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Evidence on Discrimination in Mortgage Lending

Helen F. Ladd

The ability to get a mortgage is often the key to an individual's ability to purchase a home. The lenders who originate mortgage loans include depository institutions such as commercial banks, mutual savings banks, and savings and loan associations, as well as nondepository institutions such as mortgage banking companies. The United States has enacted a variety of laws making it illegal for lenders to discriminate against members of historically disadvantaged groups, particularly women and minorities. These laws include most notably the Fair Housing Act of 1968 and the Equal Credit Opportunity Act of 1974 (ECOA). ECOA also makes it illegal for lenders to use the racial composition of the neighborhood as a determinant of the lending decision. In addition, policy concern about the viability of urban neighborhoods has generated laws such as the Community Reinvestment Act of 1977 that impose an affirmative obligation on lenders to help meet the credit needs of their entire communities.

Starting in 1975, the Home Mortgage Disclosure Act (HMDA) required lenders to report information on their mortgage lending by Census tract. The 1989 revisions to that act went much further and required lenders to report information on the disposition of individual applications. The availability of this information heightened the debate about fair lending. For example, the pre-1989 HMDA data led to a Pulitzer-Prize winning series that ran during May 1988 in the *Atlanta Journal Constitution*, called "The Color of Money." That series served as the basis for a U.S. Department of Justice case against the Atlanta-based Decatur Federal Savings and Loan, which in 1992 ended in a landmark consent decree. The new HMDA data

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revealed loan rejection rates that were twice as high for blacks as for whites, which generated an intense period of congressional oversight and fair lending actions. Based on an enhanced version of the 1990 HMDA data for the Boston area, a major study circulated in 1992 by the Federal Reserve Bank of Boston provided striking, but controversial, new evidence of discriminatory treatment by lenders against minorities. In both the research and the enforcement communities, the issue of discrimination in mortgage lending is currently one of most controversial topics in the area of civil rights.¹

Defining Racial Discrimination: Prejudice Over Profit?

The debate and controversy begins with fundamental disagreements about how to define and measure racially discriminatory behavior. Much of the confusion and controversy arises because the definition of discrimination used by some economists is narrower than the current legal definition of discrimination. A key conceptual dividing line here is whether prejudice must be put ahead of profits for behavior to be labeled as discriminatory, or whether lenders can be labeled as discriminators even if their intent is to increase profits.

Gary Becker's 1971 book (originally published in 1957) is the seminal work on the economics of discrimination. According to Becker, discriminatory behavior emerges from prejudice or a "taste for discrimination" and it requires that the discriminator pay or forfeit income for the privilege of exercising prejudicial tastes. Applying this definition to the field of mortgage lending, economists in the Becker tradition might claim that some actions that the law would interpret as unfair treatment of a protected group do not represent discrimination, on the grounds that lenders were simply trying to maximize profits. To accept the conclusion of discrimination, such an economist would require evidence that the group receiving the differentially adverse treatment imposes credit risks that on average are no higher than those imposed by other groups of borrowers.

While Becker's focus on the "taste for discrimination" has achieved significant currency within the economics profession, other well-known economists, including Kenneth Arrow and Edmund Phelps, have developed models for understanding discriminatory behavior that do not assume the lender (or the employer in the labor market situation) is prejudiced or foregoes profits. Differentially adverse treatment of a protected group may instead result from "statistical" discrimination; that is, discrimination that occurs because the lender finds it cheaper to use the characteristics of an applicant's group, such as its race, to estimate the applicant's creditworthiness rather than the applicant's own past history. In some situations, dis-

¹ For a remarkably authoritative and complete discussion of the issues in this controversial area, readers might begin with the papers collected in Goering and Wienk (1996), which grew out of a major conference held by the Department of Housing and Community Development in 1993.

crimination of this form may show up as profit-driven, but racially differing, rules of thumb that the lender uses to weight legitimate characteristics of various groups of borrowers. The legal definition of racial discrimination does not presume that lenders are foregoing profits to exercise prejudice against the protected group. Hence, illegal discrimination need not be uneconomic in the sense that it reduces profits.

Antidiscrimination laws prohibit lenders from treating equally creditworthy borrowers differently based on some protected characteristic such as their race or gender. For example, the Equal Credit Opportunity Act (sec. 701, as amended in March 1976) states that it “shall be unlawful for any creditor to discriminate against any applicant, with respect to any aspect of a credit transaction . . . on the basis of race, color, religion, national origin, sex or marital status, or age . . .” The Fair Housing Act of 1968 uses similar language (except that it omits marital status). These laws have been interpreted to mean that while lenders are allowed to differentiate among applicants based on the characteristics of the applicant or the property that are linked to the expected return on the loan, they are not allowed to use the applicant’s membership in a protected group to distinguish among applicants. In essence, the law requires that lenders make decisions about mortgage loans as if they had no information about the applicant’s race, regardless of whether race is or is not a good proxy for risk factors not easily observed by the lender.

In addition, the Equal Credit Opportunity Act makes it illegal for lenders to discriminate on the basis of the racial composition of the neighborhood and several federal courts have interpreted the Fair Housing Act in the same way. Because of the red lines that lenders were alleged to have drawn around geographic areas within which they refused to make loans (or to make them only on less favorable terms), this geographic-based form of discrimination is often called “redlining.”

The fact that the broader definition of discrimination is embodied in current law provides a powerful justification for defining discrimination in that way throughout this article. Hence, the definition of discrimination used here is broader than that associated with Becker. In contrast to his definition, this definition implies that stricter enforcement of antidiscrimination laws could possibly reduce the short-run profits of lenders and also that market pressures may not compete discrimination away. While some economists may view the laws as unfair to lenders, these laws reflect the societal judgement that the benefits from increased social justice for minorities are worth more than the costs of potentially inefficient behavior by the lenders.

