine cash-out refinancing behavior not only because it reflects wealth that can be tapped, but also because it directly influences the loan-to-value ratio on the refinanced loan. Similarly, borrowers’ liquid assets both provide alternative sources of available wealth and offer assets that may be used to meet reserve requirements on a refinanced mortgage.

The implication is that the set of factors determining rate and cash-out refinancing may be similar, while the underlying relationships are substantively different. For this reason, the determinants of rate and cash-out refinancing are likely to differ in empirical analyses.

The Cash-Out Motivation and Product Choice:

This basic difference in the motivation for refinancing also carries clear implications for product choice. Among households without a need for extracted equity, the refinancing
decision is driven by the financial incentive defined in equation (1), and the product with the lowest cost is chosen. In contrast, equity extraction directly increases the loan-to-value ratio on the new mortgage, forcing borrowers with a cash-out motivation to weigh the cost of the new mortgage product against their consumption needs in the present. As a result, the borrower must make simultaneous decisions of whether to refinance and how much equity to extract. This decision confronts the borrower with a tradeoff between the long-term cost of the mortgage and the amount of equity available for current consumption. Particularly for households with few other sources of wealth, higher-cost refinancing terms may be acceptable in order to access home equity during times of need.

The cash-out motivation additionally implies that the payment-to-income ratio may act as a binding constraint, creating a third dimension along which refinancing products are selected. Borrowers with a cash-out motivation typically face three options: extract equity through refinancing; take out a second mortgage or home equity line of credit (HELOC); or reduce consumption. While the decision between these choices is likely to be driven by the relative costs of extracting equity through each option, income constraints may also play a role for lower-income households. For borrowers who are able to secure a lower interest rate through refinancing, the cash-out option is likely to be the preferred option. Conversely, borrowers without lower-cost alternatives may prefer to leave the first mortgage intact and extract equity through a second mortgage or HELOC. The drawback to the second mortgage/HELOC option is that these products often carry higher interest rates and require borrowers to make payments on both mortgages, which often implies a higher monthly payment obligation.
For borrowers in the affordable mortgage market, the higher monthly payment burden may play a central role in the choice of refinancing products. Households experiencing a cash-out motivation, in particular, are likely to desire to both extract equity and minimize monthly payment obligations in the short-term. To the extent that borrowers face cash-out motivations and income constraints, subprime ARMs offer reduced monthly payments in the short-term while compensating lenders for the higher loan-to-value ratio following equity extraction. Particularly among borrowers who perceive their current income shock to be temporary, higher-cost ARMs may be preferred.

Despite the growing literature examining the relationship between home equity and consumption, little attention has been given to the choice of refinancing products in the context of equity extraction. Yamashita (2007) examines the decision to extract equity through a second mortgage, finding that households with relatively fewer alternative assets are more responsive to gains in home appreciation. Hurst and Stafford (2004) document a similar phenomenon with respect to refinancing, but focus on the macroeconomic implications of equity extraction for monetary policy. The literature on mortgage product choice also offers only indirect evidence. For instance, recent studies offer substantial evidence that credit risk and financial characteristics drive product choice with respect to purchase mortgages (LaCour-Little 2007; Pennington-Cross, Yezer, and Nichols 2000). This previous work guides the specification of the empirical models in this chapter, but offers little evidence with respect to cash-out refinancing specifically.

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3 Because of the fundamental nature of the recent changes to the mortgage market, the discussion here focuses on studies that include the subprime or nonprime market.
Methodology

The analysis in this chapter examines the refinancing behavior and product choice of community reinvestment borrowers. Specifically, it documents the presence and influence of cash-out refinancing among this set of homeowners, examining the implications for product choice.

Refinancing: Empirical Model and Measures

Researchers have traditionally analyzed the refinancing decision using the Cox proportional hazards framework. The option framework defined in equation (1) lends itself to hazard analysis, as borrowers are faced in each month with a decision of whether to make a payment, to exercise the put (default) option, or to exercise the call (prepayment) option. The Cox model reflects this structure, directly addressing duration dependence and handling censoring well. The limitation of the Cox model is the proportional hazards assumption. For a single hazard, estimation of a logit model on a transformed dataset offers one means of circumventing the limitations of the Cox model (Jenkins 1995; Narendranathan and Stewart 1993). The likelihood function for this logit approach can be represented as:

\[
L = \prod_{i=1}^{N} \prod_{t=1}^{T_i} \left( \frac{1}{1 + \exp(-X_i \beta)} \right)^{Y_i} \left( \frac{1}{1 + \exp(-X_i \beta)} \right)^{1-Y_i}
\]

Where i indexes individual borrowers and t indexes monthly payment periods.

Clapp and colleagues (2001, 2006) show that the logic underlying the logit-based hazard framework directly extends to modeling competing risks using the multinomial logit (MNL)
framework. This approach directly structures competing risks by defining the probability of observing the base outcome as the difference between the sum of the other probabilities and one. The cost of the MNL estimation strategy is the IIA assumption, which requires that the relative probability of observing any outcome is independent of the alternative outcomes (Small and Hsiao 1985).\(^5\)

The IIA assumption is partially relaxed by the mixed multinomial logit (MMNL) model, which allows for dependent competing risks by addressing unobserved heterogeneity (Skrondal and Rabe-Hesketh 2003a, 2003b). Applying the MMNL framework, the empirical analysis identifies separate equations for default, home sale, rate and cash-out refinancing. Default is defined to occur at 90 day delinquency. Home sale reflects residential mobility concurrent with prepayment of the mortgage. Cash-out refinancing is defined as refinancing that includes equity extraction. Conversely, rate refinancing is defined as refinancing that does not include equity extraction. The omitted category includes borrowers whose mortgages remained active and current through the end of the observation period.

The likelihood function for the resulting model is defined by:

\[
L = \prod_{i=1}^{N} \prod_{t=1}^{T_i} \prod_{j=1}^{J} \left\{ \frac{\exp(X_i \beta_j + \alpha_j)}{\sum_{k=1}^{J} \exp(X_i \beta_k + \alpha_k)} \right\} d_{ijt} \cdot f(\alpha) d\alpha
\]

where \(J\) indexes the alternative and \(d_{ijt} = 1\) if the individual chooses alternative \(j\) at time \(t\) (\(d_{ijt} = 0\) otherwise). In this specification, \(\alpha_j\) reflects unobserved heterogeneity, which may lead to violation of the IIA assumption in the standard specification without random effects.

Maximization of the random effects model shown in equation (4) partially relaxes this

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\(^5\) In the empirical analyses, tests of the IIA assumption reject independence both when rate and cash-out refinancing are combined into a single refinancing outcome and when separate equations are estimated for each refinancing type.
requirement, but requires integrating over the distribution of $\alpha$. With large datasets, this process requires substantial computation time. Estimation of equation (4) is therefore achieved using maximum simulated likelihood based on Halton sequences, which offers a marked reduction in computational time relative to adaptive quadrature (Haan and Uhlendorff 2006; Hole 2007).

The estimation models defined by equations (3) and (4) define refinancing with respect to the determinants implied by the previous discussions of option theory and the cash-out motivation. First, the potential gain from securing a lower rate is defined by the spread between the interest rate on the initial mortgage and the available interest rate on a refinanced mortgage. Because the latter measure cannot be directly observed in all periods, it is approximated using the mean interest rate on 30-year, fixed-rate prime mortgages reported each month by Freddie Mac’s Primary Mortgage Market Survey (PMMS). The resulting variable reflects the spread between the interest rate on the initial purchase mortgage and the interest rate on prime mortgage products. In the empirical analysis, this measure is virtually collinear with the measure of the refinance option defined by equation (2), as the observed set of mortgages have similar terms.\(^6\)

The measure of the interest rate spread is expected to capture the financial incentive to refinance, but must also be complemented with several additional financial measures. First, the average number of points paid by borrowers in each month is included to adjust for differences in the PMMS rate attributable to the payment of points. Second, the transactions costs of refinancing influence borrowers’ decisions to the extent that they offset the benefits of a reduced interest rate. The unpaid balance of the initial mortgage is therefore included to

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\(^6\)The correlation coefficient comparing the rate spread measure with the measure of the call option defined by equation (2) exceeds .95. Because these variables are virtually collinear, the rate spread measure is used in the empirical analyses for its ease of interpretation.
control for the relative size of the transactions costs. Third, borrower wealth may act to constrain refinancing if borrowers with few liquid assets have difficulty paying the transactions costs associated with refinancing. The analysis therefore includes two additional measures of housing and non-housing wealth. The amount of equity in the home is calculated for each month as the difference between the estimated home value and the unpaid balance of the mortgage. A measure of liquid assets, defined as whether the household has liquid assets amounting to more than two monthly payments, is also included to capture borrowers’ alternative sources of wealth. Lastly, borrowers’ credit histories directly determine the type and cost of available refinancing options. The analysis includes the borrower’s origination credit score and an indicator for a previous 30 day delinquency as measures of borrower credit history.

In addition to these financial variables, the empirical analysis also includes several demographic variables that control for differences in household makeup and economic stability. Previous studies suggest that low-income and minority borrowers prepay at lower rates than other borrowers (Firestone, Van Order, and Zorn 2007; Deng and Gabriel 2006), and that changes in marital status, household size, and other demographic triggers induce mobility and home sale (Boehm and Schlottman 2004). As a result, demographic triggers are included to adjust for changes in the household’s economic and household position. The presence of an unemployment shock is defined as whether the household head lost at least one week of work due to unemployment following home purchase. The analysis also includes indicator variables to reflect the presence of a divorce/separation, income change, and the addition of a child following home purchase. Lastly, a set of period of origination

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7Home value estimates are derived at multiple time points using Fannie Mae’s automated valuation model. See footnote 9.
indicator variables is included to adjust for unobserved factors related to cyclical economic changes and/or duration of the mortgage.

Product Choice: Empirical Model and Measures

The second objective of this chapter is to document the consequences of cash-out refinancing for borrowers’ product choices. The analysis first examines the decision between fixed-rate (FRM) and adjustable-rate (ARM) mortgage products, examining the association between equity extraction and ARM choice. Second, the high degree of overlap between ARM choice and the use of higher-cost mortgage products leads us to repeat the analyses using a measure of whether the mortgage is high-cost—defined as whether the interest rate on the refinanced product exceeds the prime rate by 150 basis points or more. This measure roughly reflects the definition of high-cost defined by the Federal Reserve Board’s recent changes to Regulation Z, which adhere to a similar definition but base the comparison on the APR rather than the nominal interest rate. Because the closing costs and fees on the refinanced mortgage are not reported, this comparison must be approximated on the basis of the originated interest rate.

Ideally, the product choice decision might be modeled simultaneously with the refinancing decision, as homeowners face both decisions together. Unfortunately, the relatively small number of observed refines—and the even smaller number of refines into ARM and high-cost products—makes reliable convergence of even a simple probit selection model difficult to obtain. Given the computational complexity of the refinancing model defined by equation (4), analysis of the product choice decision is modeled in the

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8The prime rate is defined as the mean interest rate on originated prime mortgages during the month of origination, as reported by Freddie Mac’s Primary Mortgage Market Survey (PMMS).
probit selection model framework, using a simplified first stage model of whether the homeowner refinance.

This model—a variation of Heckman’s (1979) selection model—specifies the outcomes of both the selection equation and the main equation as dichotomous variables. The estimated equations can be represented as:

\[ R_i = X_i \beta + \Theta(t) + \varepsilon_{i1} \]

\[ Y_i = X_i \beta + C_i \gamma + \rho \lambda + \varepsilon_{i2} \]

where \( R_i \) is an indicator for whether the CAP mortgage refinanced and \( Y_i \) indicates whether the refinanced product is an ARM. \( X_i \) includes the full set of covariates, \( C_i \) is the indicator for equity extraction, \( \Theta(t) \) are period of origination indicator variables and \( \lambda \) is the inverse Mill’s ratio,\(^9\) which adjusts for the probability of refinancing. This specification identifies the selection equation using three period of origination indicator variables \( \Theta(t) \), which both strongly predict refinancing and pass the necessary exclusion restrictions.

To simplify notation, denote the right hand side of equation (5) as \( Z_{i1} \omega_1 \) and the right hand side of equation (6) as \( Z_{i2} \omega_2 \). Further, let \( Y_{i1} = 1 \) if the CAP borrower refinances and \( Y_{i2} = 1 \) if an ARM refinancing product is chosen. Using maximum likelihood estimation, equations (5) and (6) can be simultaneously estimated by maximizing the corresponding likelihood function:

\[ L = \prod_{i=1}^{N} \left[ \Phi(Z_{i1}, \omega_1, Z_{i2}, \omega_2, \eta) \Phi(Z_{i1}, \omega_1) - \Phi(Z_{i1}, \omega_1, Z_{i2}, \omega_2, \eta) \Phi(Z_{i1}, \omega_1) \right]^{1-Y_{i2}} \left[ 1 - \Phi(Z_{i1}, \omega_1) \right]^{1-Y_{i2}} \]

where \( \Phi \) is the cumulative normal function and \( \eta \) is the correlation coefficient for the joint normal distribution.

\(^9\)The inverse Mill’s ratio is defined as the ratio of the probability density function to the cumulative density distribution with respect to the predicted refinancing values from the first stage equation.
Specification of equations (5) and (6) is guided both by previous analyses of the ARM/FRM decision and by the determinants of loan pricing. First, the PMMS rate for 30-year FRMs provides a measure of the nominal cost of an FRM product relative to the CAP mortgage. This measure also captures any qualification effect, as borrowers must meet the payment-to-income requirements on the refinanced product (Brueckner and Follain 1988; Brueckner and Follain 1989). Second, the relative cost of FRM and ARM products is captured by the difference between the 10-year and 1-year Treasury rates. This measure of the relative spread between long-term and short-term rates approximates the relationship between the yield curve environment and preference for ARM mortgages. Ideally, differences in the margin offered on ARM products would be included as a third measure of the relative cost of ARM products. However, very little variation exists in the margins reported by the PMMS during the period observed, and the margins on refinanced ARMs are not directly observed.

These measures of the relative cost of ARM and FRM mortgages are supplemented with measures of underwriting and demographic characteristics. Campbell and Cocco (2003) show that households with larger mortgages, variable income, and/or little expectation of future mobility are theoretically less likely to prefer ARM mortgages. Using empirical data, Dhillon, Shilling, and Sirmans (1987) show that households with dual incomes and/or expectations of future mobility are more likely to select ARM products. The prevalence of ARM products in the subprime market also suggests that traditional underwriting characteristics belong in the specification of the product choice model. The borrower’s loan-to-value ratio at the time of refinance is calculated as the difference between the home’s appreciated value—as estimated by Fannie Mae’s automated valuation model—and the
amount of the refinanced mortgage. Additionally, the measures of borrower reserves, 30-day
delinquency, and origination credit scores from the refinancing model are also included, as
are the set of demographic characteristics and trigger events. This set of covariates includes
measures of marital status and income change. However, expected mobility is not directly
observed in the CAP dataset.

Analysis of the ARM/FRM decision is performed first using the theoretical predictors
of product preference described above. This analysis identifies the association between
equity extraction and product choice if equations (5) and (6) are correctly specified.
However, the high incidence of high-cost mortgages among observed ARMs raises concerns
about the context within which CAP refinancing occurs. To this end, the product choice
analyses are repeated with the origination of a high-cost refinancing product as the outcome
of interest. The analysis also examines the robustness of the estimation results to origination
through a mortgage broker or retail lender. While empirical evidence on the practices of
mortgage brokers is still emerging (Jackson and Burlingame 2007; Woodward 2003), brokers
have received substantial attention in recent months from Congress and others critical of their
role in the growth of the subprime market. The analyses are therefore repeated after
controlling for origination through a mortgage broker. The findings and implications of both
of these specification issues are discussed at greater length with the estimation results.

The empirical analyses apply this methodology to the refinancing behavior of a
sample of community reinvestment mortgage borrowers. The effect of the cash-out
motivation on refinancing behavior and product choice is likely to be particularly influential
in the affordable market, as many of the households targeted by homeownership initiatives
have few other assets and rely on the home as a primary source of wealth. Because many
CRA lending programs offer relaxed underwriting requirements, community reinvestment borrowers may also exhibit an increased risk of transitioning into higher-cost mortgages. This chapter examines these issues within the context of the Community Advantage Program (CAP), a secondary market purchasing program for community reinvestment mortgages. While the empirical analyses must be interpreted within the context of the CAP program, the rich dataset nonetheless offers a unique opportunity to study borrowers’ transitions out of community reinvestment mortgage products.

**The Community Advantage Home Loan Secondary Market Program (CAP)**

CAP was initiated as 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 purchases 30-year, fixed-rate, home purchase mortgages with loan features that prevent them from being readily sold in the secondary market. Many of the loans allow high debt-to-income levels, limited down payments, lack of private mortgage insurance, and/or non-traditional credit history. Additionally, where affordable mortgage products generally allow the relaxation of only one qualifying requirement, loans in the CAP portfolio are allowed to deviate from multiple underwriting standards.

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; or (3) 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 markets. However, it also implies that the set of CAP loans is not specific to an individual lending program or set of underwriting criteria. Instead, the CAP portfolio reflects the CRA lending activities of a variety of lenders across the United States.

For many borrowers, equity held in the CAP home represents the primary source of wealth. Stegman, Freeman, and Paik (2007) show that home equity accounts for 60 percent of the median CAP household’s net worth. Similarly, Stegman, Quercia, and Davis (2007) follow CAP households during the run-up in housing prices between 2001 and 2005, finding that these households captured substantial home equity gains during this period. Taken together, these findings create conditions under which many households may seek to extract equity, particularly if unexpected income losses or expenses are realized. However, many CAP borrowers may not have access to similarly-priced options for refinancing credit, particularly if substantial equity is extracted during the transaction.

The analysis in this chapter relies on extensive data on CAP borrowers, including three waves of annual survey data. The third wave, collected in 2005, includes detailed information on borrowers’ refinancing products and experiences. This information is merged with information from the origination loan file, as well as monthly loan performance data. Lastly, home appreciation data is provided for the original CAP homes by Fannie Mae, using its automated valuation model.10

10Fannie Mae estimated appreciated values for each home in the 4th quarter of 2005. Appreciated values in interim periods are interpolated using the home purchase price and the Fannie Mae appreciated value, assuming a constant rate of appreciation. Fannie Mae’s proprietary automated valuation model (AVM) produces four different estimates of each home’s appreciated value based on repeat sales information, public tax records, and property characteristics. When discrepancies arise between the estimates, a reconciliation model generates the final estimate. Because of its proprietary nature, we do not directly observe the estimation procedure used by the AVM. We base our trust in the model’s reliability on OFHEO’s consistent approval in regulatory audits.
The resulting dataset follows 1,163 borrowers who purchased homes between 1999 and 2003. Of this sample, 342 borrowers refinanced their original CAP loan prior to the 2005 wave of interviews, which surveyed borrowers in detail regarding their refinancing products and experiences. Figure 3.1 shows the origination and refinancing activity of the CAP portfolio prior to the end of 2005. The percent of the full portfolio of 1,163 CAP loans that were refinanced increased through 2003 as loan origination and seasoning leads to higher nominal rates of refinancing. Refinancing activity then decreases through the end of 2005 as refinancing activity occurs with respect to the decreasing number of loans that remain in the sample. The cumulative measures then document the aggregation of the origination (refinancing) activity into the cumulative percent of loans that were originated (refinanced) prior to the end of each quarter. Figure 3.1 shows that the final origination into the analysis sample occurred in June 2003, and that nearly 30 percent of originated CAP loans refinanced during the observation period.
Figure 3.1: Refinancing rate of CAP mortgages by quarter.

N=1,163 loans.

Figure 3.2: CAP, FRM, and ARM interest rates by origination year.
Note: The FRM and ARM rates are reported by Freddie Mac’s Primary Mortgage Market Survey.

