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Housing-Finance Intervention and Private Incentives: Helping Minorities and the Poor

DESPITE THE PLETHORA of government programs and heated policy debates over the last several decades, little has been settled about the proper role for government in housing markets in general, and the mortgage market in particular. Government, it is argued, can play an important role in encouraging homeownership and eliminating discrimination in credit markets. Yet, hard evidence on the existence of discrimination is weak, as is the existing theoretical literature explaining discrimination in the credit market. Without an understanding of the magnitude and origin of discriminatory behavior in the marketplace, any policy response is merely a shot in the dark. Moreover, while being a minority is not synonymous with being poor, many programs designed to deal explicitly with poverty and its effect on housing market access are often shrouded with racial overtones in policy debates, further complicating discussion of their relative merits.

This paper provides a survey and analysis of government interventions in the housing credit market.¹ We propose several possible goals behind government inter-

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1. We limit the focus of our paper to the market for home mortgage loans. This, of course, ignores the dynamic interrelationships between the mortgage market and the housing market itself. Programs affecting housing opportunities for low-income and minority families will clearly have an impact on their experience in the mortgage market, and vice versa. For an overview of these interrelationships see Galster (1992).

Note that we are looking both at policies designed to reduce disparate racial outcomes in the home mortgage market and programs that are targeted more generally at the poor. This presents some difficulties since these distinct goals are often confused both in the literature and in policy circles. Neverthe-

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vention in housing finance, outline market imperfections and other behavior that motivate intervention into housing finance, examine the details of the specific programs that exist in response to these goals, and investigate their relative costs and benefits by focusing on their impact on the incentives of the participants in the market. Despite the complexity of government programs, we are able to come to some strikingly simple conclusions regarding the relative effectiveness and desirability of various interventions.

On the theoretical front, this paper argues that the existing informational models used to examine government intervention in lending markets are inappropriate for analyzing the market for individual mortgages. To remedy this deficiency, we develop two further explanations of discrimination in the credit market. The first is based on the idea that it is less profitable for bankers to evaluate minority loan applications, either because of a lack of “cultural affinity” between bankers and applicants, or because minorities are on average poorer than whites and hence less creditworthy as a group. As a result, minorities are denied loans more frequently than are whites. In this model discrimination can result in the sense that some individuals suffer negative externalities as a result of their race. The second model focuses on moral hazard, as opposed to the adverse selection models typically used in credit rationing studies. We argue that this moral hazard story is more natural in the housing credit market, given the informational asymmetries necessary for adverse selection models to work, and show that the policy implications of this moral hazard model are quite different from the more common adverse selection case.

An additional contribution of this paper is to shed some light on the so-called “Becker Paradox” in determining the presence of racial discrimination in the home mortgage market. Most studies of mortgage market discrimination [most notably Munnell et al. (1992)] focus on loan denial rates and typically conclude that not all of the disparity in these rates can be explained by “economic factors,” suggesting that discrimination exists. Default rate studies (Berkovec et al. 1994; Evans, Maris, and Weinstein 1985; Green and von Furstenberg 1975), however, suggest that minorities default more often than do whites, even after controlling for relevant economic characteristics, a finding which many economists regard as inconsistent with a conclusion of discrimination.² We show, however, that the added screening costs brought about by “cultural affinities” or differences in average wealth across races can lead to minorities endogenously exhibiting higher default rates than do whites, thereby providing a theory of discrimination that is consistent with both of the above observations.

The structure of the paper is as follows: Section 1 enumerates and distinguishes a variety of possible goals for housing credit policy. Section 2 reviews and categorizes the programs that affect the mortgage market. Section 3 examines four distinct economic models of the mortgage market in which government intervention may be

less, since many programs are multifaceted in their objectives, any complete study of these interventions must cover both problems.

2. Gary S. Becker, “The Evidence against Banks Doesn’t Prove Bias,” *Business Week*, April 19, 1993, p. 18.

justified. We consider the relative merits of each of these models, and then use each to analyze the intervention categories outlined earlier.

Despite the complexity of social objectives, the variety of possible economic environments that can create the need for government intervention, and the many categories of potential or actual government programs, we are able to make some progress ranking “real-world” policies. We find that the effectiveness of some categories of interventions depends crucially upon the cause of the social problem they are designed to ameliorate. Section 3 concludes by reviewing the empirical evidence on discrimination in the mortgage market, and showing how our theoretical model of “rational discrimination” can be used to explain the “Becker Paradox.” In section 4 we argue that government support for community development banks may be an effective policy response regardless of “why” the problems in the mortgage market exist.

1. POLICY OBJECTIVES

The debate over the efficacy of government interventions is too often clouded by confusion over their objectives. We suggest four distinct and often conflicting social objectives: efficiency, equitable procedures, equal outcomes, and retributive justice.³

Economists emphasize correction of inefficiencies as the key role for government in any market; much time and ingenuity has been spent developing models of markets in which costly discrimination results from market failures. Indeed, we discuss several of these models in section 3, and contribute two of our own.⁴ Nonetheless it is equity, not economic efficiency, which is the main motivation behind low-income and minority housing policies. It is impossible to analyze housing programs that seek to enfranchise the poor or protect the rights of minorities without taking into account notions of fairness.

But equity is a slippery concept. What may seem fair to one individual may be a gross injustice by the standards of another. It is for this reason we define equity in three different ways—in terms of procedures, outcomes, and sanctions. We may desire to ensure “equitable procedures”: Similarly situated individuals should receive similar treatment in the market. For example, families with the same employment backgrounds, credit histories, wealth, etc., should be shown the same menu of

3. Throughout this paper we categorize programs by their ostensible purpose in the housing market. The real motive for some programs can be quite different. It is interesting to note, for example, that the HOPE programs, which provide subsidies to private nonprofit community development organizations to purchase government owned properties and transfer them to low-income households, in effect provide a back-door bailout of the Resolution Trust Corporation, the FHA insurance fund, and other governmental agencies that foreclose upon and resell housing properties. By subsidizing purchasers of their properties, HOPE makes these sales *appear*, from the standpoint of the selling agency, more profitable than they really are.

4. While efficiency may seem a reasonably straightforward policy objective, defining an efficient outcome is not an easy task. While the First Welfare Theorem suggests that any distribution of wealth will result in an efficient outcome, in the real world externalities exist so that redistribution may improve Pareto efficiency by benefitting those from whom wealth is being taken as well as those to whom it is given. For example, reducing poverty may reduce crime, and easing racial conflict (one motivation for combating discrimination in housing markets) may improve the quality of life for all individuals.

houses by realtors and should be offered the same financing options by banks. Or, we may desire to ensure “equal outcomes” because we regard them as desirable in their own right: All individuals ought to have some minimal level of income, the percentage of homeowners ought to be the same for all racial groups, etc. If the goal of a policy is equality of outcomes, the government might be used as a pure redistributive device to assist some category of individuals.

On questions involving race, the distinction between procedures and outcomes is sometimes obscured by the fact that advocates of procedural equity may focus on racial outcomes as the clearest *measure* of success, even if they don’t view equal outcomes as their ultimate goal. While unequal outcomes are easy to observe, it is extremely difficult to determine whether the processes that led to those outcomes were fair. Those who wish to focus solely on process attempt to measure discrimination in the mortgage market by attempting to control for other differences that may affect outcomes—a regression approach. Those who focus on outcome measures may view non-outcome-oriented measures (for example, access to housing conditional on educational achievement or wealth) as a smoke-screen to justify discrimination. Proponents of process fairness, on the other hand, argue that the ultimate objective is “color-blindness,” not quotas. Focusing on outcomes tramples legitimate, benign differences in individual preferences.

