Default Rates and Mortgage Discrimination: A View of the Controversy

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Abstract

This commentary evaluates the debate over interpretation of the empirical findings of Berkovec, Canner, Gabriel, and Hannan (BCGH), which show higher default rates for black FHA borrowers. It argues that BCGH's critics, who claim that the results cannot be used to infer the absence of mortgage discrimination, are right. However, since the critics' points are acknowledged in BCGH's original paper, BCGH are hardly guilty of overstating their case.

Research in urban and housing economics is rarely controversial, but the work of Berkovec, Canner, Gabriel, and Hannan (BCGH) is a noteworthy exception to this rule. BCGH argue that their results, which show higher Federal Housing Administration (FHA) default rates for blacks, can be interpreted as evidence against mortgage discrimination, if certain assumptions are satisfied. BCGH's critics, Ross, Galster, and Yinger, claim that these assumptions are inaccurate and conclude that the evidence says nothing about discrimination. In my opinion, the critics' arguments are valid. However, since many of their points are acknowledged in the original BCGH paper, BCGH are hardly guilty of overstating their case. Instead, interpretation of their results hinges on the validity of key assumptions, which are open to debate. For some readers, the issues in the debate may appear confusing. The purpose of my comments is to offer a more transparent presentation of the controversy, using an expanded version of the BCGH theoretical model.

To begin, it is useful to verify that the BCGH modeling of default is consistent with the standard default analysis in the literature. Under that analysis, a borrower defaults on a mortgage when the house value, P, is less than the present value, M, of remaining mortgage payments minus default costs, K, which capture the cost of credit impairment. BCGH's default probability, denoted by the function D(•), can be interpreted as the probability that the inequality $P < M - K$ holds. This probability must be viewed as uncertain, because the elements of the inequality are imperfectly observed. Empirically, the default probability depends on several things: loan characteristics, which determine M; borrower characteristics, which determine default costs K; and the initial value of the house and neighborhood characteristics, which give information about P.

Consider an expanded version of the BCGH model, where the argument of the default probability function is written as equation 1:

$$C = X\beta + Z\delta + \theta R.$$

In this equation, β, δ, and θ represent parameters; X represents borrower, property, and loan characteristics that are observed by both the lender and BCGH; Z represents borrower characteristics such as credit history that are observed by the lender but not by BCGH; and R represents a race dummy variable, which equals unity for blacks and zero otherwise. If black borrowers default more often than white borrowers, holding lender-observed characteristics constant, then $\theta < 0$. Note that since C depends on loan and property characteristics, it is more properly called a loan *security* index rather than an index of borrower creditworthiness, as in BCGH.

Next, separate the Z variables into two groups, with Z_1 and Z_2 representing borrower characteristics that are respectively correlated and uncorrelated with the race dummy. The $Z\delta$ portion of C is then rewritten as $Z_1\delta_1 + Z_2\delta_2$, where δ_1 and δ_2 are parameter vectors. Since the variables in Z_1 are unobserved by BCGH but correlated with R, their influence can be summarized by the expression ϕR, where ϕ is a parameter. Note that if Z_1 contains no variables, then $\phi = 0$. The security index can then be written as equation 2:

$$\begin{aligned} C &= X\beta + Z_1\delta_1 + Z_2\delta_2 + \theta R \\ &= X\beta + (\phi + \theta)R + \varepsilon. \end{aligned}$$

In equation 2, the error term $\varepsilon = Z_2\delta_2$ represents borrower characteristics unobserved by BCGH that are uncorrelated with R.

Now consider the loan approval decision of the lender. For simplicity, ignore the presence of the conventional loan alternative in the BCGH model and suppose that the borrower is granted an FHA loan if the security index is sufficiently large. The index must satisfy equation 3:

$$X\beta + (\phi + \theta)R + \varepsilon > F + \tau R,$$

where F is a positive constant. If lenders are prejudiced against blacks, τ is positive, indicating that a black borrower must have a higher index value than a white borrower to acquire a loan. Even if lenders are unprejudiced, so that $\tau = 0$, blacks will find it harder to satisfy the equation when ϕ or θ is negative. If ϕ is negative, borrower characteristics such as credit history that are correlated with race tend to take unfavorable values for blacks, leading to a lower value of the security index and less frequent loan approval. Approval is also more difficult for blacks if θ is negative, indicating an independent negative effect of race on default. Such an effect might arise because blacks feel that economic advancement is impeded by labor market discrimination and poor schools, reducing the value of a good credit history and thus lowering default costs.