Figure 3.2 displays the mean interest rate on CAP mortgages originated in each 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). 11 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 75 basis point credit enhancement applied to CAP interest rates, which is offset by a lack of private mortgage insurance. 12 As a result, the rates shown in Figure 3.2 imply that the pricing of CAP mortgages roughly corresponds to that for prime loans. The implication is that CAP borrowers hold relatively low-cost purchase mortgages, but potentially lack access to low-cost refinancing products.

Empirical Analysis

The analysis file of CAP loans consists of 1,163 borrowers with loans originated between November 1999 and July 2003. Of this sample, 342 borrowers (29%) refinanced prior to the 2005 survey wave. The remaining borrowers are observed monthly through the end of 2005, with observations being censored either through termination or through the loan reaching the end of the sampling period without refinancing. The mean origination month is February 2002, with loans observed for an average of 33 months prior to censoring. The observation period therefore reflects the seasoning of CAP loans in the first years following home purchase. Despite the relatively short period of observation, decreasing interest rates


12The interest rates reported for the prime market by PMMS exclude borrowers’ mortgage insurance payments.
and strong home price appreciation created substantial incentives for many households to refinance.

Table 3.1 describes the characteristics of CAP borrowers. For variables that change through time, the mean value shown corresponds to the mean value across borrowers in the last period that they are observed. The unpaid balance and home equity variables therefore reflect the cumulative result of equity accumulation during the observation period. The characteristics shown in Table 3.1 reflect the population of lower-income borrowers targeted by affordable mortgage products. The mean household income for the sample is $42,452, with borrowers purchasing homes worth, on average, $83,835 at origination. By the end of the observation period, borrowers owed an average of $77,701 in principal, a figure that reflects the low down payment requirements of CAP mortgages. Strong home price appreciation following origination—along with monthly principal payments—created an average of $12,377 in home equity.

The credit history and demographic variables further reflect the economic positions of CAP borrowers. Over 70 percent of borrowers had credit scores below 720 at origination, with 37 percent having a score below 660. Following origination, 26 percent of borrowers experienced at least one delinquency of 30 days or more. This economic insecurity is also reflected in borrowers’ wealth and employment characteristics. Fifty-three percent of borrowers reported holding liquid assets amounting to more than 2 monthly mortgage payments, and 14 percent lost at least one week of work to unemployment. Fifty seven percent of respondents reported being married or partnered at origination, and 4 percent became divorced, separated, or widowed following home purchase. Eighteen percent of borrowers added a child to their household during this period.
Table 3.1: Descriptive statistics of CAP sample.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origination Date</td>
<td>Feb. 2002</td>
</tr>
<tr>
<td>Income</td>
<td>$42,452</td>
</tr>
<tr>
<td>Home Value at Origination</td>
<td>$83,836</td>
</tr>
<tr>
<td>Unpaid Balance: Outstanding amount on CAP mortgage</td>
<td>$77,701</td>
</tr>
<tr>
<td>Equity: Difference between appreciated home value and the unpaid balance</td>
<td>$21,953</td>
</tr>
<tr>
<td>Ever 30 days delinquent</td>
<td>26%</td>
</tr>
<tr>
<td>Origination Credit Score &lt;580</td>
<td>4%</td>
</tr>
<tr>
<td>Origination Credit Score 580-619</td>
<td>10%</td>
</tr>
<tr>
<td>Origination Credit Score 620-659</td>
<td>23%</td>
</tr>
<tr>
<td>Origination Credit Score 660-719</td>
<td>35%</td>
</tr>
<tr>
<td>Origination Credit Score ≥720</td>
<td>27%</td>
</tr>
<tr>
<td>Liquid assets more than 2 monthly payments</td>
<td>53%</td>
</tr>
<tr>
<td>Respondent lost at least one week of work to unemployment</td>
<td>14%</td>
</tr>
<tr>
<td>Divorced/Separated/Widowed following origination</td>
<td>4%</td>
</tr>
<tr>
<td>Income Increased</td>
<td>49%</td>
</tr>
<tr>
<td>Income decreased</td>
<td>24%</td>
</tr>
<tr>
<td>Added a child to the household</td>
<td>18%</td>
</tr>
<tr>
<td>White</td>
<td>63%</td>
</tr>
<tr>
<td>Black</td>
<td>18%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>15%</td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>4%</td>
</tr>
<tr>
<td>High School Degree or less</td>
<td>27%</td>
</tr>
<tr>
<td>Some post-secondary education</td>
<td>44%</td>
</tr>
<tr>
<td>College degree</td>
<td>28%</td>
</tr>
<tr>
<td>Married/Partnered</td>
<td>57%</td>
</tr>
<tr>
<td>Age</td>
<td>35.1</td>
</tr>
</tbody>
</table>

N=1,163

A substantial proportion of borrowers reported income changes between the first and third waves of survey data collection. The income increase and income decrease measures are derived from an income variable that segments borrowers into $5,000 income categories. The income increase and decrease variables reflect whether the borrower’s income increased into a higher category or decreased into a lower category between the first and third waves of data collection. Lastly, the demographic variables offer a broad image of the population.
served by CAP mortgages. The race/ethnicity variables show that 37 percent of CAP borrowers belong to at least one minority racial or ethnic group. 28 percent of borrowers hold a 4-year college degree, and an additional 44 percent completed some post-secondary education.

The Refinancing Decision:

The analyses of the refinancing decision examine the competing risks of rate refinancing, cash-out refinancing, default, and home sale. Through the end of 2005, 342 borrowers (29%) had refinanced, with 115 of the refinances (34%) including equity extraction. Beyond this set of refinances, 54 borrowers (5%) reached 90 day delinquency and 66 borrowers (6%) sold the home and prepaid the CAP mortgage. The remaining set of 701 mortgages (60%) remained active and current through the end of the observation period. In the MMNL analyses, this latter group is used as the base category.

Table 3.2 presents the estimation results for the competing risks model defined in equation (4). This model identifies the predictors of refinancing when rate and cash-out refinancing are combined into a single outcome variable. The results largely reinforce the theoretical predictions of option theory, showing the influence of financial factors. First, the rate spread strongly predicts whether a mortgage refinances, with borrowers reacting to decreases in the available mortgage rate. Second, a larger unpaid balance is associated with a higher likelihood of refinancing, as these borrowers are likely to benefit more from securing

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13 Interpretation of the estimated coefficients must be performed with care, as the sign of a coefficient may differ from the sign of the underlying marginal effect under certain conditions in MNL models. Derivation of the marginal effects confirms the sign of the estimated coefficient (and the substantive interpretation) for all of the variables that reach significance in the results presented. The coefficients are presented rather than the marginal effects as the hazard structure of the underlying dataset makes direct interpretation of the marginal effects difficult.
a lower interest rate. Third, borrowers with higher credit scores are significantly more likely to refinance, suggesting that refinancing is sensitive to the potential cost of the refinanced mortgage. This effect reflects the unique nature of the CAP program, as borrowers at all credit score levels received 30-year, fixed-rate mortgages with interest rates that averaged 50 to 100 basis points above the prime rate. Where borrowers with high credit scores may have access to low-cost refinancing options, many of the borrowers with low credit scores may not have been able to secure lower interest rates.

Several of the results in Table 3.2 cannot be explained by option theory. First and foremost, households with a larger amount of accumulated equity are more likely to refinance, suggesting that households react to home price appreciation. This finding is consistent with cash-out refinancing, as some households refinance to tap available equity reserves. Second, the variables measuring asset reserves and unemployment shocks suggest that wealth constraints may prevent some households from refinancing. Taken together, the asset reserves and unemployment variables suggest that transactions costs may create an obstacle to refinancing for low-wealth households. Lastly, black households are significantly less likely to refinance, a finding that is consistent with previous analyses of refinancing and prepayment (Firestone, Van Order and Zorn 2007; Deng and Gabriel 2006).

Table 3.2 also presents the predictors of default and home sale, which are consistent with previous analyses of these outcomes. The borrower’s origination credit score is the strongest predictor of default. Black homeowners and homeowners experiencing divorce, separation, or widowhood also show elevated levels of default. The home sale equation confirms that homeowners’ mobility is responsive to the financial incentives to prepay that influence refinancing behavior. Homeowners’ mobility decisions are shown to respond
positively both to the rate spread and to the accumulation of equity. Lastly, adding a child to the household also increases the likelihood of home sale.

Table 3.2: MMNL competing risks model of refinancing, default, and home sale.

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Refinance</th>
<th>Default</th>
<th>Home Sale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>(S.E.)</td>
<td>Coef.</td>
</tr>
<tr>
<td>Spread</td>
<td>1.321**</td>
<td>(.128)</td>
<td>.029</td>
</tr>
<tr>
<td>Unpaid Balance</td>
<td>.017**</td>
<td>(.003)</td>
<td>-.001</td>
</tr>
<tr>
<td>Equity</td>
<td>.015**</td>
<td>(.004)</td>
<td>.008</td>
</tr>
<tr>
<td>Reserves</td>
<td>.364*</td>
<td>(.145)</td>
<td>-.482</td>
</tr>
<tr>
<td>Credit score&lt;620</td>
<td>-.765**</td>
<td>(.271)</td>
<td>2.277**</td>
</tr>
<tr>
<td>Credit score 620-659</td>
<td>-.004</td>
<td>(.196)</td>
<td>1.389*</td>
</tr>
<tr>
<td>Credit score 660-719</td>
<td>.115</td>
<td>(.178)</td>
<td>.840</td>
</tr>
<tr>
<td>Black</td>
<td>-.953**</td>
<td>(.217)</td>
<td>1.338**</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-.247</td>
<td>(.221)</td>
<td>-.320</td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>.210</td>
<td>(.360)</td>
<td>.032</td>
</tr>
<tr>
<td>Some college</td>
<td>.041</td>
<td>(.175)</td>
<td>-.066</td>
</tr>
<tr>
<td>College degree</td>
<td>-.298</td>
<td>(.210)</td>
<td>-.419</td>
</tr>
<tr>
<td>Age</td>
<td>.007</td>
<td>(.007)</td>
<td>-.015</td>
</tr>
<tr>
<td>Log household income</td>
<td>.148</td>
<td>(.154)</td>
<td>.121</td>
</tr>
<tr>
<td>Married/Partnered</td>
<td>-.083</td>
<td>(.157)</td>
<td>.385</td>
</tr>
<tr>
<td>Unemployment Shock</td>
<td>-.724**</td>
<td>(.237)</td>
<td>.658</td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>.310</td>
<td>(.379)</td>
<td>1.333**</td>
</tr>
<tr>
<td>Income increased</td>
<td>-.269</td>
<td>(.167)</td>
<td>-.451</td>
</tr>
<tr>
<td>Income decreased</td>
<td>-.244</td>
<td>(.212)</td>
<td>.600</td>
</tr>
<tr>
<td>Added a child</td>
<td>-.159</td>
<td>(.193)</td>
<td>.381</td>
</tr>
<tr>
<td>Intercept</td>
<td>-10.066**</td>
<td>(1.70)</td>
<td>-9.982**</td>
</tr>
</tbody>
</table>

Origination period, $\chi^2(5)$

- ** (16.9) -- (6.98) -- (1.93)

Random Part:

| Var($\alpha_j$) | .956** (.339) | .151 (.394) | .800 (.815) |
| Cov($\alpha_j, \alpha_k$) | -.366 (.489) | -.736 (.467) |
| Cov($\alpha_j, \alpha_d, \alpha_d$) | .235 (.454) |

* The reported significance relates to the joint significance of the five origination period indicator variables. As a result, no coefficient is reported, and the chi-squared statistic is reported in place of a standard error.

N=38,392 monthly observations (1,163 loans).
* p<.05, ** p<.01
Table 3.3: MMNL model of rate and cash-out refinancing.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Rate Refinance</th>
<th>Cash-out Refinance</th>
<th>Default</th>
<th>Home Sale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef. (S.E.)</td>
<td>Coef. (S.E.)</td>
<td>Coef. (S.E.)</td>
<td>Coef. (S.E.)</td>
</tr>
<tr>
<td>Spread</td>
<td>1.378** (.160)</td>
<td>1.301** (.203)</td>
<td>.029 (.214)</td>
<td>.552* (.214)</td>
</tr>
<tr>
<td>Unpaid Balance</td>
<td>.021** (.003)</td>
<td>.009* (.004)</td>
<td>-0.001 (.006)</td>
<td>.000 (.005)</td>
</tr>
<tr>
<td>Equity</td>
<td>.009* (.004)</td>
<td>.027** (.006)</td>
<td>.008 (.007)</td>
<td>.019** (.006)</td>
</tr>
<tr>
<td>Reserves</td>
<td>.438* (.177)</td>
<td>.229 (.231)</td>
<td>-0.479 (.308)</td>
<td>.031 (.277)</td>
</tr>
<tr>
<td>Score &lt;620</td>
<td>-0.957** (.326)</td>
<td>-0.367 (.469)</td>
<td>2.281** (.640)</td>
<td>.074 (.458)</td>
</tr>
<tr>
<td>Score 620-659</td>
<td>-0.365 (.243)</td>
<td>.719* (.340)</td>
<td>1.387* (.642)</td>
<td>-0.208 (.408)</td>
</tr>
<tr>
<td>Score 660-719</td>
<td>-.125 (.211)</td>
<td>.690* (.321)</td>
<td>.838 (.665)</td>
<td>.142 (.354)</td>
</tr>
<tr>
<td>Black</td>
<td>-1.024** (.262)</td>
<td>-0.768* (.354)</td>
<td>1.344** (.375)</td>
<td>-0.336 (.434)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-.090 (.266)</td>
<td>-.516 (.359)</td>
<td>-.319 (.477)</td>
<td>-.835 (.506)</td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>.055 (.458)</td>
<td>.342 (.553)</td>
<td>.037 (.777)</td>
<td>-.271 (.762)</td>
</tr>
<tr>
<td>Some college</td>
<td>.266 (.220)</td>
<td>-.271 (.262)</td>
<td>-.070 (.333)</td>
<td>.368 (.369)</td>
</tr>
<tr>
<td>College degree</td>
<td>.000 (.257)</td>
<td>-.820* (.343)</td>
<td>-.417 (.472)</td>
<td>.448 (.421)</td>
</tr>
<tr>
<td>Age</td>
<td>.027* (.008)</td>
<td>-.012 (.012)</td>
<td>-.015 (.016)</td>
<td>-.032 (.017)</td>
</tr>
<tr>
<td>Log household income</td>
<td>.131 (.188)</td>
<td>.151 (.244)</td>
<td>.121 (.288)</td>
<td>.377 (.351)</td>
</tr>
<tr>
<td>Married/Partnered</td>
<td>-.099 (.190)</td>
<td>-.063 (.253)</td>
<td>.388 (.336)</td>
<td>.175 (.319)</td>
</tr>
<tr>
<td>Unemployment Shock</td>
<td>-.914** (.307)</td>
<td>-.408* (.347)</td>
<td>.653 (.354)</td>
<td>.404 (.364)</td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>.264 (.474)</td>
<td>.383 (.597)</td>
<td>1.325** (.444)</td>
<td>.675 (.652)</td>
</tr>
<tr>
<td>Income increased</td>
<td>-.279 (.201)</td>
<td>-.224 (.271)</td>
<td>-.456 (.389)</td>
<td>.355 (.371)</td>
</tr>
<tr>
<td>Income decreased</td>
<td>-.166 (.256)</td>
<td>-.376 (.347)</td>
<td>-.601 (.383)</td>
<td>.520 (.443)</td>
</tr>
<tr>
<td>Added a child</td>
<td>-.133 (.234)</td>
<td>-.180 (.314)</td>
<td>.376 (.363)</td>
<td>.730* (.310)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-10.949** (.210)</td>
<td>-10.956** (.270)</td>
<td>-9.997** (.324)</td>
<td>-11.961** (.381)</td>
</tr>
</tbody>
</table>

Origination period, $\chi^2(5)^a$ --** (21.9) -- (6.21) -- (6.95) -- (1.90)

Random Part:

<table>
<thead>
<tr>
<th>Var($\alpha_j$)</th>
<th>Cov($\alpha_j$, $\alpha_i$)</th>
<th>Cov($\alpha_j$, $\alpha_c$)</th>
<th>Cov($\alpha_j$, $\alpha_d$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.155* (.487)</td>
<td>.615 (.421)</td>
<td>-.451 (.635)</td>
<td>.178 (.485)</td>
</tr>
</tbody>
</table>

*a The reported significance relates to the joint significance of the five origination period indicator variables. As a result, no coefficient is reported, and the chi-squared statistic is reported in place of a standard error.

N=38,392 monthly observations (1,163 loans).

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

Table 3.3 repeats this model, separating rate and cash-out refinancing. Among observed refinances (n=342), 227 borrowers (66%) refinanced solely to secure a lower
interest rate, while 115 borrowers (34%) extracted equity during the refinance.\(^{14}\) The estimates in the default and home sale equations appear nearly identical to those presented in Table 3.2. However, the separate identification of each type of refinancing behavior confirms that the substantive predictors of rate and cash-out refinancing differ. In particular, cash-out refinance are shown to be less sensitive to the financial cost of the refinanced product. Where the likelihood of rate refinancing decreases marginally for each of the lower credit score buckets, the highest rates of cash-out refinancing are observed among borrowers in the middle two score buckets. In this way, borrowers who extract equity appear to be less sensitive to the cost of the refinancing product.

Several of the results shown in Table 3.3 also suggest substantive differences between rate and cash-out refinancing. The availability of equity is shown to play a stronger role in determining cash-out refinancing than rate refinancing. Additionally, the unemployment and asset reserves variables both differentially impact rate and cash-out refinancing. Interestingly, unemployment does not increase the likelihood of cash-out refinancing, but rather decreases the likelihood of rate refinancing. Similarly, the presence of asset reserves do not appear to buffer against cash-out refinancing, and instead increase the likelihood of rate refinancing. While these findings show substantive differences between rate and cash-out refinancing, they are only weakly consistent with the hypothesis that the motivation for cash-out refinancing derives from a short-term loss of income.

Instead, borrowers’ stated uses of the extracted equity reveal a more complicated picture. Of the 115 borrowers who extracted equity, 70 borrowers (61%) indicated that the

---

\(^{14}\) This definition of cash-out refinancing includes 82 refinances in which the borrower both extracted equity and secured a lower interest rate. As a result, this measure may overstate the presence of cash-out refinancing to the extent that some borrowers who extracted equity refinanced primarily to secure a lower interest rate.
primary use of the equity was to ‘Pay off credit card balance or other debts’ and 31 borrowers (27%) indicated that the primary use was for ‘Home improvement or home repair.’ The remaining 14 borrowers (12%) reported using the extracted equity for educational expenses, medical debts, vehicle down payments, or other uses. While credit card debts and unexpected home repairs may both reflect unanticipated expenses, these categories are defined broadly. As a result, both categories may equally reflect consumption in response to home equity gains.

A final finding from Table 3.3 is that education moderates borrowers’ willingness to extract equity from the home. Borrowers with a college degree are less likely to cash-out refinance than borrowers with less formal education. One potential explanation for this effect is that a college degree provides these borrowers with more stable employment, creating a more stable income stream. However, the model directly controls for both unemployment. A second potential explanation is that borrowers with less education may be less able to manage consumer credit and/or evaluate the long-term costs of alternative mortgage products, and thus more willing to extract equity. The positive relationship between age and rate refinancing is also suggestive of an educational effect, as older homeowners may have more knowledge and experience with respect to the refinancing process.