Critics of outcome-oriented policies claim that they can lead to interventions that work against equal access to housing. For example, “integration maintenance programs” (IMPs) are currently being implemented in the southern suburbs of Chicago after unsuccessful court challenges by opponents. Under these programs, municipal governments are setting targets for “racial balance” and trying to achieve that balance through “affirmative marketing” to whites. The goal of these programs is to prevent “white flight” and “clustering” by African-Americans. Colwell and Mahue (1991a), and Simpson (1992) have forcefully argued that such quotas effectively discriminate against minorities and are in violation of federal law. Such programs illustrate the conflict between these two notions of equity: While racial quotas may help achieve equity of outcome, they can impose unfair costs on individuals and violate the spirit of process equity.

Mindful of the tension between those who support using regressions and those who focus on outcomes to measure process equity, the federal government has historically been very sensitive to preserving the racial neutrality of housing policy. Consistent with the goal of focusing exclusively on the fairness of the system, programs designed to counter racial discrimination in housing markets are rarely described in racial terms. Rather, the criteria for assistance are linked to “targeted neighborhoods” or “low-income purchasers.” The Community Reinvestment Act of 1977 (CRA), which is widely viewed as an attempt to prevent discrimination against minorities by banks,⁵ never mentions minorities explicitly—this is consistent with its goal of process equity. But this approach has its drawbacks. Banks have complained that the vagueness of the CRA has led to arbitrary enforcement by super-

5. Some observers have argued, however, that the CRA did not have racial equity as its primary focus when it was enacted.

visors.⁶ In response to perceived arbitrariness, banks feel obliged to waste resources demonstrating their good faith.⁷

Finally, we need to consider the third standard of equity: "Retributive justice." Even a program that managed to satisfy advocates of both process and outcome fairness could still fail to satisfy notions of equity if it failed to mete out appropriate punishment for misbehavior. For example, a government program that succeeded in providing financing for every minority individual who was unjustly rejected by a mortgage lender might still be regarded as insufficient if it allowed discriminating lenders to avoid punishment.

Despite our emphasis on these three concepts of equity, economic efficiency remains central to our story. In addition to being a possible motivation for housing assistance to low-income or minority individuals, it is also a yardstick to use in comparing various programs for achieving an equity objective—some will involve smaller efficiency losses than others.

2. OVERVIEW OF INTERVENTIONS

Government interventions into the housing credit market can be categorized as follows: Loan guarantees, interest rate subsidies, down-payment assistance, housing cost reductions, educational assistance, bank assistance, and bank regulations. These categories are described below; an appendix (available from the authors) contains an enumeration of programs divided by category.

2.1. *Loan Guarantees*

Certainly the most famous loan guarantee program is Federal Housing Administration (FHA) mortgage insurance for single family homes. But the federal government administers a broad array of mortgage insurance programs. As of 1993, over *thirty* distinct loan guarantee programs exist just within the Department of Housing and Urban Development (HUD), not to mention programs administered by state and local governments and other branches of the federal government.

Mortgage insurance is available for almost any purpose (construction, purchase, rehabilitation, home equity loans, disaster assistance, etc.), for almost any type of housing (single family homes, condominiums, mobile homes, cooperative housing, rental housing, etc.), and under almost any type of financing arrangement (fixed-

6. Dean Foust, "Taking a Sharper Look at Bank Examiners: Is Lax Enforcement to Blame for Discriminatory Loan Practices," *Business Week*, April 19, 1993, pp. 99–100; Claudia Cummins, "Regulators Face Balancing Act in CRA Overhaul," *American Banker*, August 18, 1993, p. 1.

7. Macey and Miller (1993). Thakor and Beltz (1993) estimate the current direct cost of complying with the CRA at 4.5 percent of bank net income. Other costs may include regulatory penalties, and a less profitable loan portfolio (minority bank CRA performance supports this hypothesis; see our discussion on empirical evidence on discrimination in section 3.5). Partly in response to bankers' complaints, the Clinton administration is proposing a move toward the use of racial quotas to eliminate the vagueness of the act and reduce the costs of measuring process fairness by lenders (see Kenneth H. Bacon, "Clinton Is to Unveil Two-Part Program to Boost Lending in Poor Communities," *Wall Street Journal*, May 19, 1993, p. A2; Claudia Cummins, "Regulators Face Balancing Act in CRA Overhaul," *American Banker*, August 18, 1993, p. 1).

rate, adjustable-rate, growing equity, graduated payment mortgages, etc.). Furthermore, loan guarantees are available to individuals, private nonprofit organizations, for-profit corporations, and publicly supported agencies.

The terms of loan guarantee programs vary from program to program, but as a rule require smaller down payments than do private guarantors or than would be acceptable by lenders without any insurance at all; fees are typically higher than those with comparable private mortgage insurance. While many of the loan guarantee programs are explicitly subsidized (for example, FHA mortgage insurance for special credit risks), there is some question as to whether ostensibly unsubsidized programs are actuarially sound. For example, premiums under FHA single family home mortgage insurance do appear to cover the expected default costs of the program, but it is not clear that the administrative costs of the program are supported.⁸

For individuals, participation in these programs is usually initiated only after contact with a lender. In these cases, the lender determines whether mortgage insurance would be required for a loan (or would substantially improve the terms of the contract), and helps the borrower apply for private and/or public mortgage insurance. As a result, borrowers must go through a lender to learn whether or not they are eligible for these programs (and, for many individuals, to learn about the existence of the programs at all). On the other hand, most loan guarantees available to private organizations and state and local governments can be obtained prior to contact with a lender. This distinction becomes important if lenders, inadvertently or not, have the ability to direct certain types of borrowers toward or away from particular programs.

2.2. *Interest Rate Subsidies*

When we speak of interest rate subsidies, we mean programs that effectively reduce the interest rate or other periodic payments made by an individual or organization that has borrowed money directly associated with some housing project. These programs include direct lending to organizations that participate in providing housing for low- and very low-income families (such as HUD's nonprofit sponsor assistance program). In a few cases, such as the Farmers Home Administration Rural Housing Loans, individuals are able to obtain direct loans to purchase housing. Other programs make direct interest payments to lenders on behalf of borrowers (either individuals or qualified organizations). Both the HOPE (Homeownership and Opportunity for People Everywhere) and HOME (Home Investments in Affordable Housing) programs allow participating agencies to use their grants to buy down interest rates for low-income borrowers.

Except in the case of subsidized loan guarantees, most recipients of interest rate subsidies apply for this assistance directly through the sponsoring nonprofit organization or government agency. However, many of the programs (especially direct loans) are limited to individuals and organizations that are unable to obtain private

8. The fact that private mortgage insurance companies do not regularly guarantee loans with the small down payments required by the FHA suggests that some subsidy is involved.

financing without this assistance. This restriction affects the market in which loans are made and the incentives of the lenders.

2.3. Down-Payment Assistance

As we discuss in section 3, one of the primary problems facing low-income families who wish to purchase homes is the lack of a substantial equity stake in the loan. To deal with this problem, many government programs offer grants and low-interest loans specifically to provide borrowers with a sufficient down payment to obtain a loan. Grants may also be available to pay for closing costs, legal fees, and other costs related to the purchase of low-cost homes. A classic example of this type of program is HOPE 3 through which participating agencies can provide down-payment assistance to qualified low-income borrowers. It should be noted that HOPE 3, and other similar programs, do allow aid recipients to participate in other federal assistance programs like FHA mortgage insurance.

Eligibility for this type of assistance is generally limited to low- and very low-income families (those with incomes below 80 percent of the median income in their community, adjusted for family size). Individuals typically apply for this assistance directly through the sponsoring non-profit organization or governmental agency; this may occur either before or after initial contact with a lender.

2.4. Housing Cost Reductions

Many federal and state programs provide grants to state and local governments and various nonprofit and for-profit organizations to help them build, rehabilitate, or purchase housing for resale or rental to low-income families. Examples of grant programs of this sort include the Department of Health and Human Services Community Services Block Grants, HUD's Community Development Block Grants, and the HOPE programs. The Resolution Trust Corporation has an Affordable Housing Program designed to limit sales of certain properties to low-income individuals. Regardless of the details, each of these programs affects the credit market by directly increasing the supply of subsidized housing available for purchase by low-income families.