Note that the appearance of θR in the loan-approval condition represented by equation 3 indicates that the lender practices “statistical discrimination.” Observe, however, that the effect of such discrimination on loan approval is indistinguishable from the effect of lender racial prejudice. In other words, the negative term θR on the left side of the equation has the same effect as the positive term τR on the right. Note also that if lending laws could be enforced, lenders would be required to set $\tau = 0$, and they would be forced to act as if θ were 0. The latter change would lead to less-stringent underwriting standards for blacks than for whites.

With this background, it is possible to address the main issues of the controversy. First, note from equation 3 that loan approval requires $\varepsilon > F + \tau R - X\beta - (\phi + \theta)R$. Therefore, following BCGH, the average default probability conditional on loan approval is shown by equation 4:

$$\frac{\int_{\varepsilon > \Omega} D[X\beta + (\phi + \theta)R + \varepsilon]f(\varepsilon)d\varepsilon.}{\int_{\varepsilon > \Omega} f(\varepsilon)d\varepsilon}$$

In equation 4, $\Omega = F + \tau R - X\beta - (\phi + \theta)R$ and $f(\bullet)$ is the density function of ε.

The BCGH model is derived from equation 4 by setting $\phi = \theta = 0$. Again, this means (1) that no lender-observed borrower characteristics are correlated with race ($\phi = 0$) and (2) that race has no independent effect on default ($\theta = 0$). In this restricted model, BCGH show mathematically that if $\tau > 0$ holds, indicating lender prejudice, then the default probability in equation 4 is smaller when R equals one than when R equals zero. Thus, with lender prejudice, blacks default less often than whites.

BCGH's critics focus on cases in which 1 or 2 above is violated, so that at least one of ϕ and τ is negative. This modification changes the black default probability in two ways: by changing the range of integration in equation 4 and by changing the magnitude of the default probability over that range. To appraise the first effect, rewrite the range of integration as $\varepsilon > F + (\tau - \phi - \theta) R - X\beta$. Since at least one of ϕ and θ is negative, it follows that the term $\tau - \phi - \theta$ multiplying by R is positive, just as in the BCGH analysis. As a result, changing R from zero to one has the same effect as before: to obtain a loan, the marginal black borrower needs a better value of the error term ε than does the marginal white borrower. This effect tends to make the average default probability lower for blacks than for whites.

However, unlike the BCGH model, changing R from zero to one now increases the default probability for the borrower who is granted a loan. Referring to equation 4, the security index inside $D(\bullet)$ is smaller when R equals one. This makes $D(\bullet)$ larger, indicating that a black borrower is more likely to default than a white borrower for a given X and ε. This effect tends to make the average default probability higher for blacks than for whites.

The effects described above work in opposite directions. The marginal black borrower must have better unobserved characteristics than the marginal white borrower, making defaults lower on average for blacks. But approved blacks default more often than whites for given ε and X, tending to make black defaults higher on average. The result is that *the effect of race on default is ambiguous in the modified model.*

Given that the model has ambiguous predictions, *any* set of empirical results is consistent with its assumptions. Therefore, the finding of a higher black default rate is consistent with τ being positive, provided that at least one of ϕ and θ is negative. Black defaults *could* be higher under these assumptions. Since the empirical findings are consistent with a positive τ, they do not prove the absence of lender prejudice. By contrast, the results are inconsistent with the assumptions $\tau > 0$ and $\phi = \theta = 0$, and BCGH used this conclusion, with substantial qualification, to suggest that prejudice might not be present ($\tau = 0$). The key observation is that the empirical results can be explained in another way by keeping $\tau > 0$ and allowing ϕ or θ to be negative. This is the main point made by BCGH's critics.

Although the empirical findings are consistent with lender prejudice, they are equally consistent with the absence of prejudice when ϕ or θ is negative. Using the above argument, it is easy to see that the effect of race on default is once again ambiguous when $\tau = 0$, provided that at least one of ϕ and τ is negative. Therefore, a higher black default rate could well be observed when lenders are not prejudiced.

This discussion shows that when the BCGH model is broadened to include unobserved, race-correlated borrower characteristics ($\phi < 0$) or an independent effect of race on default ($\theta < 0$), the empirical results carry no implications about the existence of lender prejudice. BCGH readily admit this point, and recognition of it should guide any reading of their work. However, this conclusion suggests that tests for mortgage discrimination that rely on default data are likely to be less useful than more traditional tests based on loan-approval data.

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