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Hitting the Wall:
Credit as an Impediment to Homeownership

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Introduction

Representing the "American Dream," homeownership has long held a special place in the United States. A significant fraction of the typical American household's wealth is wrapped up in its primary residence, which makes homeownership a vital investment tool (Kennickell, Starr-McCluer, and Surette, 2000). Moreover, homeownership has been found to have ancillary benefits, such as better health outcomes for members of a homeowner's family, and a lower incidence of neighborhood challenges such as crime and blight (Aaronson, 2000; DiPasquale and Glaeser, 1999; Rohe, McCarthy, and van Zandt, 1996; Haurin, Dietz and Weinberg, 2002). These perceived benefits have been the motivation for the many homeownership incentives extended by all levels of government, including the mortgage interest deduction for federal income tax calculations and the Bush Administration's American Dream Downpayment Initiative, whose goal is to dramatically increase homeownership rates among lower-income households.

Given the important role that homeownership plays for households and communities, overcoming barriers to homeownership is an important social and public policy goal. This is especially true in the case of minority and lower-income communities, many of which have struggled to build and maintain the wealth and stability that homeownership has been shown to confer. Identifying how changing credit quality – poor credit quality being one of the major financial barriers to homeownership that households must overcome (Rosenthal, 2002; Barakova, Bostic, Calem, and Wachter (2003) – may be impacting access to homeownership across demographic groups is a key step to informing policies to overcome these barriers.

Important changes in consumer credit markets, including expanded access to bank revolving credit, the emergence of a sub-prime market, larger debt burdens among some

segments of the population, and increased bankruptcy rates, occurred between 1989 and 2001. These changes all have implications for the distribution of credit quality across the population. This article examines how credit quality has evolved during this period. The focus is on the distribution of credit quality and the incidence of poor credit quality, with an eye toward identifying those segments of the population that have seen significant improvements or setbacks over the past decade. The results of the analysis are considered in the context of homeownership and the success of policy initiatives designed to increase the homeownership rate. Given areas of current policy focus, a central issue is the experience of minority and lower-income individuals and their prospects looking forward.

Background

Many researchers have studied the extent to which households have been unable to become homeowners due to borrowing constraints, which include income, wealth, and credit quality limitations. Most of this work has centered on the importance of income and wealth constraints and has found that insufficient wealth is the biggest barrier for households contemplating homeownership (Rosenthal, 2002; Stiglitz and Weiss, 1981; Linneman and Wachter, 1989; Zorn, 1989; Haurin, Hendershott, and Wachter, 1997; Quercia, McCarthy and Wachter, 2003). Two more recent studies explicitly quantify the importance of poor credit quality as a barrier to homeownership. These studies provide evidence that credit quality is becoming an increasingly important barrier to homeownership.

Rosenthal (2002) finds that credit quality is indeed a barrier to homeownership for households, as bankruptcy and a history of delinquent loan repayment are positively related to the likelihood of being credit constrained but unrelated to the probability of wanting to own a

home. The key finding is that the removal of credit constraints, as defined by Rosenthal, would increase the homeownership rate by about 4 percentage points (or about 6 percent).

Barakova, Bostic, Calem and Wachter (2003) (BBCW below), like Rosenthal (2002), incorporates credit quality into the analysis of terminal outcomes. But, in addition, BBCW distinguishes among the effects of income-based, wealth-based, and credit-based constraints and tracks how the impact of each type of constraint has evolved during the 1990s. BBCW finds that in 1998 the homeownership rate among recent movers would increase by 10 percent if those households with poor credit quality had had unblemished credit records.[1] This compares to a 6 percent increase for a comparable thought experiment in 1989. Thus, for this population, the importance of credit quality constraints nearly doubled during the 1990s, reflecting an increase in the proportion of households with poor credit quality.

At the same time, BCCW finds that wealth constraints, while continuing to be the predominant barrier to homeownership, have become less so. Indeed, the mortgage industry has expended a substantial effort to provide "affordable lending" products in recent years. The increased prevalence of these products, which are designed to be more accessible to households with relatively limited means in terms of income and wealth, has coincided with declines in the importance of income and wealth constraints as documented by BCCW.

This evidence of a decline in the importance of financial constraints is consistent with evidence that homeownership rates improved during the 1990s. According to the U.S. Census, homeownership rates surged during the decade, from 64% in 1990 to over 68% today.

Several researchers have examined how borrowing constraints have impacted minority and lower-income households in particular. Wachter et al. (1996) and Quercia, McCarthy and

[1] BBCW defines recent movers as those households that have moved in the last two years. These households represent a sample that recently faced the choice of whether to rent or buy a home.

Wachter (2003) demonstrate that income, and in particular wealth, constraints are a significant impediment to homeownership for "underserved" groups in the population, including younger families, low-income individuals, and especially, minority households. Similarly, Rosenthal (2002) finds that the effects of borrowing constraints are most pronounced among Hispanic households and lower-income households. However, these papers do not separately identify the influence of credit quality and thus can not estimate the impact of changing credit quality across sub-groups over time. In addition, while BBCW does separately identify how credit quality acts as a constraint in the homeownership decision for recent movers, it does not examine the distribution of credit quality for the U.S. population and how it has evolved over time.

Thus, this paper uses the Survey of Consumer Finance's (SCF) representative sample of the U.S. population to measure how credit problems are distributed across population subgroups and how they have changed over time.[2] The study assesses trends in credit quality across segments of the population stratified by demographic characteristics, and quantifies the extent to which credit quality constraints are likely to be a significant factor for households as they consider homeownership and other purchases that require some degree of indebtedness. If trends indicate that historically disadvantaged groups, such as minority and lower-income populations, have fallen further behind, then public policy might seek to address this, and improve the standing of the disadvantaged populations.

Indeed, given the broad consensus regarding the benefits of homeownership and the myriad policies whose objective is to increase the homeownership rate, it is important to understand how changes in credit quality are affecting the likelihood of achieving these goals.