2.5. Educational Assistance

Many government programs are directed toward, or allow funds to be used for, education and counseling in personal financial management for low-income home buyers. Both the HOPE and HOME programs allow grant monies to be used in this way. Community development banks often provide educational services as a standard part of their relationship with a customer. In addition, the National Credit Union Administration provides low-interest loans (1–3 percent) to member credit unions specifically for financial counseling of members. Likewise, the Housing Counseling Assistance Program provides grants to HUD-approved agencies for the purpose of providing housing counseling services to individuals receiving assistance

through HUD programs. The intention of these programs is to improve the credit-worthiness of low-income individuals, both to reduce the costs of other governmental programs, and to make loans to these individuals more attractive to banks.

2.6. *Bank Assistance*

Many governmental agencies provide special programs to assist banks⁹ in developing programs to assist low-income borrowers in becoming eligible for mortgage loans. For example, both the National Credit Union Administration and the Home Loan Bank System provide low interest loans and grants to member institutions to support their efforts to make housing more affordable to their communities.

In addition, President Clinton has proposed providing federal grants to community development banks that can raise matching donations from private sources. It has also been suggested that financial institutions might be one source for these donations, thereby meeting some of their Community Reinvestment Act obligations (see below). The President has often argued that community development banks are better positioned to spur progress in depressed urban neighborhoods, and that government funding of these banks is liable to achieve more rapid, tangible improvements in community development than other forms of government assistance. Supporters point to successful private community development banking operations in Chicago and Philadelphia as proof of these claims.

2.7. *Bank Regulations*

Many of the most forceful and potent interventions in the housing market are those restricting the behavior of banks and other lending institutions. Equal opportunity lending laws not only enjoin banks against discriminating on the basis of race, color, etc., when making lending decisions, they also prohibit discriminating against potential borrowers who receive public assistance (ranging from welfare to FHA insurance). The Home Mortgage Disclosure Act (HMDA) requires banks to keep detailed records on the disposition of completed loan applications, including information on the geographic distribution of mortgage requests, the race of applicants, and other information. The Community Reinvestment Act (CRA) requires banks to expend a great deal of effort and considerable resources focusing on low-income concerns within their communities.

More recently, the Comptroller of the Currency has suggested that it will begin using "paired testers" to discover incidences when minorities receive different treatment than do whites from loan officers at national banks.¹⁰ OCC officials have suggested that they will follow the methodology used by HUD in their two studies of the housing market (the Housing Market Practices Survey (1977) and the Housing

9. Throughout this paper the term bank will refer to all financial institutions in the home mortgage market.

10. Kenneth H. Bacon, "U.S. to Use 'Testers' in New Campaign on Discrimination in Mortgage Lending," *Wall Street Journal*, May 6, 1993, p. A2.

Discrimination Study (1988)).¹¹ Following this model, regulators would have two individuals apply for a loan, one white and one black, and give them essentially identical characteristics (wealth, employment history, etc.). It is argued that since these applicants will be identical in all respects important to the lending decision, any difference in the way they are treated must be the result of discrimination. Furthermore, this technique has the advantage of allowing regulators to observe discrimination that may occur prior to completion of an application, information not available through other regulations like HMDA.

2.8. *Indirect Interventions*

A number of other interventions can be identified as well. Clearly the numerous federal, state, and local programs affecting rental markets for low-income individuals have spill-over effects in the housing credit markets. Not only do these programs affect the ability of low-income families to save for a down payment, they also modify the incentives these families may have to purchase a home, and they may affect the supply of affordable housing available for purchase in a community. Likewise, quality controls like building codes may make home ownership less affordable for these families.¹² Furthermore, regulations affecting the real estate market will clearly impact the mortgage market, even though such transactions are typically completed by the time an individual requests a mortgage.

Of course, no examination of government interventions in the housing market would be complete without including the role of federal tax policies to promote home ownership. The most important policy is the deductibility of mortgage interest from federal income tax, and the fact that the implicit income from home ownership¹³ is not taxed. Much of the benefit of these provisions, however, appears to accrue to middle- and upper-income families.¹⁴ Low-income individuals tend to be better off taking the standard deduction rather than itemizing, and as a result receive little or no benefit from this subsidy.

3. PROBLEMS SOLVED BY HOUSING FINANCE INTERVENTIONS

To understand the relative effectiveness of these different interventions in the housing credit market we must identify the causes of racial or income inequality. In this section we discuss four classes of problems that government housing policy might be designed to solve. These include (1) wealth inequality and poverty, (2)

11. Ellen Stockdale, Office of the Comptroller of the Currency Communications Office, telephone conversation, August 12, 1993.

12. It should be noted, however, that a number of programs do exist to provide low-interest loans or grants specifically for the purpose of bringing low-income housing up to acceptable standards.

13. Individuals who own their own homes could, instead of living in their homes, rent them on the open market thereby receiving income from the property. Although it may not be realized, it is a real income received by home owners since they do not have to "pay rent to themselves." The fact that this income is not taxed makes home ownership even more attractive than it would be otherwise.

14. Follain, Ling, and McGill (1993).

informational externalities, (3) banker or loan officer bigotry, and (4) rational discrimination arising from costly information gathering. Any of these problems may cause the housing credit market to fail to meet one or more of the goals discussed in section 1. We end the section by examining existing evidence on credit market discrimination, and discussing what this evidence suggests about the likely prevalence of each of these problems.

3.1. Wealth Inequality and Allocative Effects from Wealth Distribution

From the standpoint of outcome equity, wealth inequality is a problem per se. But wealth inequality also has consequences for economic inefficiency in the mortgage market. Under perfect (Arrow-Debreu) contracting the distribution of wealth has no effect on the efficiency of the allocation of capital. Under asymmetric information—when lenders lack full information about borrowers' characteristics or when lenders are unable to monitor and control borrowers' behavior costlessly—wealth serves an important role in capital markets as “collateral.” In such an environment individuals who should receive loans may not if they lack sufficient collateral to satisfy the concerns of lenders. In “moral hazard” stories low levels of wealth prevent borrowers from investing enough equity in a house to provide them with the proper incentive to repay their loans; in the case of “adverse selection” low levels of wealth reduce borrowers' ability to signal their true characteristics.

Despite the theoretical importance of both moral hazard and adverse selection on efficiency in the mortgage market, papers examining the effectiveness of government intervention into credit markets under incentive problems have focused mainly on the latter; they ask how adverse selection is alleviated or hindered by the existence of various forms of interventions.¹⁵ The interventions examined are in effect of two forms: A payment by the government in the event of a default by the borrower (that is, mortgage insurance), or a payment by the government in the event of a payment by the borrower (in effect, interest rate subsidies).¹⁶

We argue, however, that the adverse selection models of bank lending are likely to be less relevant for single family mortgage markets than are models of moral hazard. Furthermore we show that in pure moral hazard models, the results are quite different: While the reduction in moral hazard gives extra effectiveness to government subsidies, all comprehensive programs for subsidizing lending have the same cost to the government. Instead, the key gauge of effectiveness of a program lies in the details of the criteria for individual eligibility.

Adverse Selection. Gale (1990b, 1991) builds on the Stiglitz-Weiss model of credit rationing. In his framework, within any sector of the population are borrowers who differ in the probability with which they will be able to repay loans. These differences are unobservable to potential lenders. If the average likelihood of default

15. See, for example, Smith, and Stutzer (1989), Calomiris and Hubbard (1990), Gale (1990a, 1990b, 1991), and Williamson (1994).

16. The third possibility, a capital grant (down-payment assistance and the like), is effectively a composite of the other two.

increases as interest rates increase (as the better risk borrowers drop out of the market), then interest rates may reach a critical level where it no longer becomes profitable to lend because borrowers are so unlikely to repay. For interest rates above this critical level no lending is observed. At the critical level borrowers in the market will be rationed: Increases in demand for borrowing will not affect interest rates; instead rationing will simply increase. Reduction of the supply of funds will not increase interest rates; instead it will reduce the number of loans made. If different segments of the population have different critical interest rates then one group may be rationed while another remains unrationed.