**Product Choice:**

The second objective of this chapter is to document the consequences of cash-out refinancing for borrowers’ product choices. Table 3.4 presents the characteristics of the refinancing products used by CAP borrowers, separating the products into fixed rate (FRM)
and adjustable-rate (ARM) mortgages. Of the 342 borrowers who refinanced, 274 borrowers (80%) chose FRM refinancing products and 68 borrowers (20%) chose ARM products. Both sets of borrowers held CAP mortgages with interest rates near 7.6 percent, and both sets of borrowers refinanced into products with nominal interest rates that averaged just below 6.0 percent. Among ARM borrowers, this refinanced rate reflects the current interest rate of the mortgage at the time of the 2005 interview. Because only 19 percent of the refinanced ARMs had reset from the introductory rate at that time, the refinanced rate primarily reflects the introductory rate received by ARM borrowers.15

Table 3.4: Characteristics of refinancing products.

<table>
<thead>
<tr>
<th>Variable:</th>
<th>FRM</th>
<th>ARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP Interest Rate</td>
<td>7.62</td>
<td>7.56</td>
</tr>
<tr>
<td>Refinanced Rate</td>
<td>5.99</td>
<td>5.96</td>
</tr>
<tr>
<td>Pricing: Rate minus PMMS rate</td>
<td>0.07</td>
<td>1.95</td>
</tr>
<tr>
<td>Percent High-Cost: Pricing &gt; 1.50</td>
<td>7%</td>
<td>50%</td>
</tr>
<tr>
<td>Amount Refinanced</td>
<td>$90,590</td>
<td>$100,247</td>
</tr>
<tr>
<td>Percent who Extract Equity</td>
<td>30%</td>
<td>47%</td>
</tr>
<tr>
<td>Amount of Equity Extracted</td>
<td>$17,647</td>
<td>$15,452</td>
</tr>
<tr>
<td>N</td>
<td>274</td>
<td>68</td>
</tr>
</tbody>
</table>

N=274 FRM Refinances; N=68 ARM Refinances.
Note: The PMMS rates used to calculate the pricing measure are the monthly average rates on FRM and ARM mortgages reported by Freddie Mac’s Primary Mortgage Market Survey.

The similarity of the refinanced rates received by FRM and ARM borrowers conceals the differential pricing of these products. Because ARM borrowers accept the interest rate risk associated with the mortgage, ARM pricing generally offers a discounted interest rate relative to FRM mortgages. Figure 3.2 confirms that the interest rates offered by lenders in

15Among borrowers whose rates had reset prior to the 2005 interview, the current interest rates averaged 5.96 percent, compared to introductory rates that averaged 5.82 percent.
the primary market on 30-year FRMs remained substantially above the commitment rate on 1-year ARMs. The pricing variable in Table 3.4 measures the difference between the rate of the refinanced FRM (ARM) mortgage and the mean interest rates reported for prime mortgages by Freddie Mac’s Primary Mortgage Market Survey (PMMS). This variable shows that the refinanced rates on FRM mortgages near the prime rate, whereas the refinanced rates secured by CAP borrowers on ARM mortgages averaged nearly 200 basis points above those on prime ARMs.

To formalize this difference in cost, the second measure of pricing defines high-cost loans, identifying any loan whose interest rate is 150 basis points or more above the prevailing rate on prime products. This definition is roughly consistent with the recent Federal Reserve Board definitions, which use a 150 point spread in the annual percentage rate (APR) to delineate higher-cost mortgages from prime mortgages. Unfortunately, the APR cannot be calculated for CAP loans, as the full set of closing costs and fees is not observed. As a result, the measure of high-cost loans relies on the interest rate spread.

The resulting measure of high-cost refinancing products is closely associated with ARM choice in the CAP dataset. More than 65 percent of the identified higher-cost products were ARMs. Conversely, Table 3.4 shows that 50 percent of the refinanced ARM mortgages carried interest rates greater than 150 basis points above the prime rate, compared to only 7 percent of the refinanced FRM products. This concentration of higher-cost mortgages among ARM products likely reflects the prevalent use of ARM and hybrid ARM products in the subprime market. This interpretation is reinforced by the low reset rates among recently

---

16The Federal Reserve Board’s recent revisions to Regulation Z define first lien mortgages to be ‘higher-cost’ when the associated annual percentage rate exceeds 150 basis points above the average prime offer rate. This rule is approximated among CAP mortgages using the spread associated with the nominal interest rate.
refinanced mortgages. The interest rates on 81 percent of observed ARMs had not yet reset from their initial rate, suggesting that many of the observed ARMs reflect the hybrid products commonly originated by subprime lenders during this period (Ambrose, LaCour-Little, and Huszar 2005).

Table 3.4 lastly shows that ARM borrowers refinanced a larger amount than FRM borrowers, and that a substantially higher proportion of ARM borrowers extracted equity. The higher rate of equity extraction among ARM borrowers contrasts with previous analyses of the decision between FRM and ARM mortgages, which suggest little theoretical role for equity extraction. Instead, this relationship likely indicates households’ use of non-prime ARMs to extract equity. This proposition is tested directly by examining the effect of equity extraction on the choice of ARM/FRM products.

Table 3.5 presents the results of the estimated product choice models, which predict the likelihood of choosing an adjustable-rate mortgage.\(^\text{17}\) The immediate finding from Table 3.5 is that equity extraction is strongly associated with the choice of an ARM mortgage, and that this effect is robust to the origination of the mortgage through a broker or lender. Cash-out refinancing is strongly associated with choice of an ARM refinancing product in both specifications. Given the previous discussion of the refinanced interest rates shown in Table 3.4, this finding is consistent with the expectation that the cash-out motivation induces many borrowers to choose subprime ARMs.

\(^{17}\) Diagnostic tests suggest that the period of origination indicator variables perform satisfactorily in identifying the selection equation. These variables significantly predict whether a loan refinances, while passing the exclusion restrictions for the main equation. Furthermore, the need for the selection model structure is confirmed by the results shown in Table 3.5 for Rho.
Table 3.5: Probit selection models of ARM/FRM choice.

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Coef.</th>
<th>z-stat</th>
<th>Coef.</th>
<th>z-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRM interest rate</td>
<td>0.191</td>
<td>0.86</td>
<td>0.239</td>
<td>1.14</td>
</tr>
<tr>
<td>Yield</td>
<td>0.222</td>
<td>1.70</td>
<td>0.236</td>
<td>1.86</td>
</tr>
<tr>
<td>Updated LTV</td>
<td>0.734</td>
<td>0.87</td>
<td>0.755</td>
<td>0.92</td>
</tr>
<tr>
<td>Reserves</td>
<td>-0.126</td>
<td>0.74</td>
<td>-0.201</td>
<td>1.19</td>
</tr>
<tr>
<td>Ever 30 day delinquency</td>
<td>0.018</td>
<td>0.09</td>
<td>-0.052</td>
<td>0.26</td>
</tr>
<tr>
<td>Credit score &lt;620</td>
<td>0.226</td>
<td>0.75</td>
<td>0.169</td>
<td>0.58</td>
</tr>
<tr>
<td>Credit score 620-659</td>
<td>0.117</td>
<td>0.53</td>
<td>0.050</td>
<td>0.24</td>
</tr>
<tr>
<td>Credit score 660-719</td>
<td>0.007</td>
<td>0.04</td>
<td>-0.123</td>
<td>0.61</td>
</tr>
<tr>
<td>Cashout refinance</td>
<td>0.444*</td>
<td>2.53</td>
<td>0.879**</td>
<td>3.77</td>
</tr>
<tr>
<td>Mortgage broker</td>
<td>0.458**</td>
<td>2.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>-0.087</td>
<td>0.35</td>
<td>-0.059</td>
<td>0.25</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.304</td>
<td>1.24</td>
<td>0.268</td>
<td>1.11</td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>-0.238</td>
<td>0.55</td>
<td>-0.137</td>
<td>0.33</td>
</tr>
<tr>
<td>Some college</td>
<td>-0.025</td>
<td>0.12</td>
<td>0.002</td>
<td>0.01</td>
</tr>
<tr>
<td>College degree</td>
<td>0.363</td>
<td>1.47</td>
<td>0.299</td>
<td>1.23</td>
</tr>
<tr>
<td>Age</td>
<td>0.000</td>
<td>0.03</td>
<td>-0.004</td>
<td>0.45</td>
</tr>
<tr>
<td>Household income (logged)</td>
<td>0.119</td>
<td>0.78</td>
<td>0.137</td>
<td>0.93</td>
</tr>
<tr>
<td>Married/partnered</td>
<td>0.062</td>
<td>0.23</td>
<td>-0.148</td>
<td>0.56</td>
</tr>
<tr>
<td>Unemployment shock</td>
<td>-0.107</td>
<td>0.59</td>
<td>-0.118</td>
<td>0.68</td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>-0.472</td>
<td>0.89</td>
<td>-0.389</td>
<td>0.72</td>
</tr>
<tr>
<td>Income increased</td>
<td>-0.445*</td>
<td>2.38</td>
<td>-0.017</td>
<td>0.08</td>
</tr>
<tr>
<td>Cashout * Income increased</td>
<td>-1.168**</td>
<td>3.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income decreased</td>
<td>0.107</td>
<td>0.46</td>
<td>0.080</td>
<td>0.35</td>
</tr>
<tr>
<td>Added a child</td>
<td>0.032</td>
<td>0.15</td>
<td>-0.027</td>
<td>0.13</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.875*</td>
<td>2.25</td>
<td>-5.595**</td>
<td>2.77</td>
</tr>
<tr>
<td>Rho, ( \chi^2(1) )</td>
<td>--</td>
<td>2.74</td>
<td>--*</td>
<td>5.86</td>
</tr>
<tr>
<td>Uncensored N</td>
<td>342</td>
<td></td>
<td>342</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>1,163</td>
<td></td>
<td>1,163</td>
<td></td>
</tr>
</tbody>
</table>

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

An additional finding from the second model in Table 3.5 is that borrowers who refinanced through a mortgage broker were also significantly more likely to choose an ARM product. This effect is consistent with the central role of mortgage brokers in the origination of subprime ARM and hybrid mortgages. However, it should be interpreted merely as an association, as this analysis is not designed to isolate the impact of origination through a mortgage broker. Instead, the second model clarifies that the role of equity extraction in
product choice is robust to origination through a mortgage broker. In fact, this effect strengthens when origination channel is controlled for. While the coefficients reported in Table 3.5 cannot be directly interpreted, the associated marginal effect of a cash-out refinance suggests that equity extraction increases the predicted probability of ARM choice by roughly 15 percentage points.\textsuperscript{18}

The findings shown in Table 3.5 also support the influence of income constraints in the choice of refinancing products. Among the full set of demographic variables included in Table 3.5, only the variable reflecting whether the household’s income increased is significant.\textsuperscript{19} An increase in household income following origination is associated with a reduced likelihood that the borrower chooses an adjustable-rate refinancing product. This result is consistent with the hypothesis that households may choose ARM mortgages to extract equity while maintaining a manageable monthly payment obligation in the short-term. To further explore this effect, the second model in Table 3.5 also adds an interaction effect between the cash-out refinance and income increase indicators. This interaction effect further supports the above interpretation, showing that the effect of an income increase on product choice is specific to cash-out refinances.\textsuperscript{20}

A final comment on the product choice estimations shown in Table 3.5 is to note the weak role of many of the remaining covariates. The majority of the covariates are signed as

\textsuperscript{18}The marginal effect in non-linear models is a function of the value of the covariates. In this paper, marginal effects are computed with respect to the average of the probabilities (e.g. predicted probabilities are calculated for each individual conditional on their covariate characteristics, with the reported marginal effect reflecting the average of these values).

\textsuperscript{19}To further explore this effect, the income increase variable was separated according to the size of the income increase (e.g. an increase of one, two, three, etc... $5,000 income buckets). The effect of an income increase and the interaction with the cash-out variable consistently appear for each of the income increase variables.

\textsuperscript{20}Interpretation of this interaction term requires derivation of the marginal effect, which may differ in sign and significance from the reported effect. The interpretation of the interaction effect in this paragraph is based on the derived marginal effect (see Ai and Norton 2003).
expected and several near significance. However, several variables notably do not appear to predict ARM choice among CAP borrowers. One possible explanation for this finding is that multicollinearity, along with the small sample size, limits the ability of this model to identify these effects. However, statistical tests for multicollinearity do not reveal it to be problematic.\footnote{Descriptive analysis of the covariates does not show strong correlation between factors. Additionally, exploratory analyses removed individual covariates and/or the set of demographic characteristics. None of the associated analyses are suggestive that the results are sensitive to model specification.} A second possibility is that the set of CAP borrowers is relatively homogenous, producing less variation on these factors than that observed in other analyses.

Table 3.6 applies the ARM/FRM model to households’ use of higher-cost mortgage products. The dependent variable in these models defines high-cost mortgages to include products whose interest rates exceed the prime rate plus 150 basis points, consistent with the high-cost variable shown in Table 3.4. Given the above-prime interest rates observed on ARM products in the CAP dataset, this second set of estimations examines whether the relationship between equity extraction and ARM use implies the use of higher-cost ARMs. However, interpretation of the estimates is limited by the relatively small number of borrowers who refinance into high-cost loans. Of the 342 borrowers who refinanced, 52 (15\%) received loans with interest rates 150 basis points or more above the prime rate.

Despite this small sample, the results shown in Table 3.6 show a strong relationship between cash-out refinancing and the use of higher-cost mortgage products. Similar to the effect for ARM choice, the implied marginal effect suggests that cash-out refinancing is associated with a 13 percentage point increase in the likelihood of a higher-cost product. The second model in Table 3.6 further investigates this effect, separating cash-out refinances into ARM and FRM products. This model shows that equity extraction is associated with a
higher likelihood that both product types are higher-cost. However, the magnitude and strength of this effect is significantly larger for the set of cash-out ARMs.

Table 3.6: Probit selection models of high-cost mortgage use.

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>High-cost Coef.</th>
<th>High-cost z-stat</th>
<th>High-cost Coef.</th>
<th>High-cost z-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRM interest rate</td>
<td>-0.640</td>
<td>1.92</td>
<td>-0.787*</td>
<td>2.11</td>
</tr>
<tr>
<td>Yield</td>
<td>-0.155</td>
<td>1.06</td>
<td>-0.290</td>
<td>1.69</td>
</tr>
<tr>
<td>Updated LTV</td>
<td>1.853</td>
<td>1.73</td>
<td>1.747</td>
<td>1.51</td>
</tr>
<tr>
<td>Reserves</td>
<td>-0.063</td>
<td>0.30</td>
<td>-0.028</td>
<td>0.12</td>
</tr>
<tr>
<td>Ever 30 day delinquency</td>
<td>0.301</td>
<td>1.22</td>
<td>0.279</td>
<td>1.03</td>
</tr>
<tr>
<td>Credit score &lt;620</td>
<td>0.261</td>
<td>0.68</td>
<td>0.142</td>
<td>0.31</td>
</tr>
<tr>
<td>Credit score 620-659</td>
<td>0.190</td>
<td>0.66</td>
<td>0.194</td>
<td>0.62</td>
</tr>
<tr>
<td>Credit score 660-719</td>
<td>-0.136</td>
<td>0.48</td>
<td>-0.069</td>
<td>0.22</td>
</tr>
<tr>
<td>Cashout refinance</td>
<td>1.042**</td>
<td>4.17</td>
<td>2.165**</td>
<td>5.23</td>
</tr>
<tr>
<td>Cashout refinance-ARM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cashout refinance-FRM</td>
<td>0.562*</td>
<td>2.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortgage broker</td>
<td>0.385</td>
<td>1.90</td>
<td>0.354</td>
<td>1.59</td>
</tr>
<tr>
<td>Black</td>
<td>0.593</td>
<td>1.88</td>
<td>0.490</td>
<td>1.42</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.760*</td>
<td>2.55</td>
<td>0.816*</td>
<td>2.50</td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>0.182</td>
<td>0.35</td>
<td>0.520</td>
<td>0.98</td>
</tr>
<tr>
<td>Some college</td>
<td>-0.127</td>
<td>0.56</td>
<td>-0.115</td>
<td>0.46</td>
</tr>
<tr>
<td>College degree</td>
<td>-0.319</td>
<td>1.06</td>
<td>-0.321</td>
<td>0.96</td>
</tr>
<tr>
<td>Age</td>
<td>0.005</td>
<td>0.51</td>
<td>0.006</td>
<td>0.54</td>
</tr>
<tr>
<td>Household income (logged)</td>
<td>-0.065</td>
<td>0.34</td>
<td>-0.186</td>
<td>0.80</td>
</tr>
<tr>
<td>Married/partnered</td>
<td>0.064</td>
<td>0.22</td>
<td>0.092</td>
<td>0.28</td>
</tr>
<tr>
<td>Unemployment shock</td>
<td>0.007</td>
<td>0.03</td>
<td>0.006</td>
<td>0.02</td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>-0.597</td>
<td>0.95</td>
<td>-0.831</td>
<td>1.01</td>
</tr>
<tr>
<td>Income increased</td>
<td>-0.372</td>
<td>1.62</td>
<td>-0.108</td>
<td>0.42</td>
</tr>
<tr>
<td>Income decreased</td>
<td>0.293</td>
<td>1.04</td>
<td>0.155</td>
<td>0.49</td>
</tr>
<tr>
<td>Added a child</td>
<td>-0.246</td>
<td>0.85</td>
<td>-0.470</td>
<td>1.34</td>
</tr>
<tr>
<td>Constant</td>
<td>0.877</td>
<td>0.30</td>
<td>3.471</td>
<td>0.96</td>
</tr>
<tr>
<td>Rho, $\chi^2(1)$</td>
<td>--</td>
<td>1.76</td>
<td>--</td>
<td>0.39</td>
</tr>
<tr>
<td>Uncensored N</td>
<td>342</td>
<td></td>
<td>342</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>1,163</td>
<td></td>
<td>1,163</td>
<td></td>
</tr>
</tbody>
</table>

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

The remaining coefficients in the models of high-cost product receipt are generally signed as expected, but carry coefficients and t-statistics whose magnitudes are dwarfed by those of the cash-out refinancing variable. Of particular interest, origination through a
mortgage broker is not significantly associated with a high-cost refinancing product. The effect is positive in both models, but much weaker than the effect of broker origination on ARM/FRM choice. This result suggests that the higher incidence of ARMs among broker-originated mortgages may not translate into a higher-incidence of high-cost ARMs. However, this effect may also be due to the relatively smaller number of high-cost mortgages.

The measures of borrower credit quality exhibit a similar pattern. Ever 30 day delinquency positively predicts receipt of a high-cost product, but carries a weak z-statistic. The measure of borrowers’ loan-to-value ratios suggests that a higher loan-to-value ratio is associated with a higher likelihood of receiving high-cost refinancing products, but does not reach significance. The origination credit score buckets, as well as the remaining underwriting characteristics, show similarly weak effects. Beyond the measure of cash-out refinancing, the model only identifies the FRM rate and the Hispanic indicator variable as significant predictors of high-cost product use. The effect of the FRM rate is likely mechanical, as both this variable and the high-cost measure are calculated using the outstanding market interest rates. This mechanical relationship also explains the estimates for the yield variable. However, the higher incidence of high-cost mortgages among Hispanic borrowers cannot be similarly explained. Instead, the significance of the Hispanic indicator raises concerns about the pricing of the refinancing products received by Hispanic borrowers.

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22 As a test of the influence of this mechanical effect, estimation is repeated after excluding the FRM rate and yield variables. The remaining effects are robust to this specification choice.