[2] We also choose to focus on changes in credit quality over time rather than on wealth or income constraints. While the evidence is that wealth constraints remain important in access to homeownership, the ability to overcome this barrier depends on savings which is linked to the use of credit. The ability to pay credit in a timely way and the ability to repay credit allows growth of savings. Thus a measure of credit quality is likely to be linked to the ability

The analysis therefore places particular attention on the degree to which credit problems are concentrated among the renter population, from which the new homeowners must originate.

Credit quality: What are the trends?

For this portion of the analysis, we use the Survey of Consumer Finances (SCF), which provides detailed information on U.S. families' assets and liabilities, use of financial services, income, and housing and demographic characteristics. [3] Household balance sheet and financial variables used in this study include liquid plus semi-liquid financial assets.[4] Housing-related variables employed include whether the household rents or owns. Demographic variables employed include age, years of education, marital status and number of dependents, and racial/ethnic classification. The SCF is a triennial survey, and our analysis uses data from the 1989, 1995, 1998, and 2001 surveys.[5]

We identify an individual's credit quality using a procedure analogous to the "credit scoring" statistical methodology used by most credit-granting institutions (Avery, Bostic, Calem, and Canner, 1996). Specifically, we rely on a special sample of credit records, to develop a model for assigning credit scores to SCF households. This nationally representative sample was

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to overcome the wealth constraint as well.

[3] The SCF is a triennial survey of U.S. households sponsored by the Board of Governors of the Federal Reserve System in cooperation with the U.S. Department of the Treasury, and conducted by the Survey Research Center at the University of Michigan.

[4] Liquid and semi-liquid financial assets as defined by the SCF include all financial assets other than long-term savings instruments, such as pension plans, that cannot be borrowed against.

[5] The SCF employs a dual-frame sample design that overlays a standard geographically based random sample with a special sample of relatively wealthy households (Kennickell, 2000). Weights are provided for combining observations from the two samples to make estimates for the full population. We estimate regression models without weights but use sample weights when calculating summary statistics and predictions based on the estimated equations in order to generate summary statistics and predictions representative of the United States.

Beginning with the 1989 survey, missing data in the SCF have been imputed using a multiple imputation model, as described in Kennickell (1991) and Kennickell (1998). Each missing value in the survey is imputed five times, resulting in five replicate data sets, referred to as "implicates." Here, we pool the five implicates and adjust regression standard error estimates for the multiple imputation, following the procedure described in Kennickell (2000).

obtained by the Board of Governors of the Federal Reserve System and contains credit scores of about 200,000 individuals, along with their full credit records exclusive of any personal identifying information.[6] We develop an empirical model of a credit score by regressing the reported credit score in the sample on various individual characteristics chosen to match those available from the SCF survey in all four survey years. Because the data are proprietary, we are restricted on the extent to which we can report details of the specification or estimation results.[7]

Given the model each household in the SCF receives a predicted credit score by calculating **Zb**, where **Z** consists of the values of the variables included in the regression model for the household and **b** is the vector of estimated parameters from the credit score model.[8] Credit-constrained individuals are defined as those whose credit score falls below some minimum threshold level below which credit is unlikely to be extended. The mortgage industry generally views individuals with credit scores in about the bottom 20 percent of the national credit score distribution as not of good credit quality, and those in about the 20-25th percentile range as requiring "extra attention." These ranges correspond to individuals with FICO scores below 620 and those with FICO scores between 620 and 660 (see www.ficoguide.com). Along similar lines, the mortgage industry generally views individuals with credit scores exceeding 660 as being creditworthy and not requiring more time-consuming file reviews.

[6] Scores range from 480 at the 1st percentile to 820 at the 99th percentile, with a median of 716 and mean of 696, and with a lower score indicating greater credit risk (lower probability of repayment). The sample contains credit records and scores as of June 1999.

[7] Some of the key predictive variables in the credit score model are indicators for 30-day delinquency and 60-day or longer delinquency within the past year; aggregate balance and utilization rate on bank credit cards; and age of the individual.[7] No housing-related variables (such as whether the individual has a mortgage) were included in the regression equation. The R^2 for the imputation regression equation is .70; predicted scores range from 561 at the 1st percentile to 818 at the 99th percentile, with a median of 738 and a mean of 724.

[8] The main limitation in attempting to predict scores and the main source of unexplained variation in scores in the imputation equation are lack of information in the SCF on episodes of delinquency more than one year old, accounts in collection, and derogatory public records (other than bankruptcy). Moreover, even delinquencies within the past year may be underreported in the SCF.

Our discussion focuses on the "660 threshold" (the 25th percentile of the score distribution in our credit records database) as the cutoff for identifying a credit-constrained individual.[9] In other words, we use this cutoff to measure the percentage of the population likely to be subject to more extensive reviews, which could serve as a deterrent for those considering becoming homeowners.[10]

The credit scoring procedure was applied to each observation in both the 1989 and 2001 surveys, using the same scoring model for both surveys. Thus, in addition to identifying the cross-sectional distribution of credit quality, we can also identify how this distribution has shifted over the past 12 years.

Results

The estimates provide a variety of insights regarding the general state of credit quality in the United States and how it has changed over the past decade (Table 1). The first key observation is that most households are estimated to have good credit quality, as the median credit score for the full population is well above the 660 threshold that is typically the trigger for extensive reviews of mortgage applications. Moreover, the median credit score for the full population increased some over time.

However, credit quality, as measured by the percentage of the population estimated to be credit constrained, deteriorated substantially between 1989 and 2001. The percentage estimated to be credit constrained was more than 25 percent higher in 2001 than in 1989. This trend is

[9] About 20 percent of the full SCF sample for 1998 had imputed scores in this range, suggesting that the proportion of SCF respondents of with low credit quality is reasonably close to the proportion of such individuals in the general population.