This model, however, seems unnatural when applied to the home mortgage market. It, like all adverse selection models, presupposes that the borrower has better information about his probability of default than does the lender. In a business setting this makes perfect sense—the owner of a firm will often have a better idea of how much profit he is likely to earn than will his banker. But in the mortgage market lenders are at least as likely as borrowers to have superior information about default risks.

The only piece of information that the borrower is likely to have private from the lender is his idiosyncratic attachment to the house; the greater that attachment the less likely he is to default. But we show in the appendix that differences in degree of attachment are likely to yield an effect opposite to that of the Stiglitz and Weiss credit rationing model used by Gale. In Stiglitz and Weiss, credit rationing is the result of adverse selection due to second-order stochastic dominance. As the interest rate rises low-risk borrowers drop out of the market first, making the average borrower more risky from the banker's perspective and limiting how high the interest rate can rise to clear excess demand from the market. In the home mortgage market with private "attachment" values, however, to the extent that borrowers for housing can separate themselves at all, their differences are likely to be in terms of *first-order stochastic dominance*: increases in the interest rate will cause "bad types" (those with low expected valuations) to drop out of the market first. *Thus, the only informational asymmetry likely to exist in the home mortgage market does not lead to adverse selection, and hence credit rationing will not occur.*

Smith and Stutzer (1989) and Gale (1990a) also rely on an adverse selection mechanism, but they extend the capabilities of the lenders to offer more complex contracts. In particular they assume that instruments are available to sort borrowers into quality categories by offering menus of contracts.¹⁷ One natural instrument is "collateral" which in the case of housing mortgage markets corresponds to the size of down payment. Since the loss of down payment is a greater expected burden for individuals with a high probability of default, large down payments can be taken as a signal of a high likelihood to repay the loan. Although excessive down payments are socially wasteful, they are used by low-risk types to distinguish themselves from

17. In Smith and Stutzer, a randomized contract is used as a sorting device. They assume borrowers with good quality projects have the lowest cost to being refused a loan, and the equilibrium involves a menu in which loans with high interest rates are granted with high probability and loans with low interest rates are granted with low probability.

high-risk types. Any government program that makes low-down-payment loans relatively desirable would make the incentive constraints in the model less binding (since it is the high-risk types who prefer them), and thus improve welfare overall. On the other hand, any subsidy differentially targeted at low-risk types worsens overall welfare, since it means that the incentive constraints must be made more binding in order to enforce separation.

In this model, wealth is used as a separation device. But, *high levels of initial wealth make separation more difficult*. Thus, this adverse selection model would predict that the members of wealthier groups would be required to post *greater* collateral for a given interest rate in order to give credible assurance of their type—a prediction greatly at odds with observation.

Moral Hazard. By giving people a stake in their homes and communities, home ownership, it is often argued, creates incentives for occupants to care for their home and take pride in their neighborhood.¹⁸ But homeownership can create moral hazard problems of its own, since voluntary defaults on mortgages generate deadweight costs for society. Since moral hazard has received less attention in this context, a portion of the appendix focuses on a simple theoretical model in which adverse selection is absent and moral hazard is present. In this model, the value an individual places on a house (the intrinsic satisfaction one gets from owning a particular piece of property) is stochastic. The probability that he will repay it depends upon the (subjective) value he places on that house when the mortgage comes due. Although both the borrower and lender may know what this value might be on average, only the borrower will observe later events that affect this valuation; job changes, marriage and divorce, new children, neighborhood changes, and personal memories can all affect how much value one places on remaining in a house. If negative events occur that make the house worth less than the amount due on the loan, a borrower will default. Moreover, actions adopted by the borrower—maintenance and the like—affect the likely value and therefore the probability of default.

To protect them from this possibility, lenders will demand a high interest rate or require a large down payment—someone with a large equity stake in a home will maintain it better and absorb a larger reduction in its value before he decides to default on his mortgage. Any individuals who lack sufficient assets to make large down payments on their mortgages will pay higher interest rates (perhaps in the

18. Community development projects like that of South Shore Bank in Chicago or the Delaware Valley Mortgage Plan in Philadelphia are cited as examples of the importance of homeownership incentives in rehabilitating property and neighborhoods. See Michael Quint, "A Bank Shows It Can Profit and Follow a Social Agenda," *New York Times*, May 24, 1992; also Calem, forthcoming.

Another often-cited example of the strength of these incentive effects is the privatization of urban public housing projects, like the Kenilworth-Parkside housing project in Washington D.C. In 1990, the tenants in this public housing project took over ownership and control of the property. Privatization of public housing was made possible by tenant "right to buy" procedures enacted in the Housing and Community Development Act of 1987 (sponsored by Congressman Jack Kemp). For the Kenilworth-Parkside project, savings in administrative costs to the government are expected to total \$6 million in the first ten years alone. Scanlon (1990) and Colwell and Mahue (1991b) argue that privatization of public housing projects is associated with substantial improvement in the quality of life in the project—as measured by property maintenance, crime rates, drug usage, and teenage pregnancy.

form of mortgage insurance premiums) or will be denied loans more frequently than will others.

How then can the programs outlined in section 2 affect this incentive problem? Loan guarantees, interest rate subsidies and down-payment assistance are all interventions that may be effective in ameliorating this problem. Assistance to borrowers reduces their incentive to default, and thus increases the amount of efficient mortgage lending, decreases wasteful default, and promotes efficient effort in home maintenance.

Intuitively the result is clear. In a world with moral hazard, a subsidy to borrowing has two effects: It increases the demand by borrowers for housing and it increases the likelihood that they will repay their loans. Since all loans have zero profits, this increased likelihood of repayment means that there is a reduction in the frequency of defaults, which translates into a further willingness of lenders to provide additional loans.

Because of this incentive effect, one would imagine that the government could tailor its lending program to take advantage of the incentives of borrowers. After all, borrowers are more likely to repay their loans if the amounts they have to repay are lower. Thus it might appear that by concentrating its resources on subsidies for repaying loans and avoiding subsidies associated with inefficient evictions, the government might get more mileage out of its subsidies. Nevertheless, it can be shown that *any two comprehensive programs made available to the same population, costing the same amount, will be equally effective in inducing individuals to purchase homes.* (By a “comprehensive” program we mean one that is made available to all individuals who qualify, where qualification is a function of observable individual characteristics.)

In other words, in a world of pure moral hazard, unlike a world of adverse selection, there is nothing to choose between programs subsidizing insurance and programs subsidizing interest rates. The reason for this result is that the lenders are already tailoring their programs to derive maximum possible benefit from the incentives induced by the terms of the loan. Any attempts by the government to increase the incentives further merely reduce the lender’s incentives.^{19,20}

Comprehensive programs subsidizing an entire group of individuals are likely to be extremely expensive ways of achieving a goal, since they subsidize inframarginal as well as marginal individuals. Most programs we examine in fact are targeted toward a much more narrow segment of individuals in an attempt to reduce the cost of

19. There is an obvious caveat to this result: If the program is so extreme as to be provided exclusively by the government with lenders abandoning it entirely, it is possible for the government to develop a scheme which inefficiently reduces an individual’s incentives to repay. But it is not possible for government to find a way of increasing incentives to repay beyond what would occur with a straight subsidy to the lenders.

20. There is a second way in which moral hazard and adverse selection models are different. Many provisions for federal assistance programs require non-discrimination clauses—that is, individuals who receive the assistance cannot be treated differently from individuals who do not receive the assistance. In a world of moral hazard this requirement is not binding on any firm. Once a potential borrower receives a subsidy—for example, down-payment assistance—he is, from the point of view of the lender, in exactly the same position as an individual who owned that down payment initially.

the subsidy.²¹ Moreover, within even the targeted group, the programs may not be available to all who would qualify for them; in other words, most of the programs employ some explicit or implicit nonprice rationing even among qualified individuals. It turns out that apparently subtle distinctions in the form that rationing takes can have significant influences on the outcome.