23 Hispanic borrowers in the CAP sample do not have worse credit characteristics than other borrowers, and if anything exhibit lower likelihoods of entering delinquency and default on the CAP mortgage. Additionally, the Hispanic borrowers tend to be located in hot housing markets, suggesting that strong home appreciation should make these borrowers the most able to secure lower-cost refinancing products.
Discussion and Policy Implications

The rise of risk-based pricing not only dramatically expanded access to credit, but also altered the context surrounding targeted lending programs. Where underserved borrowers previously faced limited access to mortgage credit, the growth of the subprime market created multiple product options for both home purchase and refinancing. In this way, the subprime market began to overlap and interact with the targeted lending activities of existing lenders. Unfortunately, very little research has examined these interactions, particularly the extent to which the increasing range of product options led households to transition between low- and high-cost markets in response to changes in their economic circumstances and credit characteristics.\(^4\)

This chapter examines one specific type of transition, namely borrower refinancing out of community reinvestment mortgage products. The empirical analysis is specific to the borrowers in the Community Advantage Program (CAP), and therefore must be interpreted within the context of the CAP program. However, examination of this dataset offers interesting insight into borrowers’ refinancing decisions. While the majority of refinancing CAP borrowers transitioned into lower-cost fixed-rate products, a small number selected adjustable rate and higher-cost mortgages. This chapter presents and tests an economic rationale for the transition to subprime, examining the role of equity extraction in the refinancing behavior of CAP borrowers. The results first show differences between rate and

\(^4\)The primary exception is Courchane, Surette, and Zorn (2004), who document transitions between prime and subprime mortgages through refinancing. While the focus of the analysis is on the ability of subprime borrowers to refinance into prime credit, the survey documents that 13 percent of prime borrowers who refinance transition into subprime products. Pennington-Cross and Chomsisengphet (2007) examine equity extraction and refinancing out of subprime mortgages, but focus on mortgage termination and do not observe the subsequent product.
cash-out refinancing. Specifically, the financial predictors implied by option theory more strongly explain rate refinancing, whereas cash-out refinancing appears to be less responsive to credit history and other determinants of loan price.

This difference between rate and cash-out refinancing carries over into borrowers’ selection of refinancing products. Where rate refinancing is hypothesized to be driven by the financial incentive to secure a lower interest rate, cash-out refinancing confronts borrowers with the tradeoff between the long-term cost of the mortgage, the monthly payment obligation, and the ability to extract equity for current consumption. Within the CAP sample, this tradeoff appears to lead a minority of borrowers to use ARM refinancing products in order to extract equity while minimizing the monthly payment obligation in the short-term. Equity extraction is strongly associated with the likelihood of refinancing into an ARM product, and the effect is concentrated among the households most likely to be constrained by payment-to-income requirements. Given that 50 percent of the refinanced ARMs carry interest rates more than 150 basis points above the prime rate, this relationship suggests that the desire to extract equity led some households to accept subprime credit in exchange for lower monthly payment obligations and the ability to extract equity.

This phenomenon adds complexity to the interpretation of refinancing activity within targeted lending programs. While the transition into subprime products might be viewed as a negative outcome, such refinancing behavior does not have unambiguously negative (or positive) implications for the achievement of policy goals. Instead, the normative interpretation of such transitions varies across goals, as potentially higher long-term financing costs must be weighed against the benefits of access to accumulated equity in the present. A first upshot for policy is that efforts to encourage homeownership must consider
the long-term costs of homeownership across a potentially diverse set of homeownership experiences. Where community reinvestment mortgage borrowers previously faced few higher-cost refinancing options, the advent of risk-based pricing dramatically expanded the set of alternatives.

As a result, observing homeownership entry (and mitigating default) is no longer sufficient to ensure low long-term costs of homeownership. Instead, evaluation of the economic outcomes associated with such programs requires access to data that follows homeowners across the full homeownership tenure, linking the initial mortgage product to any subsequent refinancing products. For instance, it may be the case that CAP homeowners used subprime ARMs to weather a temporary financial shortfall, refinancing back into prime fixed-rate mortgages shortly after regaining their financial footing. Given the low nominal rates on ARMs during the period of observation, such a use is consistent with the goals of homeownership policy. Alternatively, the transition of some borrowers into subprime products may increase the financing costs of homeownership over the long-term and/or increase the risk of default and foreclosure. Unfortunately, the data necessary to draw clear conclusions regarding the long-term implications of such transitions does not yet exist. Instead, the CAP dataset is unique in allowing analysts to observe the first transition out of the initial mortgage.

In the absence of clear evidence, policymakers are faced with uncertainty regarding the implications of refinancing transitions for the achievement of policy goals. In the long-term, much more research is necessary to understand the full implications of risk-based pricing for community reinvestment lending and other targeted lending activities. In the meantime, mortgage and/or credit counseling at the point of refinancing may reduce concerns
over adverse outcomes. Given the frequent use of equity to pay down other debts, such
counseling might also help to resolve any underlying credit issues that threaten households’
financial solvency.
Bibliography


CHAPTER 4: ESSAY 3


Abstract

This study adds to an emerging literature on the lending practices of mortgage brokers during the run-up in home prices prior to 2006. Following a sample of low- and moderate-income borrowers through the first years following home purchase, the analysis identifies differences in the refinancing transaction associated with the use of mortgage brokers and retail lenders. Specifically, the analysis includes measures of the refinancing process, including whether the lender initiated contact with the borrower, whether the terms of the mortgage changed at closing, and the level of borrower satisfaction in hindsight. Care must be taken in extrapolating from this sample to the broader mortgage market, as all borrowers refinanced out of 30-year fixed-rate purchase mortgages in the Community Advantage Program (CAP). Nevertheless, analysis of this sample offers unique insight into borrowers’ interactions with mortgage brokers during the refinancing transaction. Origination through a mortgage broker, compared with origination through a retail lender, is associated with both a less satisfactory refinancing process and a higher likelihood of refinancing into an adjustable-rate mortgage (ARM).
Introduction

In the wake of recent subprime foreclosures, increasing attention has been given to the role of mortgage brokers in the dramatic growth of the subprime market. Where subprime loans accounted for less than 5 percent of the total mortgage origination volume in 1994, they grew to make up 20 percent of the total mortgage market by 2005 (Gramlich 2007). This growth initially occurred through the proliferation of independent subprime lenders. However, consolidation of the broader mortgage industry quickly extended to the subprime market. As the volume of subprime B&C lending increased from $65 billion in 1995 to $332 billion in 2003, the market share of the top 25 lenders increased from 40 percent in 1995 to 93 percent in 2003 (Chomsisengphet and Pennington-Cross 2006).

Many of the consolidated lending operations relied extensively on mortgage brokers to generate subprime loan originations. During the run-up in home prices prior to 2006, mortgage brokers offered lenders a flexible means of increasing their subprime origination volume, particularly in areas without branch locations. Where mortgage brokers originated 48 percent of subprime originations in 2003, brokers accounted for fully 63 percent of subprime originations by 2006. This proportion has since declined sharply in the face of housing market turmoil and the collapse of the subprime market (Inside B&C Lending 2007). However, this mounting attention to subprime foreclosures also generated increasing scrutiny of mortgage brokers’ role in the dramatic growth of the subprime industry.

Prior to the recognition of the subprime crisis, the primary policy response to broker industry growth came from states’ enactment of licensing requirements. Pahl (2007) documents the progression of state-level requirements, showing the consistent expansion of statutes governing broker licensing and registration. Subsequently, the wave of subprime
foreclosures placed the broker industry at the center of the federal debate over subprime lending and the policy response to the subprime crisis. The recent revision to the Real Estate Settlement Procedures Act (RESPA) directly modifies the timing and content of brokers’ disclosure requirements. Additionally, the scale of the subprime crisis has also raised the possibility of broader regulatory reforms at the federal level, resulting in a more comprehensive revision of the regulations governing brokers’ activities.

Unfortunately, very little evidence exists to guide these policy initiatives. More empirical research is necessary with respect to both brokers’ lending practices and the causal impacts of alternative policy responses. This study adds to an emerging literature on the lending practices of mortgage brokers during the run-up in home prices. Specifically, the analysis examines the impact of origination through a mortgage broker on the refinancing experiences of borrowers whose mortgages were purchased through the Community Advantage Program (CAP). Administered by a large community development financial institution in Durham, NC, the Community Advantage Program (CAP) purchases 30-year, fixed-rate, purchase mortgages with high debt-to-income ratios, limited down payments, lack of private mortgage insurance, and/or non-traditional credit history.

The empirical analysis follows these low- and moderate-income homeowners through the first years following home purchase, documenting the experiences of borrowers who

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1 Mortgage brokers’ effective exemption from regulatory oversight further heightens speculation over their role in originating risky mortgages. Where banks and thrifts undergo annual regulatory exams, mortgage brokers’ activities are examined only indirectly through examination of the affiliate lender (Longhofer and Calem 1999). Legally, oversight of mortgage brokers is the responsibility of the Federal Trade Commission, which does not conduct regular examinations.


3 Kleiner and Todd’s (2007) NBER working paper provides the most comprehensive evidence to date on the impact of state-level licensing and registration requirements. In that analysis, the authors report several interesting findings with respect to existing state-level regulations, but are hesitant to assign causality to these results.
refinance. The resulting sample is relatively small (n=348 refinances) and must be considered within the context of the CAP program. However, the CAP dataset offers a rich set of outcome measures related to both the refinancing transaction and the refinanced product. In this way, analysis of the CAP sample faces limitations to generalizability, but offers a unique opportunity to examine the role of mortgage brokers in the refinancing transaction.\(^4\)

Within this sample, borrowers refinance into a diverse range of fixed-rate (FRM) and adjustable-rate (ARM) mortgage products originated through a variety of providers in 22 states. Borrowers also report substantial variation on measures related to the refinancing process, including whether the lender solicited the mortgage, whether the terms changed at closing, and whether the lender encouraged borrowing more than the intended amount. The empirical analysis suggests that origination through a mortgage broker—compared with origination through a retail lender—is associated with both sets of measures, resulting in both a less satisfactory refinancing process and a higher likelihood of refinancing into an ARM product. The implications of these results for both future research and policy are discussed at greater length in the body of this chapter.

**Mortgage Brokers and Loan Origination**

The role of mortgage brokers in the loan origination process contrasts with the traditional model of mortgage lending. In the traditional model, potential borrowers solicit loan offers directly from competing lenders, comparing the pricing and terms offered by each

\(^4\)The CAP dataset isolates a sample of LMI home buyers, limiting extrapolation to the broader mortgage market. However, the sampling process relates to the nature of the original purchase mortgage, and should be unrelated to selection of a mortgage broker to refinance. The CAP program and the characteristics of the analysis sample are discussed in greater detail in the data section.
and choosing the mortgage with the preferred bundle of attributes. Mortgage brokers act as an additional party to this process, interacting with potential borrowers and originating loans for multiple lenders. Brokers often market loan products and recruit borrowers, document income and assess credit history, facilitate borrowers’ selection of a mortgage product, and guide borrowers’ through pre-approval, application, and origination. In this way, the mortgage broker provides lenders with the services associated with loan origination, but formally remains an intermediary between the lender and the borrower.

Researchers have examined this brokerage function using both theoretical models and empirical analyses of broker behavior. Yavas (1992) and Yavas (1994) describe the role of middlemen in financial transactions, showing that matchmakers arise in markets where buyers and sellers incur search costs. To the extent that using a broker is more efficient than searching independently, buyers and sellers are both willing to pay for matchmaking services. The implication for existing markets is that mortgage brokers may create an efficiency gain to the extent that they reduce the search costs to borrowers and lenders. For instance, brokers retain flexibility in opening and closing branch locations, potentially reducing the cost to lenders of reaching out to new markets. Conversely, borrowers may benefit from choosing a mortgage broker to the extent that brokers facilitate comparison shopping across products and lenders.

While the theoretical models of brokerage define circumstances under which brokers can be expected to appear, empirical analyses of the current mortgage broker industry suggest that the implied benefits to lenders and borrowers may be tempered by the presence of agency problems. Because brokers likely have informational advantages over both lenders and borrowers, they may use any information asymmetries to maximize their own interests
rather than the interests of the parties to the transaction. A large literature examines potential conflicts of interest related to principal-agent problems. With respect to the behavior of mortgage brokers, the relevant issue is whether brokers’ financial incentives align with those of their clients. Put another way, agency problems appear to the extent that profit-maximization by brokers is associated with sub-optimal outcomes for lenders and borrowers.

Examining agency issues in a related industry, several empirical studies suggest that real estate agents respond directly to their financial incentives. Rutherford, Springer, and Yavas (2005) compare time-to-sale and sale price of homes owned by real estate agents to homes owned by their clients. The results suggest that agent-owned properties did not stay on the market any longer, but sold for 4.5 percent more. Similarly, Rutherford, Springer, and Yavas (2004) examine agents’ incentives under exclusive agency and exclusive right to sell contracts, concluding that exclusive agency contracts create poor incentives with respect to lower-priced homes. While neither study is specific to mortgage brokers, both reinforce the influence of commission structure on the behavior of agents. The remainder of this section explores similar issues with respect to the mortgage broker industry, discussing the emerging empirical literature on broker behavior.

**Brokers and Lenders:**

Agency issues associated with the relationship between brokers and lenders relate primarily to the separation of brokers’ financial incentives from the risk associated with the originated mortgages. Because mortgage brokers act only to originate the loan, the financial risks associated with default and prepayment are held by the wholesale lender, who generally passes this risk on to secondary market investors. As a result, brokers have little incentive to
screen higher-risk applicants beyond applying the underwriting criteria required by the wholesale lender. Instead, brokers may face positive incentives to overstate an applicant’s income or credit quality in order to complete a sale.

Alexander et.al. (2002) compares the loan performance of subprime mortgages originated through the third-party channel—primarily broker-originated loans—with other subprime mortgages, finding that loans originated through the third-party channel defaulted at significantly higher levels than other loans. While this increased risk did not initially result in lenders charging brokers higher interest rates, the evidence presented suggests that lenders eventually responded by pricing third-party loans at 50 basis points, on average, above the par rate for other comparable loans.

This separation of mortgage brokers from the default risk associated with their originated loans gives rise to a volume-oriented business model. Where profit maximization by traditional lenders requires mitigating the costs associated with default risk, mortgage brokers do not directly incur financial losses from the performance of their loans. As a result, brokers may singularly pursue volume, originating as many loans as possible in order to collect the fees associated with each. For instance, LaCour-Little and Chun (1999) suggest that brokers’ incentives to originate new loans leads them to encourage refinancing (e.g. to ‘churn’ a lender’s portfolio). The authors compare broker- and retail-originated loans, showing that broker-originated loans are both more likely to refinance and substantially more sensitive to the value of the financial incentive to refinance.

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5 The authors attribute this increased risk to principal-agent problems between the lender and broker, whereby brokers are not fully held accountable for the performance of loans after origination.

6 Mortgage brokers may be indirectly affected to the extent that lenders discontinue relationships with brokers that originate particularly risky loans.
Brokers and Borrowers:

In a similar manner, agency issues arise in the relationship between brokers and borrowers to the extent that brokers’ incentives do not align with borrowers’ interests. Specifically, consumer advocates have raised concerns about the potential for brokers to be rewarded for encouraging borrowers to select higher cost products than they might otherwise qualify for (Ernst, Bocian, and Li 2008). This concern, often labeled ‘steering,’ arises from the structure of broker compensation. First, borrowers often pay a fee to the broker directly, usually as a percent of the loan amount (Guttentag 2000). While this fee directly ties broker compensation to customer satisfaction, it may also create an incentive for brokers to encourage additional borrowing and/or equity extraction.

Second, brokers may also generate revenue from the lender by keeping rebates associated with the spread between the interest rate on the originated loan and the par rate the borrower could otherwise qualify for. This rebate, also called a yield spread premium, is conceptually very similar to the payment of points. Where borrowers can purchase reductions in the interest rate by paying fixed fees (points) at origination, lenders can also offer fixed rebates to borrowers who accept a higher interest rate. At issue with respect to mortgage brokers is whether these rebates are passed along to borrowers (directly or indirectly) or whether the broker simply keeps them as additional compensation.

While brokers’ compensation through borrower fees is straightforward, brokers’ compensation through yield spread premiums requires explication. As an example, when interest rates decrease between the date of the original price quote and the date that the mortgage terms are locked in with the lender, the broker may lock a mortgage at the higher quoted rate and keep the fixed rebate. Because borrowers do not observe the lender’s offer,
they are not made aware of this indirect payment to the broker until they receive the broker’s fee disclosure at closing, long after the borrower has committed to the loan terms (White 2004). The reader should note that retail lenders can similarly capture this benefit, the only difference being that the borrower is not eventually made aware of this payment.

Beyond this simple example, yield spread premiums may also reward brokers who steer borrowers toward higher-cost mortgages. To the extent that brokers offer borrowers loans with inflated interest rates, yield spread premiums compensate brokers for any increase in the originated rate. 7 Again, retail lenders might similarly benefit from higher-cost originations, although it is less common for individual loan officers’ compensation to be tied directly to the pricing of originated loans. As a result, the issue of mortgage brokers’ pricing practices has become the subject of empirical debate. While such analyses generally are insufficient to conclusively determine the extent of steering, existing research offers insight into the relative fees and interest rates associated with mortgages originated by mortgage brokers and retail lenders.

Jackson and Burlingame (2007) empirically examine the sensitivity of brokers’ compensation to the use of yield spread premiums. Examining roughly 3,000 mortgages originated by brokers affiliated with a large national lender, 8 the authors consistently find that broker compensation is highest on loans with yield spread premiums. The results further suggest that borrowers capture less than 35 percent of the yield spread premiums through fee reductions or other offsetting compensation. Woodward (2003) similarly examines loans

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7 Appendix 1 of Ernst, Bocian, and Li (2008) presents a lender’s rate sheet, including the yield spread premiums associated with different loan prices.

8 Over 80 percent of broker-originated loans contain yield spread premiums, which average 1.5 percent of the originated loan amount.
originated by mortgage brokers, showing that broker compensation increases on loans where borrowers must tradeoff closing costs against the interest rate. Conversely, costs are lowest when closing costs are rolled into the interest rate, providing a simple metric for comparing loan pricing across lenders.

Taken together, these studies raise important concerns about the extent to which brokers’ compensation varies according to borrower sophistication. However, both are specific to samples of broker-originated loans and thus do not directly compare broker behavior to that of retail lenders. Woodward (2008) attempts such a comparison using a sample of FHA loans, documenting higher costs on broker-originated mortgages. Similar to her previous study, the analysis also suggests that increased complexity in the fee structure is associated with higher costs. Total loan costs increase when yield spread premiums, payment of discount points, and/or seller contributions are observed.9

A second approach to the issue of mortgage pricing is to examine the relative interest rates of loans originated by mortgage brokers and retail lenders. Where the previous studies examine the fee structures and compensation attached to originated loans, several additional studies directly examine the interest rates on the associated mortgage products. For instance, LaCour-Little (2008) uses two alternative methodologies to estimate the mean difference in the note rates of mortgages originated by brokers and lenders. The analysis consistently finds that the interest rates on broker originations averaged 20 basis points above the mean interest rate on retail originations. This gap is suggestive of higher pricing among mortgage brokers, but is specific to the note rate and does not reflect fees or other components of the annual percentage rate (APR). A research report of the Center for Responsible Lending

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9 Both Woodward (2003) and Woodward (2008) also report higher costs for black and Latino households, as well as for households without a college degree.
similarly finds higher interest rates among broker originated loans, but also is specific to the note rate and does not observe other aspects of loan price (Ernst, Bocian, and Li 2008). In contrast, Courchane (2007) reports higher APRs among wholesale originations in the prime and subprime markets, but cannot specifically identify broker originated mortgages within the sample of wholesale originations.

While these studies offer suggestive evidence on brokers’ pricing patterns, the strength of these findings is qualified by the inconsistent evidence found in other studies of broker pricing. First, LaCour-Little (2007) examines mortgage choice among a sample of lower-income households. The analysis offers consistent evidence that broker originated mortgages close more quickly than retail originations, but the relationship between origination channel and note rate is not consistent across FHA, prime, and subprime mortgages. El Anshasy, Elliehausen, and Shimazaki (2006) more directly contradict the findings of the previously reviewed studies, concluding that broker originated loans are priced lower than retail loans. Using a database containing the subprime mortgage originations of 10 large lenders, the authors compare the APR on broker- and retail-originated loans. Finding lower APRs on broker-originated loans, the authors conclude that “any temptation to steer borrowers to higher priced loans is tempered by competition.”