[10] The more restrictive definition of credit constrained, the 20th percentile (FICO score below 620), yields cross-sectional distributions and trends over time that are similar to those observed using the 660 threshold. However, point estimates of the percent constrained within various demographic groupings may be less reliable under this definition, due to relatively small numbers of households with estimated credit scores below 620.

consistent with trends in consumer bankruptcy and credit delinquency, important determinants of measured credit quality. For example, consumer bankruptcy filings, which significantly reduce estimates of household credit quality, doubled between 1989 and 2001 (American Bankruptcy Institute, 2004).

The mild increase in the population's median estimated credit quality masks considerable variation in the experiences of subgroups in the population. For instance, we observe divergent trends by ethnicity, as the median estimated credit quality for whites increased through the 1990s while the median credit quality for minorities (blacks and Latinos) declined. Likewise, among minorities the percent estimated to be credit constrained grew significantly, while among whites it rose only slightly. Divergent trends also are observed when the population is stratified by income. Median estimated credit quality for lower-income individuals fell, while median quality for upper-income individuals, which was already quite high in 1989, was even higher by 2001. The percent estimated to be credit-constrained for lower- versus upper-income populations also moved in opposite directions.

Similarly, the less educated saw their credit quality fall, while those with much more education had credit quality improvements. This divergence is especially evident in the estimates of percentage of credit constrained households. Among households headed by an individual with less than a high school degree, the percentage estimated to be credit constrained (660 threshold) almost doubled, while the corresponding percentage among households headed by an individual with a college diploma fell by one fourth.

Credit trends and tenure

While the overall trends are illuminating from a general credit policy perspective, for the purposes of housing policy and the issue of increasing homeownership rates it is more useful to evaluate the trends separately among renters and homeowners. This breakout provides initial evidence regarding the extent to which poor credit quality is likely to impede efforts to further increase homeownership. Further, to gain additional insights as to how trends vary across the population, we also generate pairwise statistics for subgroups defined by interactions among the categories identified in Table 1.[11]

At the outset, we should emphasize that our analysis is meant to be suggestive of underlying patterns and should be interpreted in the context of additional information. We recognize that credit quality trends are not purely exogenous within each housing tenure category, but that the trends within a category may in part reflect correlation between credit quality and likelihood of becoming a renter or owner. Thus, for instance, credit quality among homeowners might increase not because credit quality is improving among existing homeowners, but because ownership rates are increasing among households with good credit quality and declining among households with poor credit quality.

The first set of results, which partitions the samples by race and income along with ownership status, are shown in Table 2. The results reveal starkly different experiences among renters and homeowners. During the 1990s, median estimated credit quality for homeowners as a whole improved, while for renters it fell. Regarding credit constraints, the percentage of credit-constrained households among homeowners fell, but the percentage of the renter population estimated to be credit constrained increased by 75 percent.

[11]Except in the case of cells created using locational information (tables 3 and 4 below), cells with fewer than 10 observations were excluded from the analysis. These cells were viewed as containing too few observations to generate reliable statistics. We were provided access only to pairwise statistics for cells created using locational information, not the size of the cell, due to rules restricting access to proprietary locational information in the SCF.

The improvement in median credit quality among homeowners occurred quite consistently across race and income groupings. The decline in percentage of homeowners estimated to be credit constrained was most pronounced within the two highest income quintiles, where it occurred consistently across race categories. In the lowest income quintile, the percentage of homeowners estimated to be credit constrained increased overall, although it declined for blacks.

Trends for renters also varied some across income categories. For example, the median credit score for renters declined sharply across racial categories in the two lowest income quintiles. However, it remained relatively unchanged or increased in the higher income groupings. Similarly, the increase in the percentage of renters estimated to be credit constrained was concentrated in the two lowest income quintiles, where this increase was quite sharp and was consistent across race categories.

In the context of homeownership attainment, minority and lower-income renters appear to be particularly challenged as of 2001, with 55 to 65 percent of minority renters and almost half of the lower-income renters estimated to be credit-constrained using the 660 threshold. Thus, homeownership for these "vulnerable" groups is less likely from a credit perspective unless their members are willing and able to secure more costly credit in subprime mortgage markets.

Perhaps surprisingly, even in higher income quintiles for both owners and renters, blacks and Hispanics exhibit worse credit quality, suggesting that cultural and perhaps other factors play a role in how minorities interact with credit markets. Though beyond the scope of the current study, this issue merits additional attention by researchers.

Table 3 repeats this exercise with interactions of the income quintile and urban locational variables. Here again, the homeowner/renter dynamic observed in Table 2 generally holds sway.

For instance, for owners, median credit quality increased within almost all income and locational groupings. For renters, median credit quality declined sharply in all three locational categories within the two lowest income quintiles. Interestingly, the suburban homeowners exhibited trends that were somewhat distinct from those observed among central city and rural homeowners. For instance, within the lowest income quintile, the estimated percent of credit constrained homeowners increased in the suburbs but declined in central city and rural areas. Tables 4 through 6 continue the presentation of interactions between various population groupings and offer similar results. In all cases, renters generally exhibited deterioration in their median credit quality and increases in the incidence of binding credit constraints. For homeowners, median estimated credit quality generally rose between 1989 and 2001 and the incidence of binding credit constraints remained relatively unchanged or fell. Moreover, among renters, the tables show that categories representing "vulnerable" populations – those with the fewest resources and those that historically have had limited access to credit markets – exhibited the sharpest declines in estimated credit quality and as of 2001 faced considerable credit-related challenges to achieving homeownership.