Measuring Disparate Treatment of Protected Groups

Multiple regression analysis allows one to compare a large number of loan application files while controlling for the relevant information in the lender’s information set at the time of the decision. A straightforward regression model to

test for whether lenders discriminate against minorities at the loan application stage might take the form $R = f(A, P, T, M, N)$, where R is the probability that the loan is rejected, A and P refer to characteristics of the applicant and the property that can be observed by the lender and that are plausible determinants of the expected return on the loan, T is a vector of mortgage terms such as maturity and interest rate, M is a 0–1 indicator variable denoting the race of the applicant, and N is a set of indicator variables denoting the neighborhood of the subject property.² Provided that all the relevant risk-related applicant and property characteristics available to the lender are included in the equation, a positive coefficient on the race variable would indicate discrimination against minorities and a positive coefficient on specific neighborhood variables could indicate redlining.

This regression framework is commonly used and analytically sound. A somewhat more complex form would allow for interactions between the race of the applicant (and also possibly location) and the other variables in the equation. This specification would indicate whether lenders evaluate different applicant or property characteristics differently by racial group and hence would shed additional light on the mechanism through which lenders differentiate their treatment by racial group. Another approach would carry out this test bank by bank, so that one can determine whether a specific bank is treating minority applicants differently than white applicants, as argued by Stengel and Glennon (1995).

This approach, like most of the recent academic literature and public controversy, applies to the treatment of borrowers at the application stage of the process. The discussion in this article will maintain that focus. However, it is worth noting that based on current laws, unfair treatment of minorities could potentially occur at several other stages in the lending process. One stage has to do with the selection of the “service area” that a depository institution chooses to serve. According to the Community Reinvestment Act, depository institutions are obligated to help meet the credit needs of their entire service areas. However, a lender might define its service area to exclude most minorities; in the 1992 Decatur case in Atlanta, for example, the bank had defined its service area to exclude 75 percent of the African-American population in one of Atlanta’s major counties. A second stage relates to whether advertising and marketing through real estate agents is done on a nondiscriminatory basis. A third stage is prescreening of mortgage applicants. Although some prescreening is legitimate and appropriate, it becomes illegal when it is used to discourage minority borrowers from applying for loans. The fourth stage is whether minority buyers are granted less favorable loan terms such as higher interest rates or shorter maturities than white buyers. Discrimination at these other stages deserves more attention from researchers.

Moreover, while the regression framework is likely to uncover disparate treatment of minorities, it might not spot cases in which the even-handed application

² This specification follows Yinger (1996a). It is fully consistent with the Boston Fed study approach discussed below which characterizes the control variables by their contributions to the probability and costs of default.

of a bank's lending standards is having an adverse impact on people in protected classes. According to the adverse-impact concept of discrimination, a lender would be discriminating if it were using a specific applicant or property characteristic in the loan evaluation process that had a disproportionately adverse impact on minorities and that could not be justified in terms of the profitability of the loan. For example, a lender could use an applicant's income as the basis for rationing credit—which would most likely lead to fewer loans to minorities who tend to have lower income than whites—only if the applicant's income can be shown to be related to the risk of default, all other factors held constant. Such an outcome is not assured, especially if the lender is also considering the ratio of debt or housing expense (or both) to the applicant's income as a separate criterion. In a study of ten savings banks, the New York State Banking Department found that four had lending standards (such as high minimum down-payment ratios) that could adversely affect minorities, women, and low income and predominantly minority neighborhoods (cited by Galster, 1996, p. 689). However, allegations of adverse impact require that the analyst understand the relationship between all variables used to evaluate the riskiness of the loan and their impacts on the bank's profitability. Such determinations are often difficult to make and hence have not been the focus of most of the recent research and enforcement efforts.

The focus for this article is disparate treatment, rather than adverse impact. However, as we will see in the later discussion of "credit scoring," the two concepts may be interrelated.

How Plausible is it that Mortgage Lenders Might Discriminate?

In the past, mortgage lenders have clearly discriminated against some groups of borrowers and much of the discrimination was overtly part of their policy guidelines. For example, prior to the passage of the 1974 Equal Credit Opportunity Act, banks often had explicit policies to treat women less favorably than men. As documented by several surveys in the 1970s, mortgage lenders often discounted a wife's income by 50 percent or more when evaluating mortgage applications and banks were more likely to discount the wife's income if she was of child-bearing age or if the family included pre-school children. When the Equal Credit Opportunity Act of 1974 prohibited sex-based classifications and income discounting, the change seems to have had a dramatic effect on bank policies toward women (Schafer and Ladd, 1981; Ladd, 1982).

Now that racial discrimination in mortgage lending against minorities is clearly illegal under both ECOA and the Fair Housing Act of 1968, how plausible is it to believe that banks might continue to discriminate against protected groups, especially minorities?

Given the current competitive environment for mortgage lending, lending institutions are unlikely to be willing to forego profits as the price for implementing discrimination. If some lenders would prefer not to lend to minorities, they would

lose profits relative to other firms. As bankers point out, they are in business to make money. To make money on mortgages they need to make loans for which the expected return from the interest payments exceeds the expected costs of the loan, including any possible loss from having to foreclose on the property.