Borrower Search, Broker Competition, and Public Policy:

At the heart of the debate over brokers’ pricing practices is the extent to which borrower search enforces competitive pricing across originators. To the extent that borrowers compare prices across brokers and lenders, competition might eliminate the ability of any single broker to inflate prices. For instance, the National Association of Mortgage
Brokers addresses concerns about steering on its website by invoking borrowers’ abilities to search for the best terms: “While isolated instances of adverse steering can occur, the mortgage brokerage industry has predominantly armed consumers with a free-market economy weapon: open and vigorous competition. Any consumer exercising his or her basic right to shop and compare will ultimately find the loan options that are in his best interests.”

Conceptually, the resulting competition between loan originators carries the potential to protect borrowers from abusive lending practices. However, borrowers’ search behaviors may be limited by both their level of financial literacy and the structure of the mortgage transaction. Guttentag (2000) and Essene and Apgar (2007) describe potential barriers to mortgage search at length, discussing the limitations of existing measures of mortgage cost and the constraints imposed by the structure of the mortgage transaction.

A more basic concern is that some consumers may simply misinterpret brokers’ ability to sell multiple mortgage products as a substitute for diligent search across lenders. In the best case, efficient search behavior by borrowers should create little difference between the lending activities of brokers and lenders. In the worst case, borrowers might rely entirely on the broker to search for the best terms, wrongly perceiving the broker to be an agent of the consumer. The latter case heightens concerns that the most vulnerable groups may be the least protected. Kim-Sung and Hermanson (2003) describe the refinancing experiences of a group of elderly borrowers, showing that 70 percent of borrowers who used mortgage brokers relied ‘a lot’ on the broker to find the best mortgage product for them. Furthermore, 56 percent of older borrowers with broker-originated loans reported that the broker initiated

the contact with them, compared with 24 percent of borrowers with lender-originated loans. Woodward (2003) and Woodward (2008) further reinforce concerns about the vulnerability of specific groups, finding higher costs for black and Latino households, as well as for households without a college degree.

Ideally, borrowers might rely on brokers as disinterested advisors, allowing origination through a mortgage broker to reduce borrowers’ search costs. To the extent that borrowers could trust brokers to search for the best pricing and terms, the broker model might create a type of one-stop shop. Instead, borrowers do not directly observe the offers of individual lenders, and the pricing and terms of any given loan are subject to negotiation between the borrower and the mortgage broker (Longhofer and Calem 1999). This distinction between choice and price requires customers to understand the nuances of the relationship between mortgage brokers and wholesale lenders. Specifically, customers must not assume that consideration of the options offered by a mortgage broker substitutes for search across alternative mortgage providers.

As the broker industry grew, policymakers responded to these concerns in two ways. First, state legislatures responded to growth in the broker industry by implementing licensing and registration requirements. Pahl (2007) documents the steady increase in both the number of states with regulatory provisions and the restrictiveness of the mandated requirements. While the substance and intensity of regulation varies by state, the enacted proposals generally require some form of licensing or registration requirements, which often include minimum standards for education or experience as well as a requirement that firms post a bond or maintain a minimum net worth. Taken together, these licensing standards likely
increase the professional quality of broker services, but do not necessarily imply improved outcomes for consumers (Kleiner and Todd 2007).

Second, the federal response to the subprime foreclosure crisis included revision of the disclosure requirements established by the Real Estate Settlement Procedures Act (RESPA). Intended to facilitate borrower search, the rule change is intended to improve the clarity and reliability of the Good Faith Estimate (GFE) provided to borrowers during the search process. Among other things, the revised GFE categorizes and lists estimated fees, setting tolerances on the extent to which fees may increase at closing. It also includes a tradeoff table designed to assist borrowers in evaluating alternative fee-interest rate combinations (e.g. disclosure of yield spread premiums). In presenting this information to borrowers at the application stage, the revised rule carries the potential to improve borrowers’ abilities to evaluate and compare costs across alternative lenders. However, compliance with the revised rule is not mandated until January 2010, so the actual impact of this change will not be known for some time.

The literature used to inform these changes is still emerging, with much more research necessary to conclusively understand the causes and consequences of recent growth in the broker industry. This study contributes to the available body of evidence by offering evidence specific to the refinancing transaction. While the empirical analysis examines the relationship between origination channel and product choice, it also offers insight into borrowers’ interactions with mortgage brokers during the refinancing process. The specific measures and empirical methodology used in this analysis are described in the next section. The remainder of the chapter then presents and discusses the empirical results.

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11 Compliance with the rule change is not mandated until January 2010, so the actual impact of the rule change will not be known for some time.
Data and Sample: The Community Advantage Program (CAP)

The Community Advantage Home Loan Secondary Market Program (CAP) was established as a partnership between the Ford Foundation, Fannie Mae, and Self-Help, a large community development financial institution (CDFI) located in Durham, North Carolina. Under CAP, Self-Help purchases 30-year, fixed-rate mortgages (FRMs) originated through the CRA-related lending activities of participating lenders. All of the loans are structured as 30-year FRMs, and all were originated to finance home purchase. The analysis in this chapter examines the role of mortgage brokers in homeowners’ decisions to refinance out of these initial CAP mortgages. 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 of CRA lending. 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. However, the CAP dataset offers rich data on the refinancing transaction, creating a unique opportunity to examine the role of mortgage brokers in the refinancing process.

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. Many of the loans allow high debt-to-income levels, limited down payments, lack 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 underwriting standards. In some cases, lenders developed products
intended for sale to Self-Help. In others, Self-Help purchased loans originated through
existing lending programs and held in the lender’s portfolio.¹²

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; or (3) 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 markets. In
defining qualifying loans, these requirements also limit the CAP sample to low- and
moderate-income mortgages. The resulting dataset reflects the CRA-related lending
activities of 15 lenders in 22 states, and includes loans purchased from both large national
banks and mid-size regional lenders.¹³

Data and Sample:

The CAP dataset follows these mortgages through the first years following home
purchase, interviewing borrowers annually regarding their homeownership experience. The
analysis dataset includes 1,227 borrowers who purchased homes with a CAP mortgage
between 1999 and 2003. Strong home appreciation and declining interest rates combined to

¹²This second type of purchasing activity raises the prospect of seasoning bias to the extent that loans
in the lender’s portfolio that terminated prior to CAP purchase are censored from the analysis sample. For the
purposes of this chapter, the observed seasoning is not anticipated to create non-random missingness with
respect to the use of mortgage brokers. Among loans acquired through bulk purchases, the mean seasoning
period is less than six months.

¹³A complete discussion of CAP’s sampling strategy is performed by [citation omitted: CAP technical
sampling report]. They also compare the sample of CAP homeowners with the set of homeowners in the
Current Population Survey (CPS) who meet the above purchasing criteria, finding that the CAP sample is
largely representative of this population. The primary exceptions are that CAP homeowners tend to be
marginally younger, better educated, and geographically concentrated in the South.
create substantial refinancing activity in the subsequent years. Figure 4.1 displays the mean interest rate on CAP mortgages originated in each 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). 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 is roughly the size of the credit enhancement applied to CAP loans, implying that the pricing of the initial CAP purchase mortgages is comparable to the prime market.

Figure 4.1: CAP, FRM, and ARM interest rates by origination year.

Note: The FRM and ARM rates are reported by Freddie Mac’s Primary Mortgage Market Survey. N=1,227 CAP borrowers


15The credit enhancement increases the interest rate, but is offset by the lack of mortgage insurance on CAP loans.
The interest rates displayed in Figure 4.1 also document the steady decline in interest rates between mid-2000 and the end of 2003. This decline created strong incentives for borrowers to refinance into lower-rate mortgages. By the third wave of data collection in 2005, 368 borrowers (30%) had refinanced into a new mortgage. The unique characteristic of the CAP dataset is that it includes information on the refinanced mortgage in addition to the initial purchase mortgage. A module of the 2005 interview wave focuses specifically on refinancing activity, collecting information on both the refinancing process and the refinanced product (Appendix A). This information is merged with information from the origination loan file, as well as monthly loan performance data. Estimated home appreciation is also provided for the original CAP homes by Fannie Mae, using its automated valuation model.

While the majority of refinancing borrowers secured prime fixed-rate mortgages, a minority refinanced into adjustable-rate mortgages and mortgages with interest rates above the prime rate. Of the 368 refinancing borrowers, 72 borrowers (20%) refinanced into ARM products and 69 borrowers (19%) refinanced into mortgages with interest rates more than 150 basis points above the prime rate. The set of refinancing homeowners also includes considerable variation on measures of the refinancing transaction, such as whether the lender

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16 Of 1,656 owners in the sampling frame, 1,283 are contacted and complete interviews for a response rate of 77 percent. 1,227 of these interviews resulted in complete information on all measures.

17 Fannie Mae estimated appreciated values for each home in the 4th quarter of 2005. Appreciated values in interim periods are interpolated using the home purchase price and the Fannie Mae appreciated value, assuming a constant rate of appreciation. Fannie Mae’s proprietary automated valuation model (AVM) produces four different estimates of each home’s appreciated value based on repeat sales information, public tax records, and property characteristics. When discrepancies arise between the estimates, a reconciliation model generates the final estimate. Because of its proprietary nature, we do not directly observe the estimation procedure used by the AVM. We base our trust in the model’s reliability on OFHEO’s consistent approval in regulatory audits.
initiated contact, whether the terms changed at closing, and general satisfaction with the refinanced product in hindsight. This variation creates a unique opportunity to examine the role of mortgage brokers in the refinancing experiences of CAP borrowers.

Methodology and Measures:

The primary objective of this chapter is to identify characteristics of the refinancing transaction associated with the use of mortgage brokers as opposed to retail lenders. Of the 368 CAP borrowers who refinanced, 141 (38%) refinanced through a mortgage broker and 227 (62%) refinanced through a retail lender. The empirical analysis compares the experiences of these borrowers with respect to measures of both the refinancing process and the refinanced product. This section presents the individual outcomes measures as well as the empirical methodology, discussing potential threats to validity and the necessary requirements for inference.

The first component of the analysis examines the influence of mortgage brokers in borrowers’ choice of ARM refinancing products. Specifically, these first analyses identify the association between broker use and borrowers’ choice of ARM and/or higher-cost ARM products. Because all CAP borrowers initially hold 30-year fixed-rate mortgages, the choice of an ARM mortgage reflects the transition from a fixed-rate to an adjustable-rate mortgage. As a result, the nature of observed ARM products in the CAP dataset likely differs from those typically present in cross-sectional analyses of ARM choice. In particular, the increasing use of adjustable-rate and hybrid mortgage products by subprime lenders during this period raises the prospect that ARM use among CAP borrowers reflects the transition into a subprime refinancing product.
The potential presence of higher-cost ARM products dictates that the ARM analyses must be interpreted with an eye to the nature of the observed ARM products. The analyses of ARM choice approach the potential presence of subprime products first in the description of observed refinancing products. Second, the analyses of ARM choice are repeated, isolating the set of ARM mortgages whose interest rates exceed 150 basis points above the prime rate. In both cases, the definition of higher-cost ARM products would preferably be based on the spread in the annual percentage rate (APR), which more completely reflects mortgage cost. However, the APR cannot be calculated from available data, so the high-cost measure is defined with respect to the interest rate spread.

Beyond these definitional issues, interpretation of the product choice analyses is complicated by the complex nature of the refinancing decision. In particular, the decision of which refinancing product to choose is intricately related to the decisions of whether to refinance and whether to extract equity. Ideally, the complex interrelationships between these decisions might be modeled formally. For instance, Hendershott and Haurin (1997) model three simultaneous decisions with respect to home purchase: “what level of debt to obtain, whether to select an adjustable or fixed rate mortgage (ARM or FRM) and whether to choose an FHA or a conventional loan.” With respect to the components of the refinancing decision, a nested logit model might similarly be used to directly structure the tradeoffs between equity extraction, product choice, and the decision of whether or not to refinance.

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18 The Federal Reserve Board’s recent revisions to Regulation Z define first lien mortgages to be ‘higher-cost’ when the associated annual percentage rate exceeds 150 basis points above the average prime offer rate. This rule is approximated among CAP mortgages using the spread associated with the nominal interest rate.

19 For instance, Danis and Pennington-Cross apply these methods to loan performance, but structure the decision process related to delinquency. With a larger sample, a similar model could be implemented for the refinancing and/or prepayment decision. For more detailed description of this class of models, see Koppelman and Wen (1998) and Hunt (2000).
Unfortunately, the relatively small sample size prevents reliable convergence of more than a single equation analysis.\textsuperscript{20} As a result, the empirical analysis relies on simple Probit and ordinary least squares analyses that identify the association between origination through a mortgage broker and the likelihood of choosing ARM and/or higher-cost ARM products. While this simplified form is limited in its ability to shed light on the structural determinants of the ARM/FRM choice, it nonetheless offers insight into the relative frequency of ARM originations among borrowers using mortgage brokers and retail lenders.

The second component of the empirical analysis takes a similar approach to analysis of the refinancing transaction. The 2005 wave of the CAP survey instrument asks borrowers who refinanced to report multiple characteristics of the refinancing process (see Appendix A for the full module of refinancing questions):

1. “Did you contact this mortgage broker/lender or did they contact you first?”
2. “Since you last refinanced, has the broker/lender contacted you about refinancing or taking out other loans?”
3. “Were the terms at closing the same as those discussed during the loan application process?”
4. “Did you borrow more money for this loan than you had originally intended to?”
5. “Thinking about the amount you originally intended to borrow, did the lender encourage you to borrow less than that amount, more than that amount, about the same as that amount, or was no recommendation offered?”

\textsuperscript{20}Specifically, the relatively small number of cash-out refinances limits the cell sizes for ARM and FRM choice, preventing convergence of a nested logit model. For the full CAP sample, a two-equation probit selection model can be implemented to account for borrowers’ simultaneous decisions of whether to refinance. However, the results from such a specification add little to the substantive findings. The null hypothesis of random censoring can only be rejected (weakly) for the high-cost ARM outcome measures, and the estimated coefficients differ minimally in response to the presence/absence of this selection correction.
6. “How satisfied are you with the refinanced loan? Would you say very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied?”

Taken together, these measures offer insight into the nature of the refinancing process. In doing so, this second set of analyses also offers unique insight into the lending practices of mortgage brokers, providing rich information on the interaction between refinancing borrowers and the mortgage broker.

The issue for interpretation with respect to both types of outcome measures is whether the identified broker effect is attributable to brokers’ lending practices or to endogenous selection of mortgage brokers by CAP borrowers. Within the context of the CAP sample, two types of potential selection are of direct concern. First, CAP borrowers may be inclined to refinance through the initial lender, seeking out a mortgage broker only when they do not qualify for credit through the initial lender. In this case, the set of borrowers served by mortgage brokers would likely have worse underwriting characteristics and credit quality than borrowers refinancing through retail lenders. Additionally, borrowers seeking out mortgage brokers might be more likely to exhibit economic distress and/or desire to extract equity in the refinance.

The second issue is the potential for mortgage brokers to be geographically concentrated in specific neighborhoods and/or regions. The relatively recent growth of the broker industry suggests that mortgage brokers may be located disproportionately in growing markets, as new entrants appear in the areas offering the greatest promise of success. Mortgage brokers may similarly have responded to increasing demand for subprime originations, locating themselves in previously underserved neighborhoods. Both types of selection are addressed at greater length with the presentation and discussion of the empirical
results. While neither type of unobserved selection can be conclusively ruled out, scrutiny with respect to the set of observable characteristics offers little evidence that either issue biases the reported findings.

The base specification for both the product choice and process analyses includes covariates that address potential differences in the underwriting and demographic characteristics of refinancing borrowers. The borrower’s credit quality is measured with the credit score at the time of home purchase, coupled with an indicator variable reflecting whether the CAP loan ever entered 30 day delinquency. Household income and asset reserves—whether the borrower ever held less than 2 monthly payments in reserve—further reflect the financial position of the borrower. The unpaid balance and current loan-to-value ratio capture loan size and the relative equity in the home, respectively. The latter measure is also complemented with the appreciation rate on the home, which captures differences across borrowers in the accumulation of equity.\footnote{This specification is determined in part by the presence of multicollinearity among the set of possible variables. For instance, the nominal amount of equity is also observed, but is highly correlated with the current LTV and the appreciation rate.}

The potential for distressed borrowers to refinance in order to extract equity also motivates the inclusion of several demographic characteristics and potential ‘triggers.’ The set of static demographic characteristics includes age, race/ethnicity, education, and marital status. Additionally, the desire to extract equity from the home may reflect a response to a short-term financial shock or to a change in household composition. The static demographics are therefore supplemented with measures of whether the borrower lost a week of work to unemployment, whether household income has increased/decreased since home purchase, and whether a child has been added to the household.
Lastly, the product choice analyses additionally include measures reflecting theoretical determinants of ARM choice. The previous literature on the ARM/FRM choice suggests that ARM mortgages are financially preferable when long-term rates are relatively high, both nominally and in comparison to short-term rates (Brueckner and Follain 1988; Brueckner and Follain 1989). The analysis therefore includes the monthly prime interest rate for 30-year fixed-rate mortgages, as reported by Freddie Mac’s Primary Mortgage Market Survey. The difference between 10-year and 1-year Treasury rates is also used to approximate the yield curve environment.22

**Empirical Analysis**

Within the analysis sample of 1,227 CAP borrowers, 368 borrowers (30%) refinanced prior to the 2005 survey. Of this group, 141 borrowers (38%) refinanced through a mortgage broker, compared with 227 borrowers (62%) who refinanced through retail lenders. Table 4.1 presents descriptive statistics for the full sample of CAP borrowers, as well as for the sub-samples who refinanced through mortgage brokers and retail lenders, respectively. Because this analysis focuses on refinancing behavior, the covariates displayed in Table 4.1 are measured in the month of the refinance for borrowers who refinance. For all remaining borrowers, these variables are measured in the month that the observation is censored—the month of the 2005 interview for most observations. The first column of Table 4.1 presents mean values for the full sample of 1,227 borrowers.

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22Beyond these financial factors, the previous literature also suggests that ARM use is driven by mobility expectations and other demographic characteristics. Building a theoretical model of ARM choice, Cocco and Campbell (2003) show that households with larger mortgages, variable income, and/or little expectation of future mobility should be less likely to prefer ARM mortgages. Using empirical data, Dhillon, Shilling, and Sirmans (1987) confirm that households with dual incomes and/or expectations of future mobility are more likely to select ARM mortgages. Applied to the CAP dataset, mortgage size and household income are included as covariates, while mobility expectations cannot be directly observed.
Table 4.1: Descriptive statistics comparing broker and retail-originated loans.