Central city and suburban minority renters have had their median credit quality plummet from well above 660 to far below 660 between 1989 and 2001 (Table 4). In addition, as of 2001, a substantial majority of the households in each of these four categories were credit-constrained based on the 660 threshold. Tables 5 introduces education as a factor and indicates that the deterioration in credit quality among renters between 1989 and 2001 was most pronounced for households headed by a person with relatively little education, and especially, lower-income households headed by a less educated person. Table 6 shows that deterioration in credit quality among renters was most pronounced for less educated minority households. As of 2001, one-

half to two-thirds of minority households headed by a person with no more than a high school education were credit constrained.

Additional analysis (not shown in tables) revealed that younger minority renters show the largest quality deterioration.[12] Unlike other cases, minority deterioration occurs through virtually the entire age distribution; only minority senior citizen renters have increases in average credit quality. As before, this result raises questions as to the origins of poor minority credit performance, as it suggests that extended experience in credit markets may not translate into improved performance for many minority individuals.

In these tables, there is one notable exception to the overall homeowner/renter credit quality dynamic that prevailed during the 1990s. Renters with a graduate school education did not show deterioration in credit quality. Median credit quality for this group rose and the incidence of being credit-constrained fell. It thus seems that this group is qualitatively different from other renter groups. Perhaps these individuals more often than other renters either prefer renting as opposed to owning or have more limited options due to wealth or credit constraints.[13]

Validation of the trends: Regression estimates

To account for correlation among income, race, education, location and other individual characteristics, regressions of our measures of credit quality on individual characteristics were estimated. For each year, we estimate two regression equations: one that does not distinguish

[12] The regression equation employed to create a credit score for SCF respondents included age as an explanatory variable to proxy for excluded credit-related variables, so that the estimated credit score by construction is strongly related to age. However, there is little reason to believe that changes over time in the distribution of estimated credit score by age would not be indicative of underlying changes in credit quality.

[13] The other renter category that showed no deterioration in credit quality was senior citizens (not shown). Like highly educated renters, this population might be more like homeowners save a preference for renting.

between renters and owners and one that includes a dummy variable indicating whether the individual is a household or renter.

The results of these estimates, which are shown in Tables 7 and 8, corroborate the earlier findings. In each sample year, lower-income individuals, people with less education, ethnic minorities, and younger people had significantly lower estimated credit scores and were more likely to be credit constrained.[14]

The tables also document what appears to be a general deterioration in credit quality among the "disadvantaged" or "vulnerable" groups during the analytical period. Table 7 shows that the average credit score was almost identical in 1989 and 2001. However, the estimated regression coefficients for income, race, and age are generally significantly larger in 2001 than in 1989, indicating that the magnitude of the effect – in this case, a reduction in credit quality – is larger in 2001. Interestingly, the differences for the education coefficients, particularly at the extremes, are not significantly different in the two years. This suggests that the education effect observed in the cross tabs is simply an artifact of the correlation between level of education and race and income characteristics.

Table 8, which shows the results for the likelihood of being credit constrained, tells the same story. Regardless of the credit score threshold used, being an individual in a disadvantaged group was associated with a higher likelihood of being credit constrained, sometimes a considerably higher likelihood. For example, in 200, a household in the lowest income quintile was 21 percentage points more likely to be credit constrained than one in the top quintile. In addition, the deterioration in credit quality observed in earlier tables for disadvantaged groups also is present in the likelihood of being credit constrained estimates: the marginal effect of

[14] While the biggest effects are associated with age, with the very young being severely disadvantaged compared to senior citizens, in part this may be due to the fact, noted above, that age was included as an explanatory variable in

being a minority, lower-income, or young on the probability of being credit constrained was greater in 2001 than in 1989.

The results for the regressions that include a dummy variable to identify whether the household is renter also corroborate earlier findings. Renter credit quality is worse than homeowner credit quality, whether measured by credit score or the probability of being credit-constrained, holding constant characteristics of the household other than their tenure status. For example, in 1989, a 40-year old white, college-educated homeowner who is in the 50th percentile of the income distribution and lives in the suburbs had a 16.2 percent probability of being credit-constrained, while an otherwise identical renter had a probability of 19.6 percent.[15] Other simulations of this sort suggest that, on average, renters have a 15 to 20 percent higher probability of being constrained based on the 660 threshold.

The data also indicate deterioration of credit quality over time for renters relative to homeowners even after holding other household characteristics constant. For example, for the hypothetical homeowner with the characteristics specified above, likelihood of being credit constrained fell from 16.2 to 10.7, while the hypothetical renter's probability of being credit constrained rose from 19.6 percent to 25.0 percent. Consistent with the results in tables 2 through 6, the deterioration of renter credit quality was particularly pronounced among black households and those with less education.

Concluding thoughts

With homeownership acknowledged as an important goal for ensuring the well being of both individuals and the broader society, understanding barriers to achieving homeownership is

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the regression model employed to predict credit scores.

[15] This also assumes that the household has $50,000 in financial assets, lives in the West, has had some health

an important first step in designing policies to expand its reach. This paper traces the recent evolution of credit quality, a key barrier to homeownership. In particular, it describes how an estimated measure of credit quality has changed over time for the general population as well as for various segments of the population; to our knowledge, such an analysis has not previously been conducted by researchers or policy-makers.

For the overall population, median credit quality rose modestly, but credit quality as measured by the percentage of the population estimated to be credit constrained deteriorated substantially between 1989 and 2001. The latter trend is consistent with known trends in consumer bankruptcy and credit delinquency, important determinants of measured credit quality.

The key finding is that trends in estimated credit quality vary in important ways by tenure status. Whether measured as median estimated credit score or percentage of households estimated to be credit constrained, credit quality has improved between 1989 and 2001 among homeowners. This finding is broadly consistent across households stratified by race, level of education, income, and urban, suburban or rural location.

In a striking contrast, credit quality among renters has deteriorated significantly over the same period. Declines are most pronounced among the young, those with lower incomes and ethnic minorities – populations often referred to as "underserved" or "vulnerable." Importantly, sizable majorities of these subgroups, up to 50 and 60 percent, would not be eligible for conventional mortgage credit by current mortgage market underwriting standards. Thus, the decline in credit quality among members of these groups may serve as a barrier to further expansion of homeownership.