However, the desire to make money, combined with other factors such as prejudicial attitudes on the part of bank customers or the costs of gathering information, could still lead lenders to discriminate against minorities. For example, consider savings and loan associations or other depository lenders who obtain their loanable funds through the savings of local residents. To the extent that those local depositors are prejudiced against minorities and would prefer not to have minorities as neighbors, they would be less willing to deposit their funds in a local savings and loan that was known to provide local mortgages to minorities than to one that did not. In this way, prejudice on the part of the banks' customers could lead a profit-maximizing institution to discriminate against minorities. John Yinger (1986, p. 892) provides some evidence of this behavior for other actors in the housing market, namely, real estate agents who apparently cater to the racial prejudice of their current or potential white customers.

Lending institutions would also have a profit-oriented motive to discriminate against minority borrowers if, even after controlling as best they could for borrower and property characteristics, they expected minorities on average to have higher default rates than whites. Lenders might believe, for example, that discrimination against minorities in the labor market could make the income of minorities more volatile on average over the economic cycle than that of whites, even controlling for type of job, and hence make minorities more likely to default. Or they may note that minorities typically are less able to rely on friends or relatives to help them through tough economic times. These beliefs would lead lenders to treat minorities adversely, provided the race of the applicant were a cheaper screening device than the other ways they might distinguish between the quality of otherwise similar applicants.

Somewhat surprisingly, very little information on default rates by race is available. In one review of the default literature that went back to the 1960s, Quercia and Stegman (1992) briefly mention only one article that used race as an explanatory variable. According to that study by Evans et al. (1985), blacks had 7.5 percent more defaults than whites, but the difference in expected losses was only 2.4 percent. A more recent study, discussed in greater depth below, found that raw default rates on loans insured by the Federal Housing Administration were 2 percentage points higher for black borrowers than for white borrowers, even after other key characteristics of the borrower and the neighborhood were taken into account (Berkovec et al., 1996b, p. 20). If the evidence of higher default rates among minority groups holds up in future research, it would provide a motive for lenders to engage in profit-motivated statistical discrimination against minorities.

However, two puzzles remain about the plausibility of such statistical discrimination. The first puzzle relates to the important role of the secondary market in mortgage loans. Mortgage lenders are part of a complex financial system that in-

cludes governmental agencies such as the Federal Housing Administration (FHA) and the Veterans Administration (VA) which guarantee loans, and agencies that constitute a secondary market for mortgage loans, such as the Federal National Mortgage Association (FNMA, “Fannie Mae”), the Federal Home Loan Mortgage Corporation (FHLMC, “Freddie Mac”) and the Government National Mortgage Association (GNMA “Ginnie Mae”).³ Lenders in the secondary market buy loans from direct lenders and resell them. For present purposes, the important characteristic of this process is that the risks of default are shifted to investors in the secondary market, and so it is not clear why loan originators such as banks should need to pay attention to any race-specific probability of default. Provided the loan meets the standards imposed by the secondary market, originators of loans would have little or no incentive to avoid the additional risks they might perceive to be associated with some loans to minorities.

However, only about 50 percent of loans are sold to the secondary market in the first year of the loan. Moreover, if the originator can exercise some discretion with respect to the guidelines and pays some price for selling risky loans to the secondary market, the originator continues to have an incentive to practice statistical discrimination against minorities. Recent studies of the secondary market offer some evidence to support this possibility (Van Order, 1996). To reduce the incentive of loan originators to sell their riskier loans to that market and to retain their less risky loans, Fannie Mae and Freddie Mac have set guidelines as to what makes a quality loan and have imposed requirements such as that loans with high loan-to-value ratios have private mortgage insurance. However, to maximize the potential of the secondary market to mobilize capital, Fannie Mae and Freddie Mac also permit a fair degree of lender discretion. They allow lenders to sell them nonstandard loans provided the imperfections of the loan are offset by compensating factors so that the credit risk remains unchanged. To minimize the chances that lenders will abuse this discretion, Fannie Mae and Freddie Mac punish lenders who sell excessively risky loans by making them repurchase bad loans that were outside the guidelines and by threatening to stop buying loans from them. In practice, lenders appear to have significant leeway for discretion because most applicants—both white and black—fail to meet one or more of the guidelines (Browne and Tootell, 1995, p. 56).

Are the guidelines in the secondary market discriminatory or applied in a discriminatory manner? If so, then discriminatory outcomes for borrowers could reflect unfair treatment not by the originators of loans, but rather by the lenders in the secondary market. One study found no evidence of such discrimination in the secondary market (Van Order, 1996). However, research in this area is difficult and much more remains to be done.

The second puzzle relates to the mechanism through which the originators of

³ Virtually all FHA and VA insured loans are sold to GNMA. Originally, conventional mortgages originated by mortgage bankers were sold primarily to FNMA and conventional loans originated by thrift institutions were sold to FHLMC but that distinction no longer applies.

loans implement discrimination. Given that statistical discrimination is illegal, lenders cannot discriminate as a matter of explicit bank policy, as they did with women. One possibility is that lenders evaluate objective information differently for minorities than for whites. For example, in a follow-up analysis of data collected by the Boston Federal Reserve Bank, Carr and Megbolugbe (1993) found that the lender's subjective measure of an applicant's creditworthiness was highly correlated with the race of the applicant, even after controlling for three objective measures of borrower credit histories. Also, Bostic (1996) found evidence that lenders use rules of thumb to weight different components of a loan application differently by race. Another mechanism through which lenders might engage in statistical discrimination, referred to as the "thick file" phenomenon, emerged from the investigation of Decatur Federal in Atlanta. It seemed that loan officers at that institution often provided more assistance to white than to minority lenders, so that the files of the white borrowers were likely to end up thicker than those of minority borrowers, and because of that assistance, may have been more likely to be approved.⁴

These forms of discrimination may evolve because lenders believe that denying loans to minorities will raise bank profits. Alternatively, they may evolve from the cultural affinities of white loan officers. The idea is that because white loan officers may have less cultural affinity with and hence less knowledge of minority applicants, they may be likely to perceive objective information differently for minority applicants than for white applicants and to rely more heavily on that information rather than investing marginal resources in gathering more information on the creditworthiness of minority applicants (Calomiris, Kahn and Longhofer, 1994; Hunter and Walker, 1996). A variation on this theme argues that because most loan officers process more white applications than black applications, loan officers have more information on whites than on black applicants, and hence have less need to use group characteristics for whites than they do for minorities. Although these mechanisms have some plausibility, their prevalence and importance have not been fully documented and are worth further investigation.