A key issue is the extent to which the government regulators have access to the same information that is available to the banks. The appendix demonstrates that, *if the government is at an informational disadvantage and the demand for loans is sufficiently responsive to higher levels of subsidy, then rationing a fixed level of subsidy randomly will have larger effect on the demand for housing than will providing the amounts equally to all who desire it.*

In fact, while the government's information is not likely to be as good as the lender's, the government may be able to receive detailed information about objective criteria like asset holdings. The government will also be able to obtain information about the loan being offered by the lender, and, significantly, about whether the lender would normally refuse to grant a loan at all.

Suppose that the government specifies that it will fund "only those individuals who would not receive loans otherwise." We show in the appendix that *such a restriction has no effect on the market unless (a) there is randomness in the allocation of government subsidies, (b) different borrowers place different values on the subsidy, and (c) applying for loans is costly.*

It would be tempting for a government agency to attempt to fund the least expensive among the loan applicants, as a way of spreading limited resources as far as possible. But under such a program lenders and borrowers will have an incentive to deny loans to previously marginal applicants so that they can take advantage of the subsidy. In the long run, such a scheme will have no effect on the number of loans made. This idea is discussed in more detail in the appendix.

Instead the government might set a maximum level of subsidy to be offered on any loan, and to fund the poorest applicants first. We show in the appendix that if the correct maximum could be found, such a scheme achieves the optimum among nonrandom schemes. However, it should be noted that even in this case when the scheme is successful the restriction to borrowers turned down for private loans is ineffective; the result would be the same had the restriction been dropped.

The bureaucratic procedures and delays inherent in government programs provide a deterrent to many participants in those programs. To the extent that all participants in the program regard the costs as identical, then the costs are purely dissipative; they reduce participation in the program and unambiguously reduce its effectiveness. If, however, government-imposed costs of applying for government subsidies

21. There are a couple of obvious principles to apply in trying to determine the right type of targeting. For example if we are interested in increasing the numbers of minorities borrowing for housing, we should target population segments in which there are a large number of minorities with high elasticity of demand for the borrowing as a function of the subsidy level and few of whom already own housing. Conversely, since any such program will inevitably cause some change in interest rates in the economy as a whole, crowding out borrowers in non-targeted groups, the opposite criteria should hold for non-targeted groups.

have differential impact on marginal and inframarginal borrowers, these costs can have beneficial effects. The appendix shows that *if the government randomly hands subsidies to a subset of applicants, if applying for loans is expensive, and if the subsidy is most valuable to individuals with the least wealth, then the restriction of subsidies to previously rejected loan applicants can be an effective screening device, which ensures that applicants who could obtain nonsubsidized loans will self-select out of the subsidized program.* This provides a mechanism by which the government can target its subsidies to provide the greatest impact even when it does not have access to information about each applicant's level of wealth.

Delay in processing subsidies can serve as a similar selection device. Most programs have lengthy waiting periods for approval. In fact, we would conjecture that bureaucratic delay is the first line of defense for government programs in ensuring that most borrowers who take advantage of them are individuals who would not have participated in the market in the absence of the program.

3.2. *Informational Externalities*

Lang and Nakamura (1991) and Nakamura (1993) provide another efficiency-based argument for providing assistance to poor neighborhoods. They focus on dynamic information externalities that can lead to inefficient equilibria. The role of government intervention is to break the cycle of credit denial and low economic activity in poor neighborhoods with temporary subsidies that have a permanent positive effect on credit allocation and economic activity through their effect on the information technology in credit markets. The clearest case these authors examine is the possibility that "redlining" (the absence of mortgage lending to finance properties in certain neighborhoods) may be produced by the difficulty of appraising real estate in the absence of prior transactions in the neighborhood ("comparables").

Once mortgage activity and appraisals of properties fall off in a neighborhood (for whatever reason), appraisals become more costly and less accurate, which raises the probability of credit denial. This problem feeds on itself until redlining results. In essence, the point is that transactions generate a positive externality for other transactions through information costs, and that focused assistance to particular neighborhoods can help those neighborhoods to switch permanently from the "bad" equilibrium to the "good" equilibrium.

A key point of emphasis in this argument is that information externalities are location-specific. To be effective, government assistance must be narrowly focused on particular neighborhoods. Assistance doled out to all neighborhoods simultaneously will be much less effective than the same amount of assistance given to individual neighborhoods one at a time sequentially.

3.3. *Bigotry*

The most hotly debated, and most controversial, potential problem in the mortgage market is bigotry. Although there can be little doubt that bigotry based on race,

ethnic origin, and other criteria, still exists in American society,²² some economists have argued that bigotry is unlikely to be a significant problem in the mortgage market.

Consider the basic model of bigotry, Becker's 1957 "tastes for discrimination."²³ According to this theory, people who are bigoted must sacrifice something to indulge their desire to discriminate against minorities—firms will accept lower profits; workers will accept lower wages; customers will accept higher prices. But unlike markets such as the real estate market in which agents may be concerned with offending a bigoted neighborhood by introducing minorities, discrimination by bankers does not cater to any clientele. If discrimination against minority borrowers were occurring as the result of bigotry, profit-minded bankers could gain substantial profits and market share by soliciting the business of creditworthy minority applicants who were being turned down by their competitors. Loan officers who systematically forego profits will be fired by stockholders. Only stockholders willing to forego profits will encourage or permit bigotry by their employees.

Practitioners and community groups, however, have argued that these theoretical conclusions are naive. Specifically, the above theories presume that bankers have a perfectly elastic supply of funds with which to invest in projects. If the supply of loanable funds is fixed (or if the supply of *time* available to the banker to evaluate investment alternatives is fixed), then bankers may very well forego loans to minorities in favor of similarly profitable alternatives. Furthermore, bigotry is likely to be most important at the level of the loan officer. If agency problems are severe enough, then profit-minded stockholders may be unable to detect and prevent (in a cost-effective manner) discriminatory acts by their employees.

The validity of any of these arguments is still a matter of much debate. In any event, to the extent that bigotry contributes to credit market disparities, we can analyze the effectiveness of the interventions outlined in section 2. Most important, of course, are the regulations under which banks must operate. Equal credit opportunity laws and the Fair Housing Act both provide for sanctions against banks that are proven to discriminate on the basis of race. And while the Community Reinvestment Act and the Home Mortgage Disclosure Act both attempt to provide information with which to enforce fair lending laws, as we discuss in section 3.6 proving a charge of racial discrimination is extremely difficult. Others have argued²⁴ that the Comptroller of the Currency's plan to use paired testers may be the most effective mechanism for discovering and prosecuting individual cases of bigotry by banks. If bigotry is in fact the cause of disparities in the home mortgage market, this may be the only way of discovering it and achieving the goal of retributive justice against the offending banks.

22. Most relevant to our analysis is a recent study of the behavior of landlords and real estate brokers by Yinger (1986). He found that, holding constant differences in income and other characteristics of applicants, black housing seekers were told about 30 percent fewer available housing units than were whites.

23. For a more complete overview of Becker's theories on discrimination, see Becker (1971).

24. Galster (1992) and Wienk (1992).

3.4. Rational Discrimination from Costly Information Gathering

Racial discrimination in lending need not arise from bigotry per se. A bias against minorities may arise if it is less cost-effective for banks to process minorities' applications: We call this "rational discrimination."²⁵ This may occur either because of differences across races in information costs paid by the banker in processing mortgage applications, or because the expected benefits to the banker of investing in information costs are lower for minorities (because, for example, on average, they are poorer).

In the latter case, bankers who ex ante cannot perfectly distinguish the individual creditworthiness of applicants will rely on characteristics that can be observed at low cost to determine the likely benefit of investing marginal resources in information about individual applicants. Bankers interested in discovering the true "z score" of the mortgage applicant must verify all the information provided about the borrower, and possibly produce additional information relevant for measuring the borrower's true probability of default. After each investment in some information the banker must decide whether to continue collecting information or stop (and either accept or deny the application).