While we identify an important trend, the analysis does not address the question of causation. That is, we do not disentangle the many different factors that could underlie the

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problems in the past 3 years, and is self-employed.

worsening credit profiles of renters. For instance, it could be that the increase in homeownership during the period studied occurred disproportionately among renter households with good credit quality. In such a case, the patterns we identify would simply be due to a selection process where the best credits leave the renter population, a selection process that has become more accurate and pervasive over time. Such a "skimming effect" would be benign from a policy perspective, as it would be consistent with the social goal of increased homeownership.

A separate explanation that addresses changing patterns over time is that access to homeownership itself provides conditions that make it easier to improve credit quality over time. This is after all what the old forced savings and the new hyperbolic preference literature imply (Phelps and Pollak, 1968; Laibson 1996, 1997). Alternatively, it is possible that recent immigrants are more likely to be renters than homeowners, all else equal, and that successive waves of immigrants have had larger proportions with credit quality below the critical threshold levels.

Of course, none of these possibilities are mutually exclusive and neither are they exhaustive. For example, race-based discrimination could play a role in these patterns, perhaps in the context of predatory lending. These questions are ripe for future research, the results of which will help provide a considerably deeper and richer understanding of how credit markets operate.

Regardless of its cause, our results indicate that the renter population is currently not in a particularly good position to become homeowners, and that it is in a worse position in this regard than it was 5 or 10 years ago. This has important implications for initiatives with goals to significantly increase the overall homeownership rate and the homeownership rate for vulnerable populations. In order to achieve these goals, policy makers will need to focus on strategies to

improve renter performance with their existing credit accounts, such as promoting education and financial literacy program. By improving financial literacy and consequently their credit performance, renters can see their credit quality improve to the point where they are eligible for conventional mortgage credit. They would then avoid the high prices and potential pitfalls of subprime and predatory mortgage markets while still being able to enjoy the full wealth-, neighborhood-, and health-related benefits that homeownership has been shown to impart.

A final, and important, caveat is that the analysis relies on the assumption that the relationship between individual characteristics and credit quality did not change over the course of the 1990s. We use a single model to estimate an individual's credit score in both 1989 and 2001. If the relationship between an individual's characteristics and the likelihood of repaying a loan evolved over time, though, then we might have inaccurately estimated an individual's credit quality in either 1989 or 2001. If so, then our temporal analysis would be somewhat misleading. However, we have little reason to believe that, even if the relationship has evolved over time, the changes have been sufficiently large to dismiss that the general trends we highlight here. If there had been such a change, one might have expected to see some of the models used by the industry over this time perform particularly poorly. To date, we are aware of no such incidences. As a result, we have a degree of confidence that the results we uncover are robust.

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Table 1: Selected credit score characteristics, 1989 and 2001

	Median score		Pct. constrained at 660	
	1989	2001	1989	2001
Total	721.3	730.1	19.3	24.5
Income quintile				
Bottom	702.5	688.3	21.0	38.7
2	716.1	704.9	20.1	28.7
3	728.7	725.5	20.4	19.3
4	739.3	743.3	16.2	10.0
Top	729.0	753.5	7.7	2.8
Race				
White	727.0	737.7	17.0	18.8
Black	693.0	676.0	27.1	41.7
Latino	695.0	670.0	25.4	48.5
Other	710.9	725.5	25.3	32.9
Location				
Central City	724.1	727.3	19.7	27.4
Suburb	714.8	725.2	19.4	22.2
Rural	724.6	734.9	18.9	22.2
Education				
LT HS	709.1	701.6	18.1	33.2
HS Diploma	715.3	712.4	23.8	30.0
Some college	726.9	719.7	18.7	25.8
College degree	730.5	742.8	19.2	14.7
Graduate school	734.4	750.6	11.2	10.0

Table 2: Panel A. Median credit scores, by income and race, 1989, 2001

		Income Quintile					
		Bottom	2	3	4	Top	All
Renters							
1989	White	699.1	696.5	705.8	725.7	719.5	702.7
	Black	691.9	677.9	655.1	666.0	*	687.2
	Hispanic	685.2	684.0	691.0	x	*	685.2
	All	693.0	692.8	699.9	719.8	719.1	696.0
2001	White	683.0	680.6	702.9	726.7	738.5	694.7
	Black	636.1	633.0	685.6	674.1	*	641.9
	Hispanic	599.2	626.2	692.4	662.4	x	623.7
	All	657.3	669.2	699.4	722.3	736.6	679.5
Owners							
1989	White	718.5	728.9	738.8	741.9	729.3	733.6
	Black	698.1	710.0	697.4	720.4	*	704.6
	Hispanic	684.1	701.0	711.3	731.2	*	702.7
	All	716.1	727.2	735.6	740.9	729.5	730.7
2001	White	740.1	740.1	740.7	747.8	754.0	747.5
	Black	712.6	706.0	708.0	729.0	*	709.0
	Hispanic	664.5	718.3	691.5	719.9	745.7	713.5
	All	733.4	735.3	735.8	746.1	753.8	744.5

* - Omitted due to small number of observations; x – no observations in the cell.