Evidence of Disparate Treatment

Evidence that minority groups are treated differently by lenders can be separated into three categories: differences in loan denial rates, differences in loan default rates, and evidence on the possibility of geographic redlining.

Loan Applications Data

In an early study of loan applications data, Schafer and Ladd (1981) took advantage of the detailed data on applications available under state law in California

⁴ As noted by Yinger (1996a), if the assistance shows up in variables that the lender explicitly examines, the assistance may serve not only as an explanation for a positive finding of discrimination, but it may also indicate that the standard estimate of the extent of discrimination is downward biased.

and New York. Using applications data for state-regulated S&L's in California in 1977–78 and for commercial banks, mutual savings banks, and S&L's in New York in 1976–78, Schafer and Ladd estimated a series of models for each of many metropolitan areas in each state. The goal was to test for discrimination against a wide variety of groups including those defined by race, by gender, and by marital status. They found considerable evidence of discrimination against blacks. In 18 of the 32 California areas and six of the ten New York areas, black applicants had significantly higher chances of loan denial than similarly situated whites. The differences were large, with black applicants being 1.58 to 7.82 times as likely to be denied as whites.

Other than the direct evidence of discrimination, perhaps the most interesting aspect of the results was what they indicated about the differences in disparate treatment toward women and minorities over time. For the first year of the analysis in both states, the authors found differentially adverse treatment of women in a few metropolitan areas and against minorities in a large number of the metropolitan areas. However, in the second year of the analysis, differential treatment of women all but disappeared, while that of minorities remained. After the passage of the Equal Credit Opportunity Act in 1976, it apparently did not take long for banks to change their policies toward women, many of which may have been based on outdated stereotypes about women's commitment to the labor market. The differential treatment of minorities, in contrast, apparently reflected a more subtle and less overt process that was more difficult to eliminate (Ladd, 1982; Schafer and Ladd, 1981).

The set of control variables used to control for the riskiness of the loan was crucial to the Schafer and Ladd (1981) study, as well as to more recent studies. For the California analysis, the authors used applicant income, income relative to the requested loan, the loan-to-value ratio, income of secondary earners, age of applicant, age of property, and census tract or zip code variables to control for the neighborhood. The control variables for the New York analysis were comparable but also included net wealth and years at present occupation. This set of control variables was quite rich. However, the absence of a wealth variable in the California data set and of credit history variables for either state left the study open to the criticism that key variables had been omitted.

The 1989 expansion of the data reporting requirements for lending institutions under the Home Mortgage Disclosure Act of 1975 provided new data on individual applications for additional research. Beginning in 1990, nine variables are now included for each application: date of application; loan amount; census tract of property; if the property is owner-occupied; purpose of the loan (purchase, improvement or refinancing); loan guarantee (conventional, FHA, or VA); loan disposition (approved, approved but withdrawn, no lender action taken, or denied); race; gender; and applicant income. Moreover, the set of reporting lenders was expanded beyond depository institutions to include independent mortgage companies. The 1994 data, for example, included information on more than 12 million loan applications from over 3000 lenders (Goering and Wienk, 1996). However, the new HMDA data still fell short of what was required for a conclusive study of

racial discrimination. Several key variables, such as the characteristics of the property and the credit history of the applicant, were not included.

These limitations were directly addressed by the Federal Reserve Bank of Boston in its recent study of discrimination in mortgage lending. To supplement the HMDA data, researchers at the Boston Fed sought the cooperation of lenders throughout the Boston metropolitan area. Their procedure was to examine all of the 1990 loan applications from minorities in the Boston area, plus a random sample of applications from whites. For each application, the researchers asked lenders to provide an additional set of 38 pieces of information which, according to prior discussions with the lenders, included all the information in the lender's information set at the time the loan was made. Some files were dropped from the analysis because of missing data and others because the borrower withdrew the application before a decision was made. The final sample included about 3000 applications, 700 of which were from blacks and Hispanics. With this rich data set, the researchers were armed to test for discrimination in mortgage lending. The study was originally circulated in 1992, then revised in response to some of the early criticisms and published in the March 1996 issue of the *American Economic Review* (Munnell et al., 1996).

The basic strategy of the Boston Fed study was to estimate a regression equation to explain the probability that a loan would be denied as a function of four categories of variables: those that affect the risk of default, those that affect the costs of default, loan characteristics, and personal characteristics of the borrower. Among the latter is a race variable that takes on the value of 1 for both blacks and Hispanics and 0 otherwise.⁵ A positive coefficient on the race variable represents an estimate of the extent to which minorities were adversely treated by lenders simply on the basis of race—at least assuming that the researchers have fully controlled for all the other legally permissible variables used by the lender to evaluate the loan application.

The complete set of variables is listed in Table 1. Particularly noteworthy is the inclusion of some key variables related to the risk of default that are missing from most previous studies of loan denials: the consumer's credit history, mortgage credit history, public record of defaults or bankruptcies, and level of employment instability. Most of the other variables are relatively straightforward. To test for the robustness of the results, the authors test a wide variety of models and specifications.