If a borrower belongs to a group that on average is less creditworthy the lender will use a more conservative stopping rule for investing in information about the borrower. Alternatively, even if the average characteristics of both racial groups were identical, higher information costs will produce the same result. These information costs could be due to a lack of cultural affinity between a borrower and his banker.²⁶

In what follows we describe the characteristics of a market in which cultural affinities play a role, and discuss the effectiveness of various policy responses to this problem. (Similar results will emerge from a model of rational discrimination resulting from different average characteristics across races.) The formal analysis of differential costs under cultural affinity is described in the appendix.

Loan officers must expend time and effort in evaluating the prospects of a loan. This evaluation includes not only a consideration of objective financial factors but also the loan officer's opinion as to whether or not the applicant is likely to repay. This opinion is the result of a complex array of subtle signals: firmness of handshake, dress, vocal characteristics, posture, nervous habits can all play a part in a banker's appraisal of an applicant's character. Suppose that it is harder for (predominantly white) loan officers to interpret the signals they receive from minority applicants. Loan officers must either expend more resources obtaining this information from minority applicants (say, through "sensitivity training" of loan officers), or

25. The label "rational discrimination" is not an attempt to condone discriminatory behavior. By "rational" we simply mean that discrimination in the mortgage market may reflect *profit* maximizing behavior by bankers, as we will show.

26. These arguments have been suggested informally by Federal Reserve Board Governor Lawrence Lindsey, who argues that discrimination may occur because bank loan officers only help borderline white applicants to overcome flaws in their mortgage applications. Lindsey argues for the need to educate bank loan officers about unintended bias from their cultural affinity with white applicants. See Tim W. Ferguson, "The Next Lender Litigation Wave: Mortgage Bias," *Wall Street Journal*, May 25, 1993, p. A25.

they must make the loan decision relying on less informative signals. In either case, a loan to a minority applicant is less profitable for the bank than is a loan to an otherwise-identical white applicant.

In the model, banks screen applicants and offer loans to those who “pass.” It is important to note that this process provides a (second-best) socially optimal outcome—from an efficiency standpoint no problem exists. Nevertheless, none of our standards of equity are met by this market. In the appendix we show that, absent government intervention, the following two results will hold when it is unprofitable to use special screening procedures for minorities:

- (a) *The proportion of loan applications denied is larger for minorities than it is for whites; and*
- (b) *The average probability of default is greater for minorities.*

These two conclusions are consistent with existing empirical evidence on home mortgage loans. Furthermore, the second result is in striking contrast to what would happen if bigotry were the cause of discrimination in the mortgage market. We discuss this idea further in section 3.6. *On the other hand, if bankers do find it more profitable to screen minorities separately, then absent government intervention minorities should be charged higher interest rates.* This follows from the fact that white applications are less costly to process.

Since lending institutions find it more expensive to lend to minorities than to lend to whites, it is clear that attempts to force lending to minorities will induce countermeasures by lenders. For example, if the government requires that lenders use race-neutral criteria, there will be an incentive for lenders to develop criteria which, while ostensibly race-neutral are in fact screens for blocking out minorities.²⁷ If the government requires that similar proportions of white and black applicants be accepted for loans (outcome equity), then the lender will search for ways to reduce the number of minority applicants.²⁸

Suppose however, that the government does succeed in imposing egalitarian standards. What will be the consequences? To determine this, we must consider our two notions of equity from before: Outcome-based standards and procedural standards.

First, consider the effects of a government requirement that loans to both races have the same interest rates and that the cutoff criterion must be the same for both races. *In this case the (uniform) standards by which a loan will be accepted will be more stringent than they were without intervention, and the difference between the default rate for minorities and whites will be even larger. Furthermore, lenders will never invest in activities that make them better able to evaluate minority applications.*

One side effect, then, of egalitarian procedures is to undermine the formation of institutions catering to minority needs. Since such institutions will be subject to

27. For example, neighborhood specific criteria, or job specific requirements which are irrelevant in themselves may turn out to be profitable criteria for inclusion if they effectively prohibit lending to minorities.

28. For example, moving offices out of predominantly minority neighborhoods.

criticism for “reverse discrimination,” they will in equilibrium conform to the standards of majority institutions. Otherwise, since their lending will inevitably require higher interest rates, they will find themselves attracting white borrowers rejected by majority institutions.

Alternatively, the government may choose to impose egalitarian outcomes by, for example, requiring racial quotas for accepted loans. In this case, the impact on default rates depends upon how costly it is for banks to improve their minority screening technologies. *If these costs are large, then equilibrium with equality of outcomes involves even higher disparities in default rates, as well as lower lending to whites. On the other hand, if these costs are small, then equilibrium with equality of outcomes involves no disparity in default rates.* The point is that when equality of outcome is mandated, one of the potential beneficial effects is to induce firms to improve their screening procedures and to attune them to minority clients.

Of course this improvement comes at the cost of wasteful duplication of effort. By requiring the individual firms to maintain the quotas on a firm-by-firm basis, the procedure requires that each firm invest in both types of signal detection.²⁹ The same results can be achieved less expensively if specialized firms for minority lending are subsidized—or equivalently, if firms which lend to too many whites (or reject too many minorities) are permitted to fulfill their quota obligations by subsidizing firms specializing in minority lending: *A system of transferable quotas achieves the target lending at minimum cost.* This result holds whether the cost of improving minority screening is high or low. As part of delegation of minority lending, the subsidizers will take into account cost minimization.

We close this section by noting that lack of financial sophistication on the part of borrowers can contribute to rational discrimination. A lack of financial sophistication can be viewed as one of the mechanisms that produces cultural affinity obstacles between banker and mortgage applicant. The unsophisticated applicant may be unable to present his case in the manner most likely to impress the banker. Furthermore, a demonstrated lack of financial sophistication may be a signal to the banker that the applicant may lack some fundamental skills in personal budgeting. Educational interventions may be warranted to help the poor overcome these barriers. Without government intervention borrowers and lenders cannot be relied upon to produce optimal levels of financial sophistication of poor borrowers. First, borrowers themselves may not be aware that they lack some set of skills or knowledge about relevant financial transactions. Second, private financial institutions may not have an incentive to educate their borrowers in these skills, since they will not internalize all the benefits of this investment.

3.5. Evidence on Discrimination

Existing empirical evidence has not convincingly demonstrated that bigotry, rational discrimination, or educational disadvantage play an important role in the

29. In the example where “sensitivity training” provides for better evaluation of minority applications, banks must continue their standard training procedures in addition to this special training for its officers to evaluate minority applicants.

mortgage market, let alone which is most prevalent. If discrimination—from whatever source—is important, then minorities' mortgage applications should be denied more frequently than whites', controlling for all relevant observable characteristics of borrowers. One recent study by the Federal Reserve Bank of Boston (Munnell et al. 1992) finds that race plays an important role in determining whether an applicant receives a mortgage. The Fed study found that, after controlling for some economic characteristics, a black or Hispanic applicant with a typical economic profile would be denied 17 percent of the time, compared to a denial rate of only 11 percent for whites.