Table 2: Panel B. Percent credit-constrained – 660 threshold, by income and race, 1989, 2001

		Income Quintile					
		Bottom	2	3	4	Top	All
Renters							
1989	White	23.9	23.8	28.4	22.0	19.8	24.6
	Black	18.0	34.6	41.6	30.0	*	24.1
	Hispanic	18.6	16.5	37.7	x	*	20.5
	All	22.2	24.1	31.0	24.4	19.6	24.4
2001	White	39.6	40.3	29.2	14.3	0.0	35.4
	Black	56.9	57.3	35.4	32.2	*	54.2
	Hispanic	75.0	55.4	34.1	48.2	x	63.3
	All	50.4	45.2	30.4	17.4	12.0	43.1
Owners							
1989	White	11.8	12.3	14.1	14.4	4.8	12.9
	Black	33.7	29.9	32.3	28.7	*	31.5
	Hispanic	41.3	34.1	28.2	21.5	*	32.6
	All	18.8	16.6	16.2	14.9	6.5	15.8
2001	White	16.6	13.9	12.7	7.6	2.2	11.6
	Black	23.7	30.6	30.1	23.7	*	27.1
	Hispanic	44.0	19.1	36.0	0.9	3.2	27.8
	All	20.3	15.7	15.7	9.0	2.3	14.1

* - Omitted due to small number of observations; x – no observations in the cell.

Table 3: Panel A. Median credit scores, by income and urban location, 1989, 2001

		Income Quintile					
		Bottom	2	3	4	Top	All
Renters							
1989	Central City	688.7	694.1	705.8	702.7	717.7	695.0
	Suburb	700.9	683.9	699.1	718.0	715.6	700.0
	Rural	691.3	693.0	696.6	736.2	723.3	696.0
	All	693.0	692.8	699.9	719.8	719.1	696.0
2001	Central City	649.3	663.2	701.6	718.5	732.1	678.6
	Suburb	676.8	671.9	705.3	765.9	738.5	687.3
	Rural	656.9	672.1	694.3	711.5	738.8	677.7
	All	657.3	669.2	699.4	722.3	736.6	679.5
Owners							
1989	Central City	717.0	729.6	744.2	740.9	729.2	733.5
	Suburb	714.1	722.2	727.3	734.6	731.8	720.0
	Rural	716.7	728.6	735.6	741.9	729.5	733.2
	All	716.1	727.2	735.6	740.9	729.5	730.7
2001	Central City	732.5	742.1	736.3	746.1	752.9	745.2
	Suburb	730.0	728.1	729.0	736.7	759.4	734.6
	Rural	734.6	734.4	737.8	746.6	754.4	746.1
	All	733.4	735.3	735.8	746.1	753.8	744.5

Table 3: Panel B. Percent credit-constrained – 660 threshold, by income and urban location, 1989, 2001

		Income Quintile					
		Bottom	2	3	4	Top	All
Renters							
1989	Central City	28.1	16.0	25.9	37.2	15.3	23.6
	Suburb	24.3	39.3	34.3	12.8	31.1	29.3
	Rural	16.5	24.8	34.7	24.1	23.9	22.8
	All	22.2	24.1	31.0	24.4	19.6	24.4
2001	Central City	52.3	47.1	28.5	20.2	18.1	44.6
	Suburb	42.1	43.1	20.6	0.0	0.0	37.3
	Rural	51.2	43.2	25.4	17.2	0.0	43.1
	All	50.4	45.2	30.4	17.4	12.0	43.1
Owners							
1989	Central City	23.8	21.0	12.9	15.6	8.5	16.9
	Suburb	10.2	15.4	18.3	7.6	1.6	13.3
	Rural	24.0	13.3	17.8	16.7	5.5	16.3
	All	18.8	16.6	16.2	14.9	6.5	15.8
2001	Central City	20.5	16.1	17.5	10.8	1.7	15.0
	Suburb	20.5	19.2	13.1	6.2	1.2	15.6
	Rural	19.9	13.7	14.9	8.1	3.1	12.6
	All	20.3	15.7	15.7	9.0	2.3	14.1

* - Omitted due to small number of observations**.**

Table 4: Panel A. Median credit scores, by race and urban location, 1989, 2001

		Race			
		White	Black	Hispanic	All
Renters					
1989	Central City	702.7	693.3	681.3	695.0
	Suburb	706.3	678.1	703.1	700.0
	Rural	702.7	685.2	689.3	696.0
	All	702.7	687.2	685.2	696.0
2001	Central City	696.4	638.5	624.7	678.6
	Suburb	698.5	618.4	599.2	687.3
	Rural	693.0	664.0	624.0	677.7
	All	694.7	641.9	623.7	679.5
Owners					
1989	Central City	737.1	713.2	700.4	733.5
	Suburb	723.6	698.9	700.9	720.0
	Rural	734.4	704.9	719.7	733.2
	All	733.6	704.6	702.7	730.7
2001	Central City	749.5	709.3	708.9	745.2
	Suburb	736.7	698.6	734.1	734.6
	Rural	748.4	715.1	714.0	746.1
	All	747.5	709.0	713.5	744.5

Table 4: Panel B. Percent credit-constrained – 660 threshold, by race and urban location, 1989, 2001

		Race			
		White	Black	Hispanic	All
Renters					
1989	Central City	22.1	23.0	27.1	23.6
	Suburb	27.7	35.3	29.6	29.3
	Rural	24.8	21.2	6.7	22.8
	All	24.6	24.1	20.5	24.4
2001	Central City	34.8	55.6	63.1	44.6
	Suburb	32.8	66.5	73.3	37.3
	Rural	37.6	48.7	62.2	43.1
	All	35.4	54.2	63.3	43.1
Owners					
1989	Central City	11.8	31.4	39.2	16.9
	Suburb	11.1	22.7	0.0	13.3
	Rural	14.5	36.1	15.1	16.3
	All	12.9	31.5	32.6	15.8
2001	Central City	10.8	28.8	36.7	15.0
	Suburb	14.9	28.3	0.0	15.6
	Rural	10.8	24.7	19.4	12.6
	All	11.6	27.1	27.8	14.1