Before adjusting for any of the control variables, the loan denial rate was 10 percent for whites and 28 percent for minorities. This big differential is greatly reduced when personal and property characteristics are controlled for, since those characteristics tend to be disproportionately unfavorable to minorities. Once these variables are taken into account either through ordinary least squares regressions or logit models, the gap shrinks from 18 percentage points to about 8 percentage points. That is, if the typical denial rate for whites was 10 percent, the typical denial

⁵ A statistical test based on separate coefficients for the two groups of minorities would not allow the authors to reject the hypothesis of no difference in the coefficients. Hence all the reported regressions are based on the single aggregated "race" variable.

Table 1
Variables in Boston Federal Reserve Bank Study

<i>Risk of default</i>	<i>Loan characteristics</i>
Housing expense/income	Two-to four family home
Total debt payments/income	Fixed-rate loan
Net wealth	Special program (MHFA)
Consumer credit history	Term of loan
Mortgage credit history	Gift or grant in down payment
Public record history	Cosigner
Unemployment region	Lender 0–1 variables
Self-employed	
Probability of unemployment	<i>Personal Characteristics</i>
Loan/appraisal value-low	Race
Loan/appraisal value-medium	Age
Loan/appraisal value-high	Gender (female = 1)
	Number of dependents
	Marital status (not married = 1)
<i>Cost of default</i>	
Denied private mortgage insurance	
Rent/value in tract	
Housing units boarded up	
Housing units vacant	
Housing value appreciation	
Census tract 0–1 variables	

Source: Alicia H. Munnell, Geoffrey M.B. Tootell, Lynn E. Browne, and James McEneaney, "Mortgage Lending in Boston: Interpreting HMDA Data," *American Economic Review*, March 1996, Table 3.

rate for a comparable black applicant would be about 18 percent. Given the comprehensiveness of the set of control variables, it is hard to avoid the conclusion that the remaining differentials between whites and minorities indicate that lenders discriminate against minorities in the lending decision.

Moreover, since this study does not measure the amount of potential discrimination at other points in the lending process, it probably understates the extent to which lenders discriminate. As mentioned earlier, lenders could also discriminate in their selection of the institution's "service area," in their advertising and marketing strategy, at the prescreening stage, and in the setting of mortgage terms.

These results have been subjected to tremendous scrutiny and criticism. The Boston Fed made the underlying data available, so that researchers had the opportunity to examine the quality of the data and to test alternative specifications. Various combinations of the original authors have responded to their critics in numerous publications (Browne and Tootel, 1995; Tootel, 1996; Munnell et al., 1996). What follows is a brief summary of the types of criticisms and the authors' responses to them. Some of the criticisms applied to the original version and no longer apply to the final version of the study. The bottom line is that the results related to race are extremely robust.

The easiest attacks to dismiss are those related to the integrity of the data (Horne, 1994). Critics identified a large number of so-called coding or data errors, but a closer analysis showed that some of them were not errors and others were irrelevant to the analysis since they applied to parts of the HMDA data that were not used in the regression (Tootell, 1996). Various studies have since confirmed that using a modified, cleaner data set does not alter any of the conclusions about the role of race (Carr and Megbolugbe, 1993).

On a potentially more substantive note, some researchers questioned the absence from the model of a few variables that were in the data set. For example, Zandi (1993) criticized the authors for not including a variable that represented the lender's subjective evaluation of the borrower's creditworthiness, a measure intended to summarize three objective measures of creditworthiness that were already in the equation. The inclusion of this variable sometimes causes the coefficient of the race variable to become unimportant. However, both other researchers and the Fed researchers have persuasively argued that the variable should not be included in the model (Tootell, 1996; Carr and Megbolugbe, 1993). The question on which the variable was based did not appear on the original loan application form and the answer was recorded after the decision was made about the disposition of the loan. The Boston Fed researchers show that it appears to be very similar to the denial variable and hence is unsuitable as an exogenous explanatory variable.

A variety of other specification issues have been noted: that some variables might better be specified in threshold form; that the Boston Fed researchers erred in collapsing answers to nine questions pertaining to consumer credit and mortgages into two variables; and that applicants who were denied private mortgage insurance should have been eliminated from the sample. However, modifying the specification in these ways has little or no effect on the race coefficient (Stengel and Glennon, 1994). Yet another specification argument is that certain loan terms, especially the loan-to-value ratio, may create a simultaneity problem if borrowers may negotiate with the lender and agree to reduce the loan amount in response to the possibility that the loan will be denied (Yezer, Phillips, and Trost, 1994). However, while some negotiation may take place, it need not rule out interpreting the process as a sequential one. Moreover, the results do not change when instrumental variables are used for the loan-to-value ratio (Browne and Tootell, 1995).⁶

Finally, some critics fault the authors of the Boston Fed study for interpreting their race findings as evidence of discrimination against minorities. Their argument is that higher levels of loan denial, all else held constant, does not prove the existence of discrimination unless the authors can show that loans to minorities, all else constant, are no more risky than loans to whites (Brimelow and Spencer, 1993; Becker, 1993). The specific evidence on default rates will be considered in the next section. For the moment, however, suffice it to say that these critics are implicitly

⁶ The identifying instruments include liquid assets, years on the job, education, marital status, gender and years in this line of work. These variables all affect the loan-to-value ratios but are not significant in the denial equation.

assuming that discrimination must be explained in terms of lenders placing prejudice above profits. In other words, these critics refuse to acknowledge the possibility of statistical discrimination.