<table>
<thead>
<tr>
<th>Variable:</th>
<th>All Mean</th>
<th>Broker Mean</th>
<th>Retail Mean</th>
<th>T-test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAP Mortgage Characteristics:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpaid balance</td>
<td>$78,287</td>
<td>$91,408</td>
<td>$84,236</td>
<td>.053</td>
</tr>
<tr>
<td>Accumulated equity</td>
<td>$21,981</td>
<td>$23,688</td>
<td>$19,336</td>
<td>.102</td>
</tr>
<tr>
<td>Current loan-to-value ratio</td>
<td>.80</td>
<td>.81</td>
<td>.84</td>
<td></td>
</tr>
<tr>
<td>Origination credit score &lt;620</td>
<td>.15</td>
<td>.10</td>
<td>.10</td>
<td>.950</td>
</tr>
<tr>
<td>Origination credit score 620-659</td>
<td>.23</td>
<td>.23</td>
<td>.26</td>
<td>.644</td>
</tr>
<tr>
<td>Origination credit score 660-719</td>
<td>.35</td>
<td>.45</td>
<td>.34</td>
<td>.028*</td>
</tr>
<tr>
<td>Origination credit score 720 or more</td>
<td>.28</td>
<td>.21</td>
<td>.30</td>
<td>.055</td>
</tr>
<tr>
<td>30 day delinquency</td>
<td>.18</td>
<td>.23</td>
<td>.15</td>
<td>.061</td>
</tr>
<tr>
<td>Months since CAP origination</td>
<td>35.6</td>
<td>23.7</td>
<td>23.8</td>
<td>.991</td>
</tr>
<tr>
<td>Home appreciation rate through 2005</td>
<td>5.5</td>
<td>7.8</td>
<td>6.0</td>
<td>.001**</td>
</tr>
<tr>
<td><strong>Borrower Characteristics:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White borrower</td>
<td>0.62</td>
<td>0.65</td>
<td>0.66</td>
<td>.763</td>
</tr>
<tr>
<td>Black borrower</td>
<td>0.18</td>
<td>0.11</td>
<td>0.18</td>
<td>.068</td>
</tr>
<tr>
<td>Hispanic borrower</td>
<td>0.16</td>
<td>0.23</td>
<td>0.12</td>
<td>.006**</td>
</tr>
<tr>
<td>Other race/ethnicity</td>
<td>0.04</td>
<td>0.02</td>
<td>0.04</td>
<td>.251</td>
</tr>
<tr>
<td>High school diploma or less</td>
<td>0.27</td>
<td>0.30</td>
<td>0.24</td>
<td>.241</td>
</tr>
<tr>
<td>Some post-secondary education</td>
<td>0.44</td>
<td>0.41</td>
<td>0.48</td>
<td>.228</td>
</tr>
<tr>
<td>4-year college degree</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
<td>.899</td>
</tr>
<tr>
<td>Age of mortgage borrower</td>
<td>35.2</td>
<td>34.5</td>
<td>36.0</td>
<td>.193</td>
</tr>
<tr>
<td>Household income (logged in analyses)</td>
<td>$42,241</td>
<td>$46,488</td>
<td>$45,079</td>
<td>.541</td>
</tr>
<tr>
<td>Married/Partnered at origination</td>
<td>0.57</td>
<td>0.61</td>
<td>0.54</td>
<td>.174</td>
</tr>
<tr>
<td>Unemployment spell</td>
<td>0.13</td>
<td>0.12</td>
<td>0.08</td>
<td>.191</td>
</tr>
<tr>
<td>Divorced/Separated/Widowed</td>
<td>0.04</td>
<td>0.02</td>
<td>0.04</td>
<td>.336</td>
</tr>
<tr>
<td>Income increased</td>
<td>0.49</td>
<td>0.48</td>
<td>0.52</td>
<td>.538</td>
</tr>
<tr>
<td>Income decreased</td>
<td>0.24</td>
<td>0.24</td>
<td>0.20</td>
<td>.331</td>
</tr>
<tr>
<td>Added a child to the household</td>
<td>0.17</td>
<td>0.18</td>
<td>0.13</td>
<td>.176</td>
</tr>
<tr>
<td><strong>Neighborhood Characteristics:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent white households in tract</td>
<td>0.66</td>
<td>0.63</td>
<td>0.69</td>
<td>.021</td>
</tr>
<tr>
<td>Percent black households in tract</td>
<td>0.18</td>
<td>0.18</td>
<td>0.18</td>
<td>.864</td>
</tr>
<tr>
<td>Percent Hispanic households in tract</td>
<td>0.10</td>
<td>0.15</td>
<td>0.08</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>Tract median household income</td>
<td>$40,405</td>
<td>$43,204</td>
<td>$42,808</td>
<td>.793</td>
</tr>
<tr>
<td>Tract median home value</td>
<td>$92,570</td>
<td>$106,648</td>
<td>$101,908</td>
<td>.263</td>
</tr>
<tr>
<td>Percent with high school degree or less</td>
<td>0.51</td>
<td>0.52</td>
<td>0.51</td>
<td>.523</td>
</tr>
<tr>
<td>Percent with 4-year college degree</td>
<td>0.21</td>
<td>0.21</td>
<td>0.22</td>
<td>.739</td>
</tr>
<tr>
<td>Percent unemployed</td>
<td>0.05</td>
<td>0.06</td>
<td>0.05</td>
<td>.453</td>
</tr>
<tr>
<td>Percent below the poverty line</td>
<td>0.12</td>
<td>0.11</td>
<td>0.11</td>
<td>.734</td>
</tr>
<tr>
<td>Percent of homes owned in tract</td>
<td>0.67</td>
<td>0.67</td>
<td>0.68</td>
<td>.944</td>
</tr>
<tr>
<td>Percent of homes vacant in tract</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>.868</td>
</tr>
<tr>
<td>N</td>
<td>1,227</td>
<td>141</td>
<td>227</td>
<td></td>
</tr>
</tbody>
</table>

The statistics shown in Table 4.1 are reflective of the population served by CRA lending programs. More than 70 percent of CAP borrowers held credit scores at origination of less than 720, with 38 percent having scores below 660. The updated loan-to-value ratios
further reflect the relaxed underwriting requirements. Despite an average of 36 months of seasoning, the mean updated loan-to-value ratio for the CAP portfolio is .80. Given that home price appreciation averaged 5.5 percent during this period, the current loan-to-value ratios reflect the low initial down payment requirements on the original CAP mortgages. By the end of the observation period, this appreciation resulted in an average of $21,981 in accumulated equity on loans with outstanding balances averaging $78,287.

The borrower and neighborhood characteristics shown in Table 4.1 further describe the demographic characteristics of these borrowers. CAP households earned $42,241, on average, and purchased houses in neighborhoods with median incomes averaging $40,405 and median home prices averaging $92,570. The remaining characteristics shown in Table 4.1 detail the racial/ethnic, educational, and household characteristics of CAP borrowers and their neighborhoods.

A second purpose of the figures shown in Table 4.1 is to examine whether the use of mortgage brokers—as opposed to retail lenders—is systematically correlated with any characteristics of CAP borrowers. The second and third columns of Table 4.1 report the mean values for borrowers who refinanced through mortgage brokers and for borrowers who refinanced through retail lenders, respectively. The fourth column then presents t-tests that compare the demographic and loan characteristics of borrowers refinancing through brokers and lenders. These t-tests largely fail to substantiate concerns about systematic determinants of broker use. Instead, the vast majority do not show significant differences between borrowers refinancing through brokers and retail lenders. However, the basic comparisons do not eliminate concerns about the two types of potential selection discussed in the previous section, as borrowers refinancing through mortgage brokers exhibit higher rates of
delinquency, unemployment, income loss, and child birth. While none of these differences reach significance, each is consistent with higher levels of financial stress among broker-originated refinances.

Second, and more concerning, is the strong association between the home’s appreciation rate and the use of mortgage brokers. Borrowers refinancing through mortgage brokers benefited from annual price appreciation that neared 8 percent, compared with 6 percent for borrowers refinancing through retail lenders. This effect also appears in the updated loan-to-value ratio and accumulated equity measures, both of which are closely related to home appreciation. Because rates of home price appreciation differed substantially across different geographic areas during this period, the appreciation rate effect may also produce the differences documented for the race/ethnicity variables. In particular, the higher proportion of Hispanic borrowers among brokers may result from this geographic effect.

Table 4.2: Broker activity by region/state.

<table>
<thead>
<tr>
<th>Region:</th>
<th>N Refi</th>
<th>% Broker</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>368</td>
<td>38.3%</td>
</tr>
<tr>
<td>Region: South</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Carolina</td>
<td>228</td>
<td>35.1%</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>28</td>
<td>14.3%</td>
</tr>
<tr>
<td>Virginia</td>
<td>20</td>
<td>45.0%</td>
</tr>
<tr>
<td>Georgia</td>
<td>20</td>
<td>50.0%</td>
</tr>
<tr>
<td>Region: Midwest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>105</td>
<td>42.9%</td>
</tr>
<tr>
<td>Illinois</td>
<td>54</td>
<td>27.8%</td>
</tr>
<tr>
<td>Region: West</td>
<td>33</td>
<td>48.5%</td>
</tr>
<tr>
<td>Region: Northeast</td>
<td>2</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Note: States with fewer than 20 refinances are not shown.
Table 4.2 further explores the geographic distribution of broker activity by examining the proportion of loans originated by mortgage brokers by state and region. The results shown in this table reflect the geographic concentration of CAP loans—and subsequently CAP refinances—in the South and Midwest. Furthermore, Table 4.2 documents substantial differences in the use of mortgage brokers across states, with fewer broker-originated refinances in North Carolina, Oklahoma, and Ohio. Given that these three states also experienced relatively slow housing appreciation during this period, this geographic pattern may reflect the appearance and growth of the broker industry in hot housing markets.\(^{23}\) A second possibility is that it reflects variation in state-level licensing requirements (Kleiner and Todd 2007; Pahl 2007).

Before turning to the empirical analysis, these differences are explored more formally using multivariate regression to identify the factors predicting mortgage broker and retail lender choice. Table 4.3 presents the results of these analyses, predicting broker use with the set of underwriting and demographic characteristics. The results of the first model corroborate the simple t-tests shown in Table 4.1. None of the measures of financial duress reach significance, but the positive relationship between home appreciation and broker use suggests that brokered originations may be concentrated in hot markets.\(^{24}\) This finding is consistent with concerns over geographic differences in broker use. However, its interpretation is complicated by the second model, which shows that the appreciation effect is

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\(^{23}\) This phenomenon also accounts for the near significance of the unpaid balance variable in Table 4.1, as the states with fewer brokers also contained relatively low home purchase prices.

\(^{24}\) Borrowers whose origination credit scores fell between 660 and 719 are significantly more likely to refinance than borrowers whose origination credit scores exceeded 720. However, this effect is not suggestive of a systematic credit quality effect.
muted once indicators for specific states are included (the six states shown are the states with at least 20 observed refinances).

Table 4.3: Probit models predicting refinancing through a broker.

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Broker</th>
<th>Broker</th>
<th>Broker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>z</td>
<td>Coef.</td>
</tr>
<tr>
<td>Unpaid balance</td>
<td>0.001</td>
<td>0.50</td>
<td>-0.001</td>
</tr>
<tr>
<td>Current LTV</td>
<td>0.684</td>
<td>0.71</td>
<td>1.473</td>
</tr>
<tr>
<td>Credit score &lt;620</td>
<td>0.269</td>
<td>1.00</td>
<td>0.233</td>
</tr>
<tr>
<td>Credit score 620-659</td>
<td>0.226</td>
<td>1.12</td>
<td>0.240</td>
</tr>
<tr>
<td>Credit score 660-719</td>
<td>0.371*</td>
<td>2.03</td>
<td>0.398*</td>
</tr>
<tr>
<td>30 day delinquency</td>
<td>0.254</td>
<td>1.36</td>
<td>0.261</td>
</tr>
<tr>
<td>Household income (logged)</td>
<td>0.174</td>
<td>1.17</td>
<td>0.167</td>
</tr>
<tr>
<td>Asset reserves</td>
<td>0.112</td>
<td>0.74</td>
<td>0.082</td>
</tr>
<tr>
<td>Appreciation rate</td>
<td>0.037*</td>
<td>2.19</td>
<td>0.024</td>
</tr>
<tr>
<td>Black</td>
<td>-0.311</td>
<td>1.40</td>
<td>-0.398</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.330</td>
<td>1.53</td>
<td>0.278</td>
</tr>
<tr>
<td>Some college</td>
<td>-0.140</td>
<td>0.81</td>
<td>-0.028</td>
</tr>
<tr>
<td>College degree</td>
<td>-0.065</td>
<td>0.30</td>
<td>-0.003</td>
</tr>
<tr>
<td>Age</td>
<td>-0.005</td>
<td>0.65</td>
<td>-0.004</td>
</tr>
<tr>
<td>Married/Partnered</td>
<td>-0.078</td>
<td>0.49</td>
<td>-0.132</td>
</tr>
<tr>
<td>Unemployment spell</td>
<td>0.191</td>
<td>0.79</td>
<td>0.217</td>
</tr>
<tr>
<td>Income increased</td>
<td>-0.063</td>
<td>0.38</td>
<td>-0.125</td>
</tr>
<tr>
<td>Income decreased</td>
<td>0.186</td>
<td>0.86</td>
<td>0.187</td>
</tr>
<tr>
<td>Added a child to the household</td>
<td>0.193</td>
<td>0.99</td>
<td>0.179</td>
</tr>
<tr>
<td>Georgia</td>
<td>0.117</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>0.448</td>
<td>1.40</td>
<td></td>
</tr>
<tr>
<td>North Carolina</td>
<td>-0.436</td>
<td>1.89</td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>-0.617*</td>
<td>2.34</td>
<td></td>
</tr>
<tr>
<td>Oklahoma</td>
<td>-1.101*</td>
<td>3.13</td>
<td></td>
</tr>
<tr>
<td>Virginia</td>
<td>-0.268</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>Licensing regulations (index)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-3.227</td>
<td>1.82</td>
<td>-3.337</td>
</tr>
</tbody>
</table>

N=368 borrowers who refinance.
*p<.05; **p<.01

The association of broker use with these state indicators rather than the measure of home price appreciation may simply result from the state variables absorbing variation in the appreciation rate. However, a second possibility is that variation in state-level regulation accounts for the different patterns of growth in the broker industry. Pahl (2007) creates an
index measure reflecting the strength of state-level licensing requirements, noting that both North Carolina and Ohio are among the top 5 states in terms of the strength of brokers’ licensing requirements. The third column of Table 4.3 therefore repeats the analysis of broker use replacing the state indicator variables with the index measure of state licensing requirements. The inclusion of the licensing index similarly mutes the appreciation effect, and its coefficient suggests that stronger licensing requirements are associated with fewer broker-originated refinances. More research is needed before this finding can be interpreted with respect to the broader mortgage market.\textsuperscript{25} However, with respect to the CAP sample, the impact of the licensing index on the broker equation presents a caveat to concerns about unobserved heterogeneity due to broker location in hot markets. Rather than indicating general geographic discrepancies, the licensing index suggests that the strongest determinant of broker use is the presence of lax requirements for entry into the broker industry. While this type of analysis cannot eliminate concerns over unobserved selection, this result—along with the other coefficients in Table 4.3—provides little empirical evidence consistent with systematic selection into broker-originated refinances. Nonetheless, the subsequent estimations include the full set of control variables from the third specification in Table 4.3.\textsuperscript{26} In these analyses, the weak effects of the measures of financial duress, home price appreciation, and the state-level licensing index further reduce concerns over unobserved heterogeneity in the estimated impacts of broker use.

\textsuperscript{25}The effect is also consistent with the analysis of Kleiner and Todd (2007). While the authors hesitate to apply a causal interpretation to their findings, they report that stronger bonding and net worth requirements are associated with the presence of fewer mortgage brokers.

\textsuperscript{26}Each analysis is also repeated using the second specification from Table 4.3 and using a specification that includes both the state indicator variables and the licensing index. All reported results are robust in sign and significance to this specification decision.
Mortgage Brokers and Product Choice:

Table 4.4 describes the refinancing products originated through mortgage brokers and retail lenders. First, the CAP borrowers served by mortgage brokers and retail lenders both refinanced out of CAP mortgages that carried interest rates of roughly 7.6 percent. Both groups also, on average, secured lower interest rates on their refinanced mortgages. The refinanced rates on broker-originated FRMs averaged 5.9 percent, a reduction of more than 150 basis points. While the refinanced rates on broker-originated ARMs were a bit higher, they remained, on average, roughly 135 basis points lower than the initial CAP rates. Borrowers refinancing through retail lenders captured similar decreases, although some variation again exists between FRM and ARM products.

Table 4.4: Characteristics of broker- and retail-originated refinancing products.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Broker</th>
<th>Retail</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP interest rate</td>
<td>7.57</td>
<td>7.61</td>
</tr>
<tr>
<td>Refinanced rate (FRM)</td>
<td>5.88</td>
<td>6.02</td>
</tr>
<tr>
<td>Spread: Refi rate minus prime rate (FRM)</td>
<td>-.05</td>
<td>.12</td>
</tr>
<tr>
<td>Refinanced rate (ARM)</td>
<td>6.21</td>
<td>5.56</td>
</tr>
<tr>
<td>Spread: Refi rate minus prime rate (ARM)</td>
<td>2.30</td>
<td>1.42</td>
</tr>
<tr>
<td>Percent ARM</td>
<td>28.4%</td>
<td>14.1%</td>
</tr>
<tr>
<td>Percent ARM: Spread&gt;1.50</td>
<td>17.7%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Percent who extract equity</td>
<td>39.0%</td>
<td>31.7%</td>
</tr>
<tr>
<td>Amount refinanced</td>
<td>$97,654</td>
<td>$89,264</td>
</tr>
<tr>
<td>Amount of equity extracted</td>
<td>$16,309</td>
<td>$16,074</td>
</tr>
<tr>
<td>N</td>
<td>141</td>
<td>227</td>
</tr>
</tbody>
</table>

Note: The prime rates for FRM and ARM mortgages reflect the mean rates reported for the primary market in the month of the refinance, which are recorded by Freddie Mac’s Primary Mortgage Market Survey.

The general decrease in the refinanced rates reflects the downward trend in interest rates between 2000 and 2003 (see Figure 4.1). However, the variation across product and lender types suggests that not all borrowers may be able to qualify for prime rate mortgages.
A second approach to describing the pricing of the refinanced mortgages is to examine the rate spread, defined as the difference between the refinanced rate and the prime interest rate on ARM/FRM loans in the month of refinancing. This measure of loan pricing corroborates the pattern observed among nominal interest rates, while also highlighting the differences across product and lender types. Where broker- and retail-originated FRMs are both priced near the prime rate, the interest rates on broker-originated ARMs averaged 2.3 percent above the prime rate and the interest rates on retail-originated ARMs averaged 1.4 percent above the prime rate.

Table 4.4 further shows that mortgage brokers originated a higher proportion of both ARM and higher-cost ARM loans, defined as loans whose interest rate exceeded the prime rate by 150 basis points or more. The set of broker-originated refinances included more than twice the proportion of ARM loans as the set of retail-originated refinances. This gap grows for the set of higher-cost ARMs, with more than half of broker-originated ARMs meeting the higher-cost threshold. The remaining characteristics show that broker-originated refinances also included a higher incidence of equity extraction, although the mean amount of equity extracted through mortgage brokers and retail lenders is similar. This greater incidence of equity extraction among broker-originated loans likely contributes to the larger refinancing amount observed among broker-originated loans. The relative absence of broker originations in Ohio, Oklahoma, and North Carolina—three states with relatively low home prices—likely also contributes to the difference in the size of the refinanced mortgages.

The first set of analyses predicts the ARM/FRM decision, examining the difference in product choice across brokers and retail lenders. The estimated models with respect to

---

27 The prime rates for FRM and ARM mortgages reflect the mean rates reported for the primary market, which are recorded monthly by Freddie Mac’s Primary Mortgage Market Survey.
ARM/FRM choice are shown in Table 4.5 and show substantial differences between broker- and retail-originated loans. Borrowers who refinanced through mortgage brokers are significantly more likely to receive ARM mortgages. The magnitude of this relationship is underscored by the relatively weak performance of the included covariates. While most coefficients are signed as expected, none reach significance.\textsuperscript{28} The difference between long-term and short-term rates (yield) carries a positive coefficient. Households with a college degree and households with increasing incomes also show positive effects. Lastly, both higher appreciation and stronger licensing regulations carry negative coefficients. While these coefficients cannot be confidently interpreted, they minimize the concerns with borrower selection discussed in the previous section.\textsuperscript{29}

The second and third models in Table 4.5 repeat this analysis, separating cash-out refinances from refinances in which no equity was extracted. Because the decision of whether to extract equity is closely connected to product choice, these supplemental analyses offer insight into the robustness of the broker effect to the presence of equity extraction.\textsuperscript{30} The results confirm that the positive association of broker use with ARM choice is not specific to rate or cash-out refinances. Instead, the broker effect appears within each type of refinancing behavior. First, broker use is positively associated with ARM choice within the sample of cash-out refinances, although the effect is only significant at the 10 percent level.