Table 5: Panel A. Median credit scores, by income and education, 1989, 2001

		Income Quintile					
		Bottom	2	3	4	Top	All
Renters							
1989	LT HS	700.9	690.9	680.6	712.7	719.1	697.1
	HS Diploma	685.2	684.5	703.0	760.3	692.3	689.5
	Some college	688.3	692.4	700.2	716.3	717.9	693.0
	College degree	673.3	724.1	713.0	732.9	719.9	717.8
	Graduate school	706.4	695.4	710.4	722.3	735.7	716.3
	All	693.0	692.8	699.9	719.8	719.1	696.0
2001	LT HS	654.1	636.3	672.9	750.9	713.2	656.1
	HS Diploma	641.0	652.4	670.5	696.2	720.8	659.9
	Some college	671.6	679.8	703.1	698.5	725.9	683.0
	College degree	694.5	677.0	713.3	738.1	757.4	702.9
	Graduate school	691.8	716.4	719.1	744.8	738.8	722.3
	All	657.3	669.2	699.4	722.3	736.6	679.5
Owners							
1989	LT HS	714.3	720.6	725.5	737.5	730.4	717.8
	HS Diploma	716.7	727.2	733.2	740.2	735.5	728.9
	Some college	709.3	742.7	734.5	743.9	738.9	740.3
	College degree	738.2	738.4	743.6	734.8	724.6	732.8
	Graduate school	721.8	735.02	750.0	744.2	728.6	735.4
	All	716.1	727.2	735.6	740.9	729.5	730.7
2001	LT HS	731.7	728.1	721.0	735.0	747.4	731.7
	HS Diploma	735.6	734.8	729.3	732.4	758.8	733.7
	Some college	725.4	728.2	732.7	731.1	761.2	736.2
	College degree	740.1	744.6	741.0	744.9	755.7	748.4
	Graduate school	739.4	759.6	748.8	755.8	751.4	752.7
	All	733.4	735.3	735.8	746.1	753.8	744.5

Table 5: Panel B. Percent credit-constrained – 660 threshold, by income and education, 1989, 2001

		Income Quintile					
		Bottom	2	3	4	Top	All
Renters							
1989	LT HS	15.7	24.5	34.3	20.7	0.0	19.7
	HS Diploma	30.0	30.6	30.9	23.7	97.9	30.0
	Some college	19.0	20.2	25.6	18.1	10.0	20.5
	College degree	42.5	14.9	36.6	33.3	21.1	30.7
	Graduate school	11.6	0.0	30.8	20.0	20.2	18.4
	All	22.2	24.1	31.0	24.4	19.6	24.4
2001	LT HS	52.0	54.1	26.3	29.0	0.0	50.6
	HS Diploma	56.3	53.3	40.8	23.7	71.9	50.9
	Some college	46.0	38.0	34.4	13.8	0.0	38.8
	College degree	36.3	41.3	17.4	14.9	0.0	30.0
	Graduate school	32.8	21.4	14.1	12.4	0.0	19.3
	All	50.4	45.2	30.4	17.4	12.0	43.1
Owners							
1989	LT HS	16.7	16.8	17.9	16.9	0.0	16.7
	HS Diploma	18.0	16.0	22.6	18.2	1.8	18.6
	Some college	44.9	22.8	12.1	15.7	9.8	17.4
	College degree	4.8	11.3	16.3	14.2	10.5	13.5
	Graduate school	33.3	7.4	8.5	10.9	4.6	9.0
	All	18.8	16.6	16.2	14.9	6.5	15.8
2001	LT HS	22.2	12.8	24.0	7.9	0.0	18.3
	HS Diploma	17.8	18.2	17.1	10.9	2.2	16.5
	Some college	13.1	20.4	19.5	13.6	0.6	17.3
	College degree	36.7	9.4	10.0	6.0	2.4	8.9
	Graduate school	17.3	6.5	9.2	8.3	2.7	7.9
	All	20.3	15.7	15.7	9.0	2.3	14.1

Table 6: Panel A. Median credit scores, by education and race, 1989, 2001

		Education					
		LT HS	H.S. Diploma	Some College	College Diploma	Graduate School	All
Renters							
1989	White	702.5	696.9	697.3	720.6	722.3	702.7
	Black	695.0	677.9	677.9	703.2	666.0	687.2
	Hispanic	683.1	682.7	687.3	*	*	685.2
	All	697.1	689.5	693.0	717.8	716.3	696.0
2001	White	680.0	676.3	693.0	706.0	727.8	694.7
	Black	648.1	627.2	664.5	686.7	665.0	641.9
	Hispanic	603.9	603.9	665.3	661.7	676.3	623.7
	All	656.1	659.9	683.0	702.9	722.3	679.5
Owners							
1989	White	720.7	733.1	742.8	732.8	735.6	733.6
	Black	703.8	699.0	713.4	727.5	736.4	704.6
	Hispanic	704.3	701.3	727.6	*	*	702.7
	All	717.8	728.9	740.3	732.8	735.4	730.7
2001	White	736.8	737.2	714.3	749.6	753.5	747.5
	Black	715.3	715.1	690.7	677.2	735.9	709.0
	Hispanic	713.0	714.5	718.4	721.5	706.8	713.5
	All	731.7	733.7	736.2	748.4	752.7	744.5

* - Omitted due to small number of observations**.**

Table 6: Panel B. Percent credit-constrained – 660 threshold, by education and race, 1989, 2001

		Education					
		LT HS	H.S. Diploma	Some College	College Diploma	Graduate School	All
Renters							
1989	White	23.6	29.0	17.8	31.4	17.6	24.6
	Black	16.2	33.0	24.4	26.4	39.4	24.1
	Hispanic	10.9	27.1	31.2	*	*	20.5
	All	19.7	30.0	20.5	30.7	18.4	24.4
2001	White	39.1	43.2	35.4	26.3	15.7	35.4
	Black	52.6	63.4	43.3	39.5	46.4	54.2
	Hispanic	67.0	67.4	52.4	43.6	34.7	63.3
	All	50.6	50.9	38.8	30.0	19.3	43.1
Owners							
1989	White	9.8	17.0	14.8	13.2	6.5	12.9
	Black	33.9	28.2	33.4	11.3	38.8	31.5
	Hispanic	29.2	39.1	25.5	*	*	32.6
	All	16.7	18.6	17.4	13.5	9.0	15.8
2001	White	15.4	14.7	14.4	6.3	6.4	11.6
	Black	20.0	24.0	36.3	36.6	17.2	27.1
	Hispanic	35.1	30.7	20.0	9.2	31.3	27.8
	All	18.3	16.5	17.3	8.9	7.9	14.1

* - Omitted due to small number of observations.