An interesting twist on this argument comes from Bostic (1996). Using the Boston Fed data, he expands the specification of the equation to include terms that interact race with the other applicant and property characteristics. When this is done, Bostic finds that lenders accord minorities favorable treatment with respect to the loan-to-value ratio and adverse treatment with respect to debt burdens, and that the remaining stand-alone race variable has a statistically insignificant coefficient. Although Bostic shows that the net effect of these two opposite effects is that lenders treat marginally qualified minority borrowers adversely relative to otherwise similar white borrowers, he refuses to call this discrimination on the grounds that lenders are evaluating characteristics of minorities differently than those of whites based on profit-maximizing rules of thumb. However, according to the legal definition of discrimination, rules of thumb with a racial dimension are not permitted. They violate the requirement that applicants be treated as individuals, not as members of a protected category.

In sum, the Boston Fed study provides persuasive evidence that lenders in the Boston area discriminated against minorities in 1990, even in the presence of clear laws that make racial discrimination unlawful and market pressures that should eliminate taste-based discrimination. The study has survived close scrutiny by a host of skeptical critics. While some people might be tempted to belittle its significance, since it is based on a single metropolitan area that has had a long and troubled history of race relations, such a judgement would be precipitate. According to the HMDA data, which can be compared across cities, Boston is not an outlier in terms of the relationship between white and minority denial rates.⁷

Loan Default Studies

Some researchers have tried to approach the issue from the other end; that is, instead of looking at evidence on the disposition of loan applications, they examine evidence on loan performance (Van Order et al., 1993; Berkovec et al., 1994, 1996a,b). However, their argument at best applies only to taste-based discrimination. If lenders were engaged in discrimination motivated by their prejudice, they would do so by setting a higher cutoff in terms of creditworthiness for minorities than for whites so that, at the margin, the minorities who received loans would be more creditworthy than the whites who received loans. Hence, the argument goes, loans to minorities would be expected to perform better than those of white applicants, a hypothesis that can be tested by examining loan defaults by race. Because

⁷ Based on HMDA data for 1992, the ratio of loan denial rates for blacks to whites for the following selected cities were Boston (2.2), Atlanta (2.6), Chicago (3.2), Dallas (2.3), New York City (1.6), San Francisco (2.2) and Washington D.C. (2.8). The absolute denial rate for blacks in Boston was 22 percent and it ranged from 17 to 31 percent in the other cities. (Data from the Right-to-Know Network on the internet.)

the data indicate that minorities have higher default rates than whites, not lower, these authors reject the hypothesis that lenders discriminated against minorities in the loan approval process.

The main evidence to support this position can be found in studies by Berkovec et al. (1996a, b), which are based on a large sample of single family mortgage loans originated between 1987 and 1989. As one example of their findings, for the 1987 cohort of borrowers, the default rate was 9 percent for blacks and 4.3 percent for whites. While the addition of statistical controls for loan and borrower characteristics reduced the differential by about a half, it still left a statistically significant black-white differential of about 2 percentage points.

Of course, the methodology of the Berkovec et al. (1996a, b) study can be questioned as well. First, their analysis is based entirely on loans insured by the Federal Housing Administration, while the Boston Fed study is based on conventional loans. FHA loans are more costly than conventional loans and have a low cutoff for the maximum loan amount. For these reasons and because minorities are more likely to use FHA mortgages than conventional mortgages, the relative default rates of blacks and whites could differ between the two types of mortgages. Second, Berkovec et al. measure defaults by lender foreclosures of mortgaged properties, which raises the possibility that they are measuring something with an element of lender discretion, rather than just the behavior of borrowers (Yinger, 1996b, p. 27).⁸ Finally, as Berkovec et al. acknowledge, their data set does not allow them to control for the credit history of the borrower. Omitting a variable such as credit history which the lender uses to evaluate loan applications biases the results of a loan default study away from a finding of discrimination.

However, a problem deeper than these specification issues arises because neither the lender nor the researcher is able to observe all the characteristics likely to affect the creditworthiness of the borrower and these unobserved credit characteristics are likely to be less favorable for blacks than for whites (Yinger, 1996a, b; Galster, 1996). Because the variables are not easily observed or measured, even a complete data set on defaults would not include them. Indeed, it is precisely the presence of those unobservables, examples of which were mentioned earlier, that could induce lenders to engage in statistical discrimination against blacks in the loan approval process. In the absence of any discrimination by lenders (either profit driven or taste-based), the differential effect of these unobservable variables would lead to a higher default rate for blacks than for whites.

The existence of such unobservable credit factors creates a serious problem for interpreting default-based studies of discrimination. The problem arises because it is impossible to sort out the two separate effects on the default rate of blacks

⁸ Yinger (1996a) has also pointed out that the theory relates not strictly to default rates but rather to default rates times the size of the loss. Hence, additional information on how much lenders lose on a typical default by a black borrower relative to a white borrower would be useful to complete the story. While Berkovec et al. (1995) try to address this issue, Ross (1996) raises some important criticisms of their approach.

relative to whites. Working in one direction, the presence of the unobservable factors disproportionately increases the likelihood of blacks defaulting on any approved loan. Working in the other direction, taste-based or profit-motivated discrimination decreases the likelihood of default for blacks because fewer loans are approved to that group. For example, if the unobservable factors generated a default rate for blacks that was 4 percentage points higher than for whites (after the researcher has controlled for all the legally permissible characteristics used by the lender in the loan approval process), then, contrary to their interpretation, the Berkovec et al. finding of a 2 percentage point differential would be consistent with the hypothesis that lenders discriminate at the loan approval stage: the rate differential between blacks and whites is lower than it would be in the absence of discrimination. However, because we do not know in practice how the unobservable factors associated with race affect the probability of default, evidence from default studies provide no clear information about whether lenders discriminate against minorities.⁹ This problem of unobservable variables does not arise in a study of loan approval, especially one as complete as that by the Boston Fed which includes all the variables used by the lenders.