Because the Boston Fed's data are unique this study has had great influence on policymakers. It has also been the subject of vocal criticism. Two recent Op-Ed pieces argue that the Boston Fed's findings were entirely the result of faulty data and faulty methodology. Both articles concluded that a small number of data coding errors produced the findings of apparent discrimination.³⁰

Evidence on the repayment histories of mortgages has also raised doubts about the existence of bigotry in mortgage markets, although this evidence may be consistent with rational discrimination against minorities or lack of financial sophistication by the poor. If bankers did in fact have "tastes for discrimination," minority applicants receiving credit should, after controlling for differences in mortgage contracts, have *lower* default rates than whites receiving credit.³¹ Until recently, there has been little empirical research on the correlation between default rates and race, but what evidence exists does not indicate a prevalence of bigotry. Using averages across census tracts sorted by the proportions of minorities in each, the Boston Fed found no relationship between default rates and the racial mix of census tracts.³² In more formal studies, Green and von Furstenberg (1975) found no systematic relationship between race and mortgage default risk, and Evans, Maris, and Weinstein (1985) and Berkovec et al. (1994) found that default rates of whites were lower than for other groups after controlling for other characteristics.^{33,34}

Equal or lower default rates for whites, however, may be consistent with rational discrimination against minorities. As we pointed out in our earlier discussion, the average default rates of minorities may be higher than those of whites (after controlling for economic characteristics using data provided to intermediaries) even though the marginal default rates would be identical. Under rational discrimination (either

30. Writing for the *Wall Street Journal* (September 1, 1993, p. A14), Stan Liebowitz and Ted Day of the University of Texas, Dallas claim that the Boston Fed data showed many borrowers with substantial *negative* net worth. In fact, Liebowitz and Day claim that after eliminating only six of the most obviously flawed loan entries in the Boston Fed's data base, there is no evidence of discrimination for the remaining sample of 1,017 single family home mortgage applicants. See also Mark Zandi, "Boston Fed's Bias Study Was Deeply Flawed," *American Banker*, August 19, 1993, p. 1.

31. Bigoted bankers must make a larger profit on loans to minorities since they must be compensated for this "distasteful" activity. But to earn a higher profit, the default rate must be lower for minorities. For a popular discussion of this idea, see Gary S. Becker, "The Evidence Against Banks Doesn't Prove Bias," *Business Week*, April 19, 1993, p. 18. For a rebuttal of this argument see Tootell (1993).

32. Peter Brimelow and Leslie Spencer, "The Hidden Clue," *Forbes*, January 3, 1993, p. 48.

33. It should be noted, however, that these default rate findings only prove that bigotry is not present if the credit market is perfectly competitive. If other frictions do exist (see below), then higher default rates for minorities may, in fact, be consistent with bigotry.

34. Other studies on the relationship between default rates and race are currently under way.

due to cultural affinity or differences in average creditworthiness across races), competition ensures the equivalence of marginal default rates, but because signals are noisier for minorities and the payoff for investing in signals is lower on average, average default rates will be higher for minorities.³⁵

Finally, studies of Community Reinvestment Act ratings cast some doubt on the existence of bigotry or cultural affinity in producing discrimination in mortgage markets. Studies by the Federal Reserve and by an independent bank consultant found that “minority banks and thrifts scored far lower on their CRA ratings than did all other banks.”³⁶ While minority banks “make overwhelmingly more housing loans to minorities, [they] are singling out the richest segment of their communities to a greater degree than all other banks.” It is difficult to argue that minority bankers are bigoted or that they lack cultural affinity with minority borrowers. If bigotry and cultural affinity do not explain poor CRA ratings by minorities, then what does? One possibility is that educational disadvantages of some applicants or lower average wealth of minorities (and hence rational discrimination) may explain minority bankers’ low CRA ratings.³⁷

Another possibility is that CRA compliance involves making unprofitable loans (that is, regulators expect banks to provide loan subsidies to the poor or to minorities). But why would this tend to produce lower CRA ratings by minority-owned banks? Many minority-owned banks and thrifts are in precarious positions. As one banker remarked, “Because many [minority banks] are not stable, they are not in a position to effectively reach out with the kinds of creative lending that is required to rebuild communities.” This suggests that bank rejections of minority applicants that lead to poor CRA ratings are often due not to discrimination but to the poor expected performance of the mortgage.³⁸

4. COMMUNITY DEVELOPMENT BANKS

Thus far we have argued that a wide variety of underlying goals guide policy, and that there is little evidence to show which potential problems are likely to be the most important impediments to achieving those goals. Therefore, it is worth noting that a properly designed system of assistance for community development banks would be consonant with alleviating all of the above-noted market failures. In contrast, other interventions, while more effective for some potential problems, may be counter-productive for other problems.

If the goal of policy is to transfer wealth in order to mitigate moral hazard or

35. See also Tootell (1993).

36. Robert B. Cox, “Minority Banks Seen Lagging in CRA Arena,” *American Banker*, August 20, 1993, p. 1.

37. One should also note here that minority bankers may well be sorting their application pool by criteria other than race; one example would be redlining of certain neighborhoods.

38. Note that this idea is distinct from the suggestion that rational discrimination causes poor CRA performance. If rational discrimination due to lower average wealth of minorities were the reason for these ratings, minority owned banks should not be financially less sound than their white owned counterparts.

adverse selection problems, then these transfers can be achieved as well through community development banks as through other vehicles—and indeed community development banks will dominate other mechanisms if they are structured so that their clientele is the desired target group. Second, the existence of dynamic information externalities—which imply benefits from concentrated local assistance to communities—suggests that localized assistance to individual community development banks may be more effective than programs that spread resources too thinly throughout the population. Third, if bigotry is a problem, its consequences for minority borrowers (high denial rates, search costs, etc.) can be eliminated by creating an alternative source of funds through community banks. Fourth, as noted in section 3.4, cultural affinity problems between bankers and lenders argue for channeling assistance through community development banks, rather than through down-payment assistance or other subsidies which will be implemented by “ordinary” banks. Finally, community development banks are a natural focal point for providing financial and business education for their communities, and they may have extra incentives to do so as stakeholders in their neighborhoods.

Community development banks can potentially avoid costs that often beset other approaches. First, many government agencies are accused of misallocating funds or failing to achieve their objectives. Government agencies lack the incentives of private banks to allocate funds properly. So long as government assistance to a community development bank depends on that bank’s ability to attract private *uninsured* investments from other sources (for example, funds from other banks which are required to devote some resources to the community development bank of their choice), community development banks will face the discipline of the market. Incompetent bankers will not be tolerated. The example provided by the South Shore Bank in Chicago proves that it is possible for such specialized institutions to raise such funds.³⁹

A reliance on community development banks also can avoid the adverse consequences of CRA regulation. As already noted, direct and indirect costs to banks of CRA compliance are large. White (1993) and Macey and Miller (1993) argue that such regulation unfairly discriminates against banks and places them at a competitive disadvantage. In the long run, these regulations may even promote exit of some commercial banks from cities, where CRA compliance is especially costly.

Finally, alternative schemes for promoting community development—like property giveaways to the poor—generate deadweight losses not implied by community development bank assistance. HUD places restrictions on resale rights after privatization (which are also found in similar programs subsidizing home purchases through the Resolution Trust Corporation). Colwell and Mahue (1991b) argue that such restrictions discourage privatization and limit the maintenance investments by former tenants once property is privatized. Such restrictions, however, are useful for limiting the extent to which profit-seeking investors “arbitrage” government assis-

39. See the discussion by Joan Shapiro in “Banking Under the Community Reinvestment Act.” Conference at the University of Illinois at Urbana-Champaign, September 1993.

tance programs for their own private gain. In the absence of restricted resale, outsiders could be hired as conduits to allow speculators to profit from government subsidies. In this case, programs could be very costly while accomplishing little. By eschewing property giveaways, one avoids the difficult choice between the adverse effects on neighborhoods of limiting property resale and the wastage from arbitrage.

These arguments support the general concept of community development banks, not any particular proposal or program currently being debated in the political arena. Channeling government subsidies for borrowing, educational assistance, and the like through *competitive* community-based organizations with specialized banking skills can be a more effective method of providing assistance than the current menagerie of programs. A pitfall of current proposals for funding of such institutions is the failure to require government grants to be matched by *uninsured* deposits from private financial institutions. Uninsured deposits are a necessary market discipline on the behavior of community development banks; deposit insurance for matching funds reduces the incentives of private financial institutions to monitor community development banks.⁴⁰

Furthermore, there is one social objective that community development banks will be unable to achieve—retributive justice. In particular, the notion that CRA compliance can best be achieved through investments by “ordinary” banks in community development banks ignores the potential desire to punish bigoted bankers. Nevertheless, given the absence of evidence in support of bigotry by bankers, and the difficulty in obtaining clear proof of such behavior, the costs of meting out such punishment are likely to be extremely high.