Table 7: Estimates for regressions on individual credit score

	1989 SCF sample				2001 SCF sample			
Parameter	Estimate	S. E.	Estimate	S. E.	Estimate	S. E.	Estimate	S. E.
Intercept	741.78***	6.96	731.49	7.35	764.86***	6.04	737.25***	6.31
Income quintile (Top omitted)								
Bottom	-11.09**	4.26	-7.54	4.35	-30.03***	3.41	-20.03***	3.46
2	-4.39	3.73	-2.16	3.77	-17.97***	3.12	-11.36***	3.09
3	5.41	3.32	6.47	3.32	-6.07*	2.84	-3.35	2.78
4	9.38**	3.02	9.72**	3.01	5.13	2.60	2.18	2.55
Education (less than H.S. omitted)								
Grad School	19.58***	3.43	18.83***	3.42	19.73***	3.10	18.88***	3.04
College degree	11.21***	3.39	10.77**	3.38	17.76***	2.95	17.30***	2.90
Some college	16.96***	3.18	16.63***	3.17	10.00***	2.86	10.83***	2.80
H.S. diploma.	7.47**	2.74	7.52**	2.73	5.92*	2.66	6.12*	2.60
Race (white omitted)								
Other	-4.60	4.62	-4.12	4.61	-9.77*	4.64	-8.31	4.55
Latino	-13.22**	4.30	-12.78**	4.30	-20.34***	3.32	-18.47***	3.25
Black	-19.87***	3.18	-18.92***	3.18	-26.36***	2.66	-22.64***	2.64
Age (65+ omitted)								
LT 25	-74.52***	5.89	-69.09***	5.73	-96.06***	4.16	-84.31***	4.18
25-34	-59.86***	3.32	-56.50***	3.41	-84.73***	2.84	-75.82***	2.87
35-54	-37.79***	2.72	-36.25***	2.74	-52.77***	2.27	-49.16***	2.25
55-64	-20.91***	2.83	-20.60***	2.82	-35.88***	2.50	-34.72***	2.45
Location (Suburb omitted)								
Rural	1.99	2.09	1.20	2.09	-0.45	1.62	0.59	1.59
Cent. City	-4.25	2.45	-4.44	2.44	1.06	2.35	0.50	2.31
Homeowner	--	--	9.74***	2.72	--	--	24.81***	1.95
Dep. Variable mean	.153		.153		.204		.204	
Observations	15675		15675		22210		22210	
R-squared	0.096		0.097		0.239		0.256	

NOTE: Other controls include gender, self-employment, marital status, health condition, and regional dummy variables, as well as a variable for the number of children the individual is responsible for.
*** - $p < .001$, ** - $p < .01$, * - $p < .05$.

Table 8: Estimates for regressions on percent credit constrained using the 660 threshold

	1989 SCF sample				2001 SCF sample			
Parameter	Estimate	S. E.	Estimate	S. E.	Estimate	S. E.	Estimate	S. E.
Intercept	-0.033	0.050	0.003	0.053	-0.027	0.044	0.132**	0.046
Income quintile (Top omitted)								
Bottom	0.054	0.030	0.042	0.031	0.213***	0.025	0.156***	0.025
2	0.081**	0.026	0.073**	0.027	0.128***	0.022	0.090***	0.022
3	0.077**	0.024	0.073**	0.025	0.039	0.020	0.024	0.020
4	0.050*	0.022	0.049*	0.022	-0.008	0.019	-0.012	0.019
Education (less than H.S. omitted)								
Grad School	-0.086***	0.025	-0.083***	0.025	-0.076***	0.022	-0.071**	0.022
College degree	-0.040	0.025	-0.038	0.025	-0.071***	0.021	-0.068**	0.021
Some college	-0.069**	0.024	-0.068**	0.024	-0.034	0.021	-0.039	0.020
H.S. diploma.	-0.008	0.020	-0.008	0.020	0.005	0.019	0.004	0.019
Race (white omitted)								
Other	0.022	0.034	0.020	0.034	0.073*	0.034	0.064	0.033
Latino	0.025	0.031	0.023	0.031	0.130***	0.024	0.119***	0.024
Black	0.088***	0.023	0.084***	0.023	0.134***	0.019	0.112***	0.019
Age (65+ omitted)								
LT 25	0.322***	0.040	0.304***	0.041	0.409***	0.031	0.341***	0.031
25-34	0.234***	0.024	0.222***	0.024	0.321***	0.021	0.270***	0.021
35-54	0.163***	0.019	0.158***	0.020	0.183***	0.017	0.162***	0.017
55-64	0.086***	0.020	0.085***	0.020	0.150***	0.018	0.144***	0.018
Location (Suburb omitted)								
Rural	0.004	0.015	0.004	0.015	0.004	0.012	-0.002	0.012
Cent. City	0.019	0.017	0.019	0.017	-0.016	0.017	-0.012	0.017
Homeowner	--	--	-0.034*	0.016	--	--	-0.143***	0.014
Dep. Variable mean	.153		.153		.204		.204	
Observations	15675		15675		22210		22210	
R-squared	0.096		0.097		0.239		0.256	

NOTE: Other controls include gender, self-employment, marital status, health condition, and regional dummy variables, as well as a variable for the number of children the individual is responsible for.
*** - p < .001, ** - p < .01, * - p< .05.