Berkovec et al. (forthcoming) have recently developed a new strategy for using default data to test specifically for taste-based discrimination. In the spirit of Becker's work, they posit that taste-based discrimination, but not profit-driven statistical discrimination, should be higher when lenders have more market power. Hence, they argue that the coefficient on the interaction of race and the concentration of the mortgage lending market could provide information on whether lenders engage in taste-based discrimination. This approach avoids the bias in their earlier tests for discrimination because the market power of the lenders is not correlated with the unobserved variables. Based on a large sample of data on the performance of FHA loans, the authors find that the coefficient on the interaction term is not statistically significant. Hence, they conclude that lenders do not engage in taste-based discrimination. However, this new study sheds no light on whether lenders engage in profit-motivated statistical discrimination.

If the default studies are flawed as a means of studying discrimination, why have they generated so much interest? Surely, part of their appeal, especially to bankers, is because they have been interpreted as evidence that lenders are not

⁹ Brueckner (1996) provides a particularly clear mathematical exposition of the problem. Letting C be the perceived security of a loan, we can write $C = aX + bR + e$ where X represents variables that are observed both by the lender and the analyst and R is an indicator variable that takes on the value 1 for blacks. The parameter a measures the effects of the measured variables and b (expected to be negative) the unmeasured and unobserved effects of race on the perceived security of the loan, and e a random error term. If $b=0$, then the prediction by Berkovec et al. that discrimination tends to lower the average default probability for blacks is correct. However, if b is not zero, which means that blacks have higher true probabilities of default, the prediction becomes ambiguous. For any X and e , any black now has a higher default probability than a white, which makes the average default probability higher for blacks than for whites. The result is that the effect of race on the average default probability is ambiguous. Also see the simulation based critique of this approach in Ross (forthcoming).

discriminating. More generally, the answer may relate largely to the appeal of Becker's narrow definition of discrimination, under which higher default rates for blacks provide the economic rationale for lenders to treat black borrowers differently from white borrowers and, hence, for the conclusion that lenders are not engaged in prejudice-based discrimination. But with respect to the legal definition of discrimination, the bottom line is clear: denial of loans on grounds of membership in a protected group is against the law, regardless of whether it can be justified in some average sense by default rates.

Geographic Redlining

Some of the policy interest in lender discrimination is as much about neighborhood deterioration and decline as it is about unfair treatment of individuals. The fear is that banking practices may exacerbate the problems of poor neighborhoods by systematically denying them credit. The Community Reinvestment Act of 1977 addresses this concern by imposing an affirmative action on lenders to help meet the credit needs of the bank's entire community, including low- and moderate-income neighborhoods, as consistent with safe and sound operation of the bank.

Before 1989, when the Home Mortgage Disclosure Act was expanded to require that lenders provide data on individual loan applications, empirical studies of geographic redlining suffered from a difficult problem: it was impossible to separate the behavior of lenders from what was happening to the demand for mortgages and more generally to the supply and demand of housing within the geographic area. Even the very careful study of mortgage lending patterns by geographic area based on the HMDA data by Bradbury, Case, and Dunham (1989) concluded (p. 25): "Whether the source of the racial pattern lies in the housing market or the mortgage market is impossible to tell."

Most of the other studies of redlining based on more refined techniques provide little or no evidence that mortgage lenders are currently discriminating against certain allegedly redlined areas. In an ambitious study that involved interviewing households who were involved in housing transactions (either as potential buyers or sellers) in Cincinnati, Indianapolis, and Nashville, Benston and Horsky (1991) found no differences between households in allegedly redlined areas and those in control areas in terms of their ability to secure mortgage financing. In the context of the regression framework presented earlier, the test for redlining involves measuring the effect of location or racial composition of the neighborhood, while controlling for other individual and neighborhood characteristics that affect the rate of return on the loan. Using that method, Schafer and Ladd (1981) found little evidence of geographic redlining. More recently, the authors of the Boston Fed study found no evidence that lenders in Boston deny loans to an area because it has a large proportion of minority residents or because it is poor and rundown (Munnell et al., no date). They conclude that lenders discriminate not on the basis of the location of the property, but rather on the race of the applicant.

Additional Research and Policy Directions

Where should research and policy with regard to discrimination in mortgage lending go from here? Two main suggestions appear in the literature: a call for audit studies to test for discrimination at the prescreening stage; and the use of “credit scoring” systems to rank mortgage applications.

Audit Studies and Discrimination in Mortgage Lending

In an audit study, pairs of comparable testers whose observable qualifications differ only by race would inquire about mortgage loans from specific lenders. Although such studies introduce their own problems, some of which are noted below, they could potentially provide straightforward and clear evidence of discrimination by lenders in general and by specific lenders. In addition, they allow investigation of how loan applicants are treated during the prescreening stage in the application process, not just after an application is filed.

Agencies such as the Department of Justice and the Equal Employment Opportunity Commission have either supported or used the results of auditing studies to ferret out discriminatory practices in other aspects of the housing market and in employment cases. Audit studies of real estate agents have been helpful in understanding differential rates of access to information about mortgages. The 1989 Housing Discrimination Study which conducted over 2,000 audits of real estate brokers in a national sample of metropolitan areas found large differences in the willingness of brokers to assist white and minority home buyers to secure mortgage financing; for example, only 13.3 percent of the black auditors were offered assistance in contrast to 24.4 percent of the white auditors (Yinger, 1996a, p. 59).