\textsuperscript{28}Sensitivity analyses were performed in response to concerns about multicollinearity and the weak z-statistics on the covariate variables. None of these analyses suggest that multicollinearity drives the reported results. Instead, the weak effects appear to result from the relatively homogenous nature of the CAP sample (and the small sample size). All CAP households enter homeownership during roughly the same period, limiting the observed variation in the measures based on interest rate variation and equity growth.

\textsuperscript{29}If anything, the negative sign on the appreciation variable suggests that borrowers in hot markets benefit from increased home equity (and a lower loan-to-value ratio) in qualifying for FRM refinancing products.

\textsuperscript{30}When equity extraction is present, the choice of an ARM product may reflect the borrower’s tradeoff of loan terms against the monthly mortgage obligation and the ability to extract equity. Conversely, these factors should not be influential when equity extraction is not present, as rate refinancers seek only to lower the long-term costs of mortgage credit.
Similarly, broker use is positively associated with ARM choice within the sample of rate refinances.

Table 4.5: Probit models of ARM choice.

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>ARM Full</th>
<th>ARM Cash-out Refi</th>
<th>ARM Rate Refi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>Coef</td>
<td>z-stat</td>
<td>Coef</td>
</tr>
<tr>
<td>Mortgage broker</td>
<td>0.546**</td>
<td>3.16</td>
<td>0.595</td>
</tr>
<tr>
<td>Prime rate (FRM)</td>
<td>0.166</td>
<td>0.69</td>
<td>0.350</td>
</tr>
<tr>
<td>Yield</td>
<td>0.232</td>
<td>1.63</td>
<td>0.551*</td>
</tr>
<tr>
<td>Unpaid balance</td>
<td>0.003</td>
<td>1.06</td>
<td>0.005</td>
</tr>
<tr>
<td>Current LTV</td>
<td>0.731</td>
<td>0.57</td>
<td>1.650</td>
</tr>
<tr>
<td>Credit score &lt;620</td>
<td>0.148</td>
<td>0.47</td>
<td>-0.449</td>
</tr>
<tr>
<td>Credit score 620-659</td>
<td>0.149</td>
<td>0.63</td>
<td>-0.475</td>
</tr>
<tr>
<td>Credit score 660-719</td>
<td>-0.008</td>
<td>0.03</td>
<td>-1.184*</td>
</tr>
<tr>
<td>30 day delinquency</td>
<td>0.223</td>
<td>1.02</td>
<td>0.751</td>
</tr>
<tr>
<td>Household income (logged)</td>
<td>-0.056</td>
<td>0.34</td>
<td>-0.030</td>
</tr>
<tr>
<td>Asset reserves</td>
<td>-0.228</td>
<td>1.30</td>
<td>-0.476</td>
</tr>
<tr>
<td>Appreciation rate</td>
<td>-0.025</td>
<td>1.11</td>
<td>-0.068</td>
</tr>
<tr>
<td>Licensing regulations (index)</td>
<td>-0.022</td>
<td>0.83</td>
<td>0.090</td>
</tr>
<tr>
<td>Black</td>
<td>0.112</td>
<td>0.44</td>
<td>1.708**</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.091</td>
<td>0.35</td>
<td>0.279</td>
</tr>
<tr>
<td>Some college</td>
<td>0.024</td>
<td>0.11</td>
<td>-0.487</td>
</tr>
<tr>
<td>College degree</td>
<td>0.410</td>
<td>1.62</td>
<td>-0.257</td>
</tr>
<tr>
<td>Age</td>
<td>-0.003</td>
<td>0.30</td>
<td>-0.013</td>
</tr>
<tr>
<td>Married/Partnered</td>
<td>-0.043</td>
<td>0.23</td>
<td>0.302</td>
</tr>
<tr>
<td>Unemployment spell</td>
<td>0.238</td>
<td>0.85</td>
<td>0.022</td>
</tr>
<tr>
<td>Income increased</td>
<td>-0.382</td>
<td>1.95</td>
<td>-0.827*</td>
</tr>
<tr>
<td>Income decreased</td>
<td>0.071</td>
<td>0.29</td>
<td>0.264</td>
</tr>
<tr>
<td>Added a child to the household</td>
<td>0.064</td>
<td>0.28</td>
<td>0.500</td>
</tr>
</tbody>
</table>

N 368 127 241

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

The remaining covariate effects reinforce the substantive differences between rate and cash-out refinancing. Cash-out refinancing appears to be more responsive to the interest rate environment and to household income growth. Additionally, among the set of cash-out refinances, black borrowers were more likely to receive ARM products. Conversely, among
the set of rate refinances, borrowers with a college degree were more likely to receive an
ARM product.

Table 4.6: Probit models of high-cost ARM choice.

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>High-cost ARM</th>
<th>High-cost ARM</th>
<th>High-cost ARM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full</td>
<td>Cash-out Refi</td>
<td>Rate Refi</td>
</tr>
<tr>
<td>Sample:</td>
<td>Coef</td>
<td>z-stat</td>
<td>Coef</td>
</tr>
<tr>
<td>Mortgage broker</td>
<td>1.030**</td>
<td>4.06</td>
<td>1.559**</td>
</tr>
<tr>
<td>Prime rate (FRM)</td>
<td>-0.331</td>
<td>0.88</td>
<td>-0.555</td>
</tr>
<tr>
<td>Yield</td>
<td>0.137</td>
<td>0.76</td>
<td>0.471</td>
</tr>
<tr>
<td>Unpaid balance</td>
<td>0.001</td>
<td>0.19</td>
<td>0.005</td>
</tr>
<tr>
<td>Current LTV</td>
<td>1.557</td>
<td>0.84</td>
<td>-0.671</td>
</tr>
<tr>
<td>Credit score &lt;620</td>
<td>0.335</td>
<td>0.76</td>
<td>0.510</td>
</tr>
<tr>
<td>Credit score 620-659</td>
<td>0.547</td>
<td>1.52</td>
<td>-0.075</td>
</tr>
<tr>
<td>Credit score 660-719</td>
<td>0.113</td>
<td>0.33</td>
<td>-0.548</td>
</tr>
<tr>
<td>30 day delinquency</td>
<td>0.621*</td>
<td>2.33</td>
<td>1.100*</td>
</tr>
<tr>
<td>Household income (logged)</td>
<td>-0.188</td>
<td>0.99</td>
<td>0.047</td>
</tr>
<tr>
<td>Asset reserves</td>
<td>-0.171</td>
<td>0.72</td>
<td>-0.387</td>
</tr>
<tr>
<td>Appreciation rate</td>
<td>0.000</td>
<td>0.00</td>
<td>-0.126*</td>
</tr>
<tr>
<td>Licensing regulations (index)</td>
<td>0.023</td>
<td>0.61</td>
<td>0.091</td>
</tr>
<tr>
<td>Black</td>
<td>0.717*</td>
<td>2.21</td>
<td>2.624**</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.371</td>
<td>1.11</td>
<td>1.252</td>
</tr>
<tr>
<td>Some college</td>
<td>0.076</td>
<td>0.28</td>
<td>-0.277</td>
</tr>
<tr>
<td>College degree</td>
<td>-0.277</td>
<td>0.74</td>
<td>-0.537</td>
</tr>
<tr>
<td>Age</td>
<td>0.003</td>
<td>0.29</td>
<td>0.012</td>
</tr>
<tr>
<td>Married/Partnered</td>
<td>-0.243</td>
<td>0.97</td>
<td>-0.120</td>
</tr>
<tr>
<td>Unemployment spell</td>
<td>0.128</td>
<td>0.37</td>
<td>-0.329</td>
</tr>
<tr>
<td>Income increased</td>
<td>-0.425</td>
<td>1.52</td>
<td>-0.555</td>
</tr>
<tr>
<td>Income decreased</td>
<td>0.306</td>
<td>0.98</td>
<td>0.928</td>
</tr>
<tr>
<td>Added a child to the household</td>
<td>0.038</td>
<td>0.12</td>
<td>0.515</td>
</tr>
</tbody>
</table>

N 368 127 241

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

Table 4.6 repeats this analysis, limiting the outcome variable to the set of ARMs whose interest rates exceed the prime rate by 150 basis points or more. Where the first set of analyses includes all ARM products, this second set attempts to isolate transitions into higher-cost ARMs. Again, the immediate finding is that refinancing through a mortgage broker is strongly associated with the transition into a higher-cost ARM product. This effect
consistently appears among both rate and cash-out refinances, as well as for the full sample of refinancing borrowers. Where cash-out refinancers may accept a higher-cost ARM in exchange for equity extraction, the rationale for refinancing into a higher-cost ARM when no equity is extracted is less clear. The limitations of this analysis prevent any definitive conclusions of loan steering in either case. However, the strong association between origination through a broker and the use of higher-cost ARM products raises concerns over the role of brokers in the refinancing decision.

The remaining covariate effects reinforce that the outcome measure isolates higher-cost lending. Borrowers with a 30 day delinquency on the CAP mortgage are significantly more likely to refinance into a higher-cost ARM across each of the models. Additionally, a higher appreciation rate is associated with a lower likelihood of originating a higher-cost ARM among cash-out refinances. Rather than creating concern over abusive practices in high growth markets, this result indicates that CAP borrowers in hot markets benefited from the additional equity created by appreciation. Lastly, black borrowers were more likely to receive a higher-cost ARM, particularly among cash-out refinances.

**Mortgage Brokers and the Refinancing Transaction:**

The CAP survey module also directly asks borrowers several questions about the refinancing process. Table 4.7 presents these measures and describes borrowers’ responses to each. The first measures show the proportion of borrowers who refinanced through a mortgage broker (38%) and who extracted equity during the refinance (35%), respectively. The second set of measures provides greater detail regarding the nature of these transactions. The broker solicitation measure records whether the lender/broker created the first contact
with the borrower, showing that 23 percent of refinances were solicited by the lender/broker. Of this group, over half reported that the lender contacted them over the phone, roughly one third reported contact through the mail, and just over ten percent were contacted by door-to-door solicitations or in some other way. The re-contact variable offers a similar measure, documenting whether the lender/broker has contacted the borrower since the refinancing transaction. Twenty-seven percent of borrowers reported a solicitation by the lender/broker in the interim following the refinance.

Table 4.7: Characteristics of CAP borrower refinancing.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measure</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broker</td>
<td>Originated refinance through a mortgage broker.</td>
<td>38.3%</td>
</tr>
<tr>
<td>Cash-out</td>
<td>Borrower extracted equity during the refinance.</td>
<td>34.5%</td>
</tr>
<tr>
<td>Solicit</td>
<td>Lender/Broker solicited the refinance.</td>
<td>22.8%</td>
</tr>
<tr>
<td>Re-Contact</td>
<td>Lender/broker has made contact since refinancing.</td>
<td>27.4%</td>
</tr>
<tr>
<td>Terms Change</td>
<td>The mortgage terms changed at closing.</td>
<td>9.5%</td>
</tr>
<tr>
<td>Lend More</td>
<td>Lender/broker recommended borrowing more</td>
<td>14.4%</td>
</tr>
<tr>
<td>Borrow More</td>
<td>Borrowed more than originally intended.</td>
<td>9.8%</td>
</tr>
<tr>
<td>Satisfied</td>
<td>Very satisfied with refinanced loan.</td>
<td>65.0%</td>
</tr>
<tr>
<td></td>
<td>Somewhat satisfied with refinanced loan.</td>
<td>26.6%</td>
</tr>
<tr>
<td></td>
<td>Somewhat dissatisfied with refinanced loan.</td>
<td>4.9%</td>
</tr>
<tr>
<td></td>
<td>Very dissatisfied with refinanced loan.</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

N=368 borrowers who refinance.

The terms change measure surveys borrowers regarding whether the terms of the mortgage contract differed at closing from those discussed during the negotiation. Thirty-five borrowers (10%) reported a substantive difference in mortgage terms. Of this group, 18 borrowers (5%) reported that their interest rate changed, while 17 borrowers (5%) reported a change in the fees required to close on the loan. The lend more and borrow more measures ask borrowers whether the lender/broker recommended borrowing more than originally
intended and whether the borrower in fact borrowed more than originally intended, respectively. These measures show that 14 percent of borrowers were advised to borrower more than they intended, but that only 10 percent did so.

The final measure in Table 4.7 provides a direct measure of borrowers’ refinancing experiences, asking borrowers in hindsight to report their satisfaction with the refinancing experience. Borrowers’ responses to this measure suggest that the vast majority of borrowers are at least somewhat satisfied with their refinanced loan, but that a minority are at least somewhat dissatisfied. Of the borrowers who refinanced, 31 borrowers (8%) reported being at least somewhat dissatisfied, with 13 borrowers (4%) being very dissatisfied with the refinanced loan.

Table 4.8 presents the first models of the relationship between origination through a mortgage broker and the measures of borrowers’ refinancing transactions. Depending on the form of the dependent variable, each model is specified as a Probit or OLS analysis that includes the full set of covariates from the broker choice model (Table 4.3). The analyses also include controls for whether the borrower extracted equity during the refinance and whether the borrower chose a higher-cost ARM (as defined in the previous analyses) These measures are expected to adjust for any differences in the refinancing process that result from differences in the refinancing product desired by the borrower. The analyses also included

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31 Each analysis is also repeated using a probit selection model to correct for differences in the propensity to refinance. The reported results are robust to model choice. Moreover, the null hypothesis of random selection into the set of refinancers cannot be rejected for any of the outcomes related to the refinancing transaction.

32 The analyses were also repeated using several alternative specifications of these measures, as the use of high-cost ARMs may not be the only relevant product distinction. For instance, one alternative model replaces the high-cost ARM measure with an indicator variable for ARM choice, an indicator variable for a higher-cost mortgage, and an interaction between these measures. The sign and significance of the reported broker effect are robust to the specification of these variables with respect to each of the outcome measures.
the full set of underwriting and demographic characteristics from the previous analyses, although the demographic characteristics are omitted for space considerations.\textsuperscript{33}

The immediate finding from Table 4.8 is that origination through a mortgage broker is strongly associated with the nature of the refinancing process. First, borrowers who used a mortgage broker are significantly more likely to report that the broker/lender initiated contact than borrowers refinancing through a retail lender. One possible explanation for this finding is that borrowers initiating a refinance may have frequently chosen the initial CAP lender. However, this effect may also reflect more extensive marketing efforts by mortgage lenders. The effect of broker origination in the re-contact equation offers some support to the second hypothesis, although the effect of broker origination in that model is only significant at the 10 percent level.

The third model in Table 4.8 further shows that borrowers who refinanced through a mortgage broker are significantly more likely to report a change in the mortgage terms at closing than borrowers refinancing through retail lenders. The indicator variable for higher-cost ARMs also strongly predicts the terms change outcome measure. This latter effect may reflect a lower level of understanding of ARM or hybrid ARM products on the part of borrowers, resulting in the perception that the terms changed at closing. However, it may also reflect the aggressive use of ARM products on the part of brokers/lenders. In either case, the effect of broker origination remains after controlling for product type, raising concerns about brokers’ approach to the refinancing transaction itself.

\textsuperscript{33}The omitted demographic estimates rarely show significant effects and offer little to the substantive interpretation.
Table 4.8: Broker origination and the refinancing transaction, part I.

<table>
<thead>
<tr>
<th>Model</th>
<th>Dependent Variable</th>
<th>Probit</th>
<th>Probit</th>
<th>Probit</th>
<th>OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Coef.</td>
<td>z-stat</td>
<td>Coef.</td>
<td>z-stat</td>
</tr>
<tr>
<td></td>
<td>Mortgage broker</td>
<td>0.498**</td>
<td>2.98</td>
<td>0.272</td>
<td>1.72</td>
</tr>
<tr>
<td></td>
<td>High-cost ARM</td>
<td>0.624*</td>
<td>2.39</td>
<td>0.079</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>Cash-out</td>
<td>-0.198</td>
<td>-1.10</td>
<td>-0.006</td>
<td>-0.03</td>
</tr>
<tr>
<td></td>
<td>Unpaid balance</td>
<td>-0.005</td>
<td>-1.73</td>
<td>0.002</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>Current LTV</td>
<td>1.328</td>
<td>1.16</td>
<td>0.616</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td>Credit score &lt;620</td>
<td>-0.240</td>
<td>-0.75</td>
<td>-0.071</td>
<td>-0.24</td>
</tr>
<tr>
<td></td>
<td>Credit score 620-659</td>
<td>0.157</td>
<td>0.69</td>
<td>0.196</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>Credit score 660-719</td>
<td>0.054</td>
<td>0.26</td>
<td>0.141</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>30 day delinquency</td>
<td>-0.022</td>
<td>-0.10</td>
<td>-0.132</td>
<td>-0.65</td>
</tr>
<tr>
<td></td>
<td>Household income (logged)</td>
<td>-0.110</td>
<td>-0.70</td>
<td>-0.227</td>
<td>-1.49</td>
</tr>
<tr>
<td></td>
<td>Asset reserves</td>
<td>0.018</td>
<td>0.11</td>
<td>0.066</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>Appreciation rate</td>
<td>0.002</td>
<td>0.08</td>
<td>0.009</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td>Licensing regulations (index)</td>
<td>-0.013</td>
<td>-0.53</td>
<td>0.005</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Includes demographics | Yes | Yes | Yes | Yes |

N=368 borrowers who refinance.
* p<.05; ** p<.01
The final column in Table 4.8 suggests that these effects are reflected in borrowers’ satisfaction with their overall refinancing experience. Borrowers who refinanced through a mortgage broker reported substantially lower levels of satisfaction than borrowers refinancing through retail lenders. This effect is relatively small in comparison with the strong relationship between the use of a higher-cost ARM and borrower satisfaction. Nonetheless, the use of a broker is also independently associated with lower borrower satisfaction.  

Table 4.9 presents the results of similar models with respect to the amount of the refinanced mortgage. The results further raise concerns regarding brokers’ sales practices, but offer only limited evidence that these practices influence borrower behavior. Borrowers who refinanced through a mortgage broker are significantly more likely to report that the lender encouraged them to refinance more than originally intended. In contrast, origination through a mortgage broker is not strongly associated with either whether the borrower actually borrowed more than intended or whether the borrower extracted equity through the mortgage transaction. Instead, equity extraction is determined primarily by borrower responses to appreciation in home values. Once home price appreciation and product type are accounted for, the difference between broker- and retail-originated loans appears minimal.

While each of these findings individually offers only limited basis for inference regarding the marketing and sales practices of mortgage brokers, the cumulative evidence from these analyses is free of the caveats tied to any single measure. For instance, broker solicitation and/or changes in mortgage terms are not necessarily indicative of problematic

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1 Because the use of high-cost ARMs may not be the only relevant product distinction, the robustness of the broker effect is examined using multiple specifications of ARM choice, use of above-prime mortgages, etc… The use of a mortgage broker carries a significant negative effect on satisfaction across models.
practices. However, in the context of lower borrower satisfaction and a higher likelihood of receiving a high-cost ARM, they raise red flags with respect to borrowers’ refinancing experiences. Similarly, the concerns over borrowers’ endogenous selection of mortgage brokers cannot explain the higher incidence of terms changing at closing or of encouragement to borrow more than intended among broker-originated refinances. Instead, when considered together, the findings presented in this analysis corroborate concerns about aggressive marketing and sales practices among mortgage brokers during the period of strong home price appreciation.