But no large-scale national studies have been undertaken in the area of mortgage lending. The closest we have come to such an attempt was in 1991, when the Federal Reserve Board of Governors rejected an ambitious proposal from its own Consumer Advisory Council for a national audit study of lender behavior at the prescreening stage. Since then, various smaller pilot studies have been undertaken and, under the aegis of HUD’s Fair Housing Initiatives Program, many fair housing organizations have started to use the method for enforcement purposes (Galster, 1996, p. 710; Lawton, 1996; Smith and Cloud, 1996). While the pilot studies have provided initial evidence of the feasibility and usefulness of the approach, none has been sufficiently rigorous to pass muster with the research and enforcement communities.

Several concerns about audit tests are worth noting (Galster, 1996). First, additional small-scale tests are necessary to determine the sample sizes needed to detect the potentially subtle differences in treatment that might add up to a discriminatory outcome. Depending on the incidence of a particular behavior among lenders and the “true” differences in treatment among lenders, one author has estimated that the required sample size could rise to about 2100 paired tests. Second, for an inquiry about a loan to generate a serious and meaningful response, the potential borrowers need to identify the specific houses that they are buying.

None of the obvious ways of doing this in a study context—having potential borrowers claim to be buying homes that are being sold directly by owners, using dummy sales contracts, or even dummy real estate companies—is very satisfactory. A third concern relates to potentially serious ethical and legal issues such as deception, use of human subjects—in this case the mortgage lending agents—without their knowledge, or consent and concerns about entrapment (Galster, 1993). Fourth, the further into the application process that the testers probe, the more likely it is that lenders would start verifying some of the information. This consideration makes it difficult to imagine ever pushing the testing beyond the prescreening stage into the application stage of the process. Yet some of the studies illustrate the desirability of continuing the testing through the completion of the application (Smith and Cloud, 1996). A fifth question involves the possibility that a testing study will be compromised by the lenders discovering that they are being tested. The chance of discovery rises the more tests are repeated in a given institution, the more similar and or unusual are the tester pair scenarios, the smaller is the institution in terms of loan originations and loan officers, the more predominantly white is the area in question (so that minority applicants stand out), and the more fabricated are the documents and histories of the testers.

Advocates of testing believe that these concerns can be effectively resolved and that testing is not only feasible but absolutely necessary as the next step in ferreting out discriminatory lending. They point out that even high-quality regression studies, such as that done by the Boston Fed, have provided neither clear-cut evidence of a smoking gun nor enough information about specific lenders to guide enforcement efforts. Civil rights activists and many researchers who are convinced that lenders discriminate believe that audit studies are the only way to provide irrefutable evidence of discrimination that will be understandable to all. Nonetheless, the methodological concerns over such studies are sufficiently valid to justify caution as researchers and regulators move forward in the direction of large scale audit studies. In the meantime, additional experiments by fair housing groups and others would be desirable.

Credit Scoring

The idea of credit scoring models is to use historical data to estimate the relationship between the characteristics of the borrower and the property and the riskiness of the loan. The credit scoring model would then be used to predict the riskiness of future loans. This approach has long been used to evaluate applications for consumer loans and credit cards, but credit scoring is only now being considered and adopted by various actors within the mortgage market. In particular, both Fannie Mae and Freddie Mac have recently adopted credit scoring as an element in their loan evaluation process, and have recommended that the originators of loans use it as well (Galster, 1996; Carter, 1996).

The main motivation for a credit scoring approach appears to be to reduce the costs of processing loan applications. However, some authors believe that the impersonality and objectivity of this approach could serve to reduce racial discrim-

ination in the mortgage lending process (Galster, 1996). Under a credit scoring approach, lenders could make decisions without ever seeing the applicant, and hence, without knowing the applicant's race.

However, a number of dangers and questions should be noted. First, most of the credit scoring models to date have been developed by private firms, which means that they are proprietary and not subject to public scrutiny. That black-box quality has made many groups nervous. Second, even when models predict quite well in a broad statistical sense, they might be saying only that, say, 20 percent of those with similar characteristics have been delinquent or defaulted on their loans. Thus, for every five people turned down on the basis of such a finding, four would have repaid their loans on time. Third, there is a danger that a credit scoring model may have built into it standards that have adverse impacts on minority borrowers and that cannot be justified in terms of the riskiness of the loan. In this way, credit scoring might simply substitute discrimination in the form of adverse impacts for discrimination in the form of disparate treatment.

Conclusion

Much of the controversy about whether mortgage lenders discriminate against minorities can be explained in terms of the confusion about how to define discrimination. According to the legal definition, careful studies of loan denial rates, such as that done by the Federal Reserve Bank of Boston, represent an appropriate method for testing for discrimination by lenders. Based on that study, it is clear that mortgage lenders discriminate against minorities. The fact that minorities may have higher default rates on average than whites is irrelevant to the interpretation of the race coefficient in such models.

While it is not clear whether the discrimination that emerges from the Boston Fed study is attributable to a taste for discrimination or to profit-motivated statistical discrimination, my guess is that a substantial part of it is statistical discrimination driven by the drive for profits. If so, market forces are not likely to eliminate it.

I believe that we need a lot more research on and discussion about the relationship between the race of the applicant and delinquencies, defaults, and losses. Given the limited evidence currently available, lenders may operate now more on their guesses about the loss experiences of blacks and minority groups than on concrete data. Of course, it is possible that this research could end up reinforcing the views of lenders that black applicants are less good risks than white applicants, even after holding constant all other measurable determinants of creditworthiness. However, further research might also generate criteria for lenders to evaluate loan applicants in a way that pays attention to individual differences and reduces the pressure for lenders to engage in statistical discrimination. The move to credit scoring systems has been one attempt in this direction. However, the different credit scoring models deserve research scrutiny as well, to be sure that they are not simply

substituting discrimination in the form of adverse impact for discrimination in the form of disparate treatment.

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