Table 4.9: Broker origination and the refinancing transaction, part II.

<table>
<thead>
<tr>
<th>Model:</th>
<th>Lender More</th>
<th>Borrower More</th>
<th>Cash-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coef.</td>
<td>z-stat</td>
<td>Coef.</td>
<td>z-stat</td>
</tr>
<tr>
<td>Mortgage broker</td>
<td>0.462*</td>
<td>2.46</td>
<td>0.188</td>
</tr>
<tr>
<td>High-cost ARM</td>
<td>0.334</td>
<td>1.16</td>
<td>0.394</td>
</tr>
<tr>
<td>Cash-out</td>
<td>-0.019</td>
<td>-0.10</td>
<td>-0.136</td>
</tr>
<tr>
<td>Unpaid balance</td>
<td>0.003</td>
<td>0.93</td>
<td>-0.005</td>
</tr>
<tr>
<td>Current LTV</td>
<td>-0.125</td>
<td>-0.10</td>
<td>0.811</td>
</tr>
<tr>
<td>Credit score &lt;620</td>
<td>-0.456</td>
<td>-1.12</td>
<td>-0.172</td>
</tr>
<tr>
<td>Credit score 620-659</td>
<td>-0.008</td>
<td>-0.03</td>
<td>0.023</td>
</tr>
<tr>
<td>Credit score 660-719</td>
<td>0.228</td>
<td>0.99</td>
<td>0.120</td>
</tr>
<tr>
<td>30 day delinquency</td>
<td>0.019</td>
<td>0.08</td>
<td>-0.106</td>
</tr>
<tr>
<td>Household income (logged)</td>
<td>-0.202</td>
<td>-1.16</td>
<td>0.064</td>
</tr>
<tr>
<td>Asset reserves</td>
<td>0.154</td>
<td>0.81</td>
<td>0.068</td>
</tr>
<tr>
<td>Appreciation rate</td>
<td>0.002</td>
<td>0.07</td>
<td>0.014</td>
</tr>
<tr>
<td>Licensing regulations (index)</td>
<td>0.002</td>
<td>0.06</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Includes demographics | Yes | Yes | Yes |

N=368 borrowers who refinance.
* p<.05; ** p<.01

Discussion and Conclusions

This chapter seeks to better understand the role of mortgage brokers in loan origination by examining the relative refinancing experiences of borrowers who refinanced with mortgage brokers and retail lenders. Following a sample of community reinvestment
mortgage borrowers through the first years following home purchase, the analysis examines the refinancing experiences of these homeowners. Specifically, it identifies differences in the refinancing product and transaction associated with origination through a mortgage broker. Care must be taken in extrapolating from this sample to the broader mortgage market, as the sample includes only low- and moderate-income borrowers who refinanced out of 30-year fixed-rate purchase mortgages. Nevertheless, analysis of this sample of borrowers offers rich insight into these borrowers’ interactions with mortgage brokers and retail lenders.

The empirical analysis corroborates concerns regarding marketing and sales practices within the broker industry. Borrowers refinancing through mortgage brokers are found to be more likely to receive both ARM and high-cost ARM refinancing products. First, origination through a mortgage broker is significantly associated with receipt of an ARM mortgage. Second, this effect strengthens among the set of higher-cost ARMs, and consistently appears within both rate and cash-out refinances. One might speculate that this effect reflects the close association of mortgage brokers with the subprime market, as ARM originations are much more common among subprime loans. However, comparison of the set of borrowers served by mortgage brokers and retail lenders offers little evidence that these outcomes result from underlying differences in underwriting characteristics.

Instead, the relationship between broker use and the origination of ARM and high-cost products raises red flags with respect to brokers’ marketing strategies. A second explanation for the concentration of ARM and higher-cost ARM products among mortgage brokers is that brokers responded to the run-up in home prices by soliciting refinances. Because higher-cost ARMs offer a reduced nominal interest rate in the short-term and lower
underwriting restrictions, brokers may have used these products to encourage borrowers to refinance, downplaying the longer-term risks of these mortgages.

The analyses with respect to the measures of the refinancing transaction are consistent with this latter interpretation. Borrowers refinancing through mortgage brokers are found to be more likely to report that the lender/broker initiated contact and more likely to indicate that the terms of the mortgage contract differed at closing from those discussed during negotiation. Moreover, while the evidence suggests that brokers have at best limited success in convincing borrowers to extract equity and/or borrow additional amounts, borrowers refinancing through mortgage brokers are significantly more likely to report that the lender/broker encouraged them to borrow more than they originally intended. Not surprisingly, origination through a broker is also associated with significantly lower satisfaction with the refinanced mortgage in hindsight.

While each of these findings individually might be benign, together they offer consistent evidence that brokers responded directly to the financial incentives posed by their compensation structure. Specifically, where brokers’ encouragement of additional borrowing reflects their fee structure, brokers’ increased solicitation and frequent use of hybrid ARMs are both suggestive of a volume-oriented business model. The implication for policy is that reforming brokers’ behavior requires more than increased disclosure. Instead, the recent rule changes to RESPA—which improve applicants’ abilities to observe and compare broker compensation—ought to be coupled with more direct revision of the system of broker compensation, as well as a fiduciary duty for brokers to act in the interests of the consumer. The task for researchers and policymakers is to identify the relative effectiveness of borrower
search, licensing requirements, and alternative policy instruments during a period of rapidly changing markets and slow information.
Bibliography


CHAPTER 5: POLICY DISCUSSION AND CONCLUSIONS

Discussion

In addition to the specific policy questions addressed in the individual essays, the analyses in this dissertation carry broader implications related to low-income homeownership. Specifically, this dissertation adds to an emerging literature that seeks to understand mortgage transitions and the interaction of independent market segments. Where the traditional mortgage cycle of a prime borrower includes refinancing when interest rates fall—as well as potential interruptions due to default or geographic mobility—the introduction of risk-based pricing makes this process substantially more complex. In the early years of the subprime market, subprime lenders specialized in refinancing, creating the potential for borrowers to transition out of prime mortgages. In the case of hybrid ARMs, the availability of subprime credit also increased the incidence of repeated refinancing, as borrowers terminated loans prior to interest rate resets—presumably, by mortgaging associated fees and thereby eliminating accumulated equity. Lastly, the movement of subprime lenders into the purchase market created opportunities for borrowers with limited or damaged credit to enter homeownership with a high-cost loan and subsequently build credit to refinance into a prime mortgage.

Unfortunately, very little is known about borrowers’ transitions between mortgage products and markets. The need for such empirical research is of particular relevance to affordable housing policy, particularly policies that aim to create access to credit among
underserved borrowers and neighborhoods. This dissertation specifically focuses on community reinvestment mortgage borrowers, but engages several of the questions related to the transitions between low- and high-cost markets. The first essay provides evidence that borrowers substitute between products when choosing a purchase mortgage. The second essay offers an economic rationale for transitions from prime to subprime mortgage credit through refinancing. The third essay documents the role of mortgage brokers in soliciting borrowers to transition into subprime refinancing products.

When considered together, these essays describe the overlap and interaction of the community reinvestment market with subprime and higher-cost lending. These market segments are shown not to be independent but rather to create a finance system in which homeowners transition between low- and high-cost mortgage products in response to changes in their credit history and current consumption needs. This view of the community reinvestment market implies that CRA lending must be considered in the context of the surrounding market.

**Policy Recommendations**

This revised view of the market for CRA loans offers insight into both the immediate response to subprime foreclosures and the longer-term revision of mortgage market regulation and oversight. First, the concentration of foreclosures in underserved neighborhoods gives rise to precisely the type of negative externality that CRA was created to address. As foreclosures mount, the negative impact of each foreclosure on neighboring home values endangers the homeownership tenure of all homeowners in the community. Additionally, this process creates negative feedback between home values and the behavior
of potential buyers and lenders. President Obama’s Making Homes Affordable Plan attempts
to directly address this feedback, by facilitating loan refinancing and modification to stem the
tide of foreclosure. However, this plan offers less protection against the second feedback
mechanism, offering little to entice cautious buyers and lenders to invest in distressed
neighborhoods.

Second, the interaction of CRA lending with surrounding lenders and market
segments also echoes the need for broader regulatory reform. The second and third essays
highlight the potential for individual lenders to undermine the public interest in stable and
sustainable homeownership. Given the broader incentives for homeownership, the public
stake in individual homeowners’ outcomes extends well beyond the bounds of CRA lending.
However, the demonstrated potential for subprime lending to impact the homeownership
outcomes of CRA borrowers further justifies calls for broader public oversight of the
mortgage market.

These general insights give rise to a specific agenda for public policy reforms:

1. **Modernize CRA and expand CRA lending.**

   In the wake of mounting foreclosures and the collapse of the subprime industry, the
availability of mortgage credit in underserved neighborhoods is likely to be relatively
less plentiful and with stricter terms in a post-reform era than before the credit crisis,
even for borrowers with strong credit records. Expanding the scale of CRA lending
in these communities would not only mitigate the impact of concentrated foreclosures
on home prices, but also provide a foundation for rebuilding the affordable housing
finance system.
In this context, the expansion of CRA lending should be accompanied by modernization legislation that enhances the scope of CRA. First, coverage of CRA should be expanded to all institutions that originate mortgages above a specified volume threshold, and not limited to depositories. In the years since CRA’s enactment, the separation of loan origination from the lending and investment functions created new types of non-depository institutions that should be included in CRA’s purview. Defining CRA coverage on the basis of the loan origination function rather than the institution type reflects the changing institutional structure of the housing finance system.

A second component of CRA modernization requires the creation of a mainstream secondary market outlet for CRA loans. To this end, Fannie Mae and Freddie Mac should be directed to purchase and securitize CRA loans. Goals for CRA purchases might be included directly as a percentage of the overall affordable lending goals. Alternatively, a separate purchasing goal for CRA lending might be established to induce GSE purchases. While the CAP model demonstrates the financial sustainability of such purchases, federal guarantees or direct subsidies might also be used as necessary to support GSE purchasing of CRA loans.

In any case, the standard for expanded CRA purchases should be inclusive of flexible underwriting characteristics and innovation in CRA mortgage products. Because the GSEs showed previous wariness with respect to the non-traditional characteristics of
many CRA products, the establishment of a CRA purchasing goal might be accompanied by support for product development. Specifically, the GSEs might be provided with an annual grant to support efforts to identify and benchmark the financial characteristics of new products.

2. *Strengthen regulations governing mortgage originators.*

Given the documented interdependence of CRA lending and competing lenders, any expansion of CRA should be accompanied by broader revision of the regulations governing subprime lenders and other mortgage originators. A first step is to standardize coverage in a manner similar to the CRA modernization discussed above. Any entity that originates a mortgage should be subject to the full set of fair lending and safety and soundness examinations. In particular, mortgage companies and subprime subsidiaries of mainstream financial institutions should be brought under the umbrella of existing regulations.

The increasing reliance on mortgage brokers must also be addressed, particularly in light of the controversy over brokers’ role in soliciting subprime mortgages. The third essay discusses the potential for the revised RESPA rule to provide increased disclosure by improving the good faith estimate provided to borrowers at loan application. However, disclosure and consumer search constitute only one component of the necessary reforms. Implementation of the revised RESPA rule should be accompanied by the imposition of a fiduciary duty that brokers serve the
best interests of the borrower, as well as revision of the system of broker compensation.

While many brokers work to serve the long-term interests of their clients, the previous system allowed lenders to incentivize unscrupulous behavior. A simple resolution is to prohibit brokers from receiving compensation from lenders, requiring instead that brokers charge customers a flat fee for their services and disclose the amount of the fee before the customer makes any financial commitment.

3. *Decouple consumer protection from safety and soundness.*

A more general component of required regulatory reform would include the creation of an independent agency with sole authority over fair lending and consumer protection in financial services. At present, consumer protection issues have not received priority from regulators, despite the potential for consumer protection concerns to foretell looming safety and soundness issues (Seidman 2009). The current crisis exemplifies the need for an independent agency with broad authority to respond to emerging fair lending and consumer protection issues.

A more expansive proposal from Elizabeth Warren (2008) is to also grant this agency the authority to act as a ‘Financial Product Safety Commission,’ evaluating the characteristics of individual products and approving their use by consumers. Where the regulatory reforms outlined above offer necessary steps to eliminate problematic activities, this type of agency offers a flexible response to future innovations.
Bibliography


APPENDIX A: IN-HOME REFINANCING SURVEY MODULE (2005)

ORIGINAL HOMEOWNERS REFINANCING QUESTIONS

REFI  [IF HOMOWN=1] Have you refinanced the original mortgage on your home? {HOM 35}
   1   YES
   2   NO
   DK
   REF

HOM1_44.  [IF REFI=1] How many times have you refinanced the mortgage on this home? {HOM 36}
           _______________ [ALLOW 1-3]
           DK
           REF

HOM1_45.  [IF REFI=1] In what month and year did you [IF HOM1_44>1 fill: “last”] refinance this
           loan? {HOM 37}
           ENTER MM/YYYY
           __/____
           DK
           REF

HOM1_46.  [IF REFI=1] How much did you refinance [IF HOM1_44>1 fill: most recently”]? {HOM 38}
           $______________ [ALLOW 0-999,999]
           DK
           REF

HOM1_47.  [IF REFI=1] What is the annual rate of interest charged on that [IF HOM1_44>1 fill: most
           recently”] refinanced mortgage? X816 {HOM 39}
           RECORD PERCENTAGE WITH UP TO TWO DECIMAL POINTS
           ___._ % [ALLOW 3.00-20.00]
           DK
           REF

HOM1_48.  [IF REFI=1] Did you refinance in order to get better terms, borrow additional money on your
           home equity, or do both? X7137 {HOM 40}
           1   GET BETTER TERMS
           2   BORROW ADDITIONAL MONEY ON YOUR HOME EQUITY
           3   BOTH
           DK
           REF

HOM1_49.  [IF HOM1_48 = 2 OR 3] How much additional money, besides the balance of the original
           loan, did you borrow during the refinace? {HOM 41}
           $______________ [ALLOW 0-999,999]
           DK
           REF

HOM1_50.  [IF HOM1_48 = 2 OR 3] Please take a look at SHOWCARD 1 and let me know for what
           purpose was the money used? You may select more than one. {X6723 HOM 42}
           TO SELECT MORE THAN ONE CATEGORY, PRESS THE SPACE BAR
           BETWEEN
           EACH CATEGORY RESPONDENT INDICATES.
           1   PAY OFF CREDIT CARD BALANCE OR OTHER DEBTS
HOM1_50a.  [IF ANY SELECTION AMONG THOSE FOR HOM1_50=6] What was the other purpose for which the money was used?

____________________ [ALLOW 60 CHARACTERS]

HOM1_51.  [IF REFI=1] Since you last refinanced, has the lender contacted you about refinancing or taking out other loans? {HOM 43}
1  YES
2  NO

HOM1_52.  [IF REFI=1] What is the current annual rate of interest being charged on the refinanced mortgage? {X816 HOM 44}
   RECORD PERCENTAGE WITH UP TO TWO DECIMAL POINTS
   __________________% [ALLOW 1.50-15.00 PERCENT]

HOM1_53.  [IF REFI=1] Is the refinanced mortgage a 30-year mortgage, 15-year, or some other term? {HOM 45}
1  30 YEARS
2  15 YEARS
3  OTHER (SPECIFY)

HOM1_52a.  [IF HOM1_53=3] How many years is the term, or duration, of your refinanced mortgage?

__________________ [ALLOW 10 CHARACTERS]

HOM1_54.  [IF REFI=1] Is this an adjustable rate mortgage; that is, does it have an interest rate that can increase or fall from time to time? {X820 HOM 29}
1  YES
2  NO

HOM1_55.  [IF HOM1_54=1] When the interest rate on your mortgage changes, does the amount of your monthly payments also change? {X825 HOM 30}
1  YES
2  NO
HOM1_56. [IF HOM1_54=1] Has the interest rate changed since you have had this mortgage? {HOM 31}

1  YES
2  NO
DK
REF

HOM1_57. [IF HOM1_56=1] What was the interest rate on this mortgage when you first got it? {X828 HOM 32}

RECORD PERCENTAGE WITH UP TO TWO DECIMAL POINTS

_._._% [ALLOW 1.00-15.00 PERCENT]
DK
REF

HOM1_58. [IF HOM1_54=1] What is the most the interest rate can increase at any one time? {X826 HOM 33}

RECORD PERCENTAGE WITH UP TO TWO DECIMAL POINTS

_._._% [ALLOW 0.50-10.00 PERCENT]
DK
REF

HOM1_59. [IF HOM1_54=1] How high can the interest rate go during the life of the loan? {X827 HOM 34}

INTERVIEWER: WE WANT THE HIGHEST TOTAL RATE ALLOWED OR THE CAP OF THE LOAN, NOT HOW MUCH THE RATE COULD RISE FROM ITS CURRENT VALUE.

_._._% ALLOW 1.50-15.00 PERCENT
DK
REF

HOM1_60. [IF REFI=1] How satisfied are you with this refinanced loan? Would you say very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied? {HOM 77}

1  VERY SATISFIED
2  SOMewhat SATISFIED
3  SOMewhat DISSATISFIED
4  VERY DISSATISFIED
DK
REF

HOM1_61. [IF HOM1_60=3 OR 4] Why are you dissatisfied with this loan? {HOM 78}

_______________________ [ALLOW 60 CHARACTERS]
DK
REF

HOM1_62. [IF REFI=1] Did you get this loan using a mortgage broker or did you work directly with the lender? {HOM 69}

1  MORTGAGE BROKER
2  LENDER
DK
REF

HOM1_63. [IF REFI=1] Did you contact this [(IF HOM1_62=1 “mortgage broker”) OR (HOM1_62 =2 “lender”)] or did they contact you first? {HOM 70}

1  RESPONDENT CONTACTED LENDER/BROKER
2  LENDER/BROKER CONTACTED RESPONDENT
DK
If REFI=1 AND HOM1_63=2 How did they contact you? Was it by phone, a mailing, door-to-door solicitation, through the Internet, or some other way? {HOM 71}

1 PHONE
2 MAILING
3 DOOR-TO-DOOR
4 INTERNET
5 SOME OTHER WAY

DK

Ref

If HOM1_64=5 How did they contact you?

____________________ [ALLOW 60 CHARACTERS]

DK

Ref

If REFI=1 Were the loan terms at closing the same as those discussed during the loan application process? {HOM 72}

1 YES
2 NO

DK

Ref

If HOM1_65=2 Were the fees for the loan different from what was discussed during the loan application process? {HOM 73}

1 YES
2 NO

DK

Ref

If HOM1_65=2 Was the interest rate different from what was discussed during the loan application process? {HOM 73}

1 YES
2 NO

DK

Ref

If HOM1_65=2 Were options offered to you different from those discussed during the loan application process? {HOM 73}

1 YES
2 NO

DK

Ref

If REFI=1 Did you borrow more money for this loan than you had originally intended to? {HOM 74}

1 YES
2 NO

DK

Ref

If REFI=1 Thinking about the amount you originally intended to borrow, did the lender encourage you to borrow less than that amount, more than that amount, about the same amount, or was no recommendation offered? HOM 75}

1 LESS THAN THAT AMOUNT

169
MORE THAN THAT AMOUNT
ABOUT THAT AMOUNT
NO RECOMMENDATION OFFERED

HOM1_71. [IF REFI=1] Which of the following describes your credit rating at the time you took out the loan? Excellent, good, fair, or poor? {HOM 76}
1 EXCELLENT
2 GOOD
3 FAIR
4 POOR
DK
REF

HOM1_72. [IF REFI=1] Has the [(IF HOM1_62=1 “mortgage broker”) OR (HOM1_62 =2 “lender”)] tried to contact you since you signed the contract? {HOM 79}
1 YES
2 NO
DK
REF