5. CONCLUSIONS

The proper role of government in the mortgage market depends on the source of market failures and the goals of intervention. If racial differences in outcomes in the mortgage market are due to a taste for discrimination by lenders, and if retribution is the objective of policy, then policies should be designed to ferret out and punish discriminators. But these policies will be less effective in solving other problems. If, for example, the inequities stem from income and wealth differences, and process equity is the goal, then targeted subsidy programs are the effective solution. If observed inequities stem from differences in the cost of monitoring borrowers, differences in borrower sophistication, or information externalities, then institutions should be developed that focus on these sources of inequity. Subsidizing community development banks to fill specialized needs and target assistance to specific neighborhoods will be more effective than mandating procedural requirements for existing banks. If the goal of government intervention is equal outcomes for their own sake, then once again the most effective policy is to channel assistance through community development banks. If properly designed, institutions with specialized focus and localized objectives will have a comparative advantage in processing low-

40. See Calomiris and Kahn (1991) and Calomiris, Kahn, and Krasa (1992).

income/minority loan applications, rebuilding neighborhoods, and providing educational services.

APPENDIX—MODELS

Consider a two-period world in which all borrowers and lenders are risk neutral. All housing costs \$1 per unit. The competitive gross expected return on a loan is G .

General Preferences

The value of a house to an individual is a random variable \tilde{A} . The distribution of this random variable is denoted $\tilde{F}(\cdot)$. In what follows this distribution may be conditioned on information about the individual's type, actions, etc.; for any vector of such variables z we will write the conditional distribution $\tilde{F}(\cdot | z)$. In particular, the distribution can be affected by effort undertaken by the home owner (maintenance, for example). We denote the level of effort by e .

A loan contract specifies an amount $P < 1$ to be received in period one and applied toward the purchase of a house, as well as an amount R to be repaid in period two. If the repayment is not made the house is forfeited and the borrower enjoys no benefit from it. We assume for simplicity that the house is worthless to all others in the economy. In the absence of government intervention, the borrower provides the remainder of the purchase price $(1 - P)$ himself. Borrower n has liquid wealth L_n which earns the competitive rate of return if not applied toward the down payment. In addition, the borrower can, if necessary, make further payment toward purchasing the house. If he pays $1 - P$ in total, and his liquid wealth is $L_n < 1 - P$, he suffers disutility $C(1 - P - L_n)$ (we regard this as the cost of extra work, liquidating other illiquid assets, or obtaining funds from relatives). We assume $C(\cdot)$ is an increasing strictly convex function, and

$$C'(0) = G . \tag{1}$$

The borrower learns the value of the house to him before the payment is due. The borrower will not repay the loan ex post if $\tilde{A} < R$. Thus, the ex ante expected utility from a loan (P, R) and expenditure of effort e is

$$\int_R^\infty (\tilde{A} - R) d\tilde{F}(\tilde{A} | e) - e - C(1 - P - L_n) . \tag{2}$$

The lender's expected profit is

$$[1 - \tilde{F}(R | e)]R - GP . \tag{3}$$

We make the following parametric restrictions: $E[\tilde{A}] > G$ for all individuals, so

that homeownership is always socially desirable, and $E[\tilde{A}] < C(1 - L_n)$ for all individuals, so that no one will buy a house without being able to borrow from a bank.

Specialized Assumptions

Specific Distributions: In some of the models which follow we will use one of two assumptions about the distribution of \tilde{A} :

TWO-POINT DISTRIBUTION [2PD]: \tilde{A} is either equal to 0 or A . Individuals differ in the probability with which A occurs; for individual n this is denoted $p_n(e)$.

ADDITIVE NOISE [A + B]: For individual n , $\tilde{A} = A_n + B_n$, where A_n is deterministic, and B_n is identically distributed for all individuals with distribution $F(\cdot)$ (with $E[B_n] = 0$).

Specific Restrictions: In the version of the model below, we will restrict the utility function in various ways in order to focus on specific aspects of the problem.

NO HIDDEN ACTION [NHA]: $\tilde{F}(\cdot | e) = \tilde{F}(\cdot)$, for all e .

This assumption says that effort is ineffective; it eliminates the hidden action, allowing us to focus on pure adverse selection issues (note that \tilde{F} can still be individual specific, it just cannot be affected by any action of the individual).

NO ILLIQUID RESOURCES [NIR]: $C(x) = \infty$, for $x > 0$.

This assumption eliminates the use of collateral as a second-best screening device in adverse selection contexts; instead all individuals use their liquid wealth to the extent that they possess it.

Model I—Adverse Selection

Without Second-Best Collateral. For this section we assume [NHA] and [NIR]. Then the framework is analogous to that of Gale (1990b, 1991). If banks compete by offering contracts for $(1 - L)$ of funds to a holder of L in down payment, then the competitive payment $R(L)$ is determined by the following condition:

$$\int_{n \in S(R, L)} ([1 - \tilde{F}(R | n)]R - G(1 - L)) dn = 0, \quad (4)$$

where $S(R, L)$ is the set of types (among those providing down payment L) for whom

$$\int_R^\infty (\tilde{A} - R) d\tilde{F}(\tilde{A} | n) \geq GL \quad (5)$$

—that is, those types willing to borrow on those terms. We assume for now, and show below, that borrowers will choose to use all their liquid assets as collateral. As

R increases, the set of potential borrowers shrinks. As R increases, the actual return given to the lender varies for two reasons: individual borrowers become less likely to repay and the mix of borrowers varies. The expected rate of repayment for a contract (R, L) is

$$\frac{\int_{n \in S(R,L)} [1 - \bar{F}(R | n)] dn}{\int_{n \in S(R,L)} dn} \tag{6}$$

RESULT 1: *For the [2PD] distribution the rate of repayment is increasing in R .*⁴¹

PROOF: As R increases the probability of repayment by any single type remains unaffected (for $0 < R < A$), but the low probability types drop out of the market sooner. Thus, the average rate of repayment increases. ♠

If an individual’s likelihood of repayment remains constant, increases in the interest rate *improve* the selection of good quality borrowers. For interest rate subsidies to have dramatic effects in the credit rationing framework, it is necessary that individuals be rationed out of the market. This happens only when the likelihood of repayment strongly decreases with interest rate increases. For this to occur it is moral hazard, not adverse selection, considerations which must dominate.

THEOREM 1: *Assume $[A + B]$ is the distribution and it is uncorrelated with the distribution of L . Then in competitive equilibrium, individuals would voluntarily spend the entirety of their wealth as down payments.*

PROOF: It can be shown that when $R(L)$ and $S(R(L), L)$ are defined as above, the expected utility of a borrower of a given type is monotonically increasing in offered down payment. ♠

With Second-Best Collateral. We continue to assume [NHA] but drop [NIR]. Thus, it becomes possible to use excessive down payments as a second-best self-selection device. If we also assume [2PD] and the existence of just two types in the population, with differing “high-attachment” probabilities, where $p_H > p_L$, then we have the model of Gale (1990a). The general results of that model and analogous results of Smith and Stutzer (1989) are described in the text. The purpose of this portion of the appendix is to demonstrate how changes in the initial level of wealth in that model affect the equilibrium.

In equilibrium low-quality types receive loans that are efficient:

$$\begin{aligned} &\max_{P,R} p_L(A - R) - C(1 - L - P) \\ &\text{s.t. } p_L R \geq PG \end{aligned} \tag{7}$$

41. This result holds more generally for any case of first-order stochastic dominance across distributions.

or

$$P = 1 - L, \quad R = \frac{(1 - L)G}{p_L}. \quad (8)$$

High-quality types receive loans that make zero profits and for which low-quality types have no incentive to masquerade as high-quality types:

$$\begin{aligned} & \max_{P,R} p_H(A - R) - C(1 - L - P) \\ & \text{s.t. } p_H R \geq p_G \\ & p_L(A - L) - C(1 - L - P) \leq p_L \left(A - \frac{(1 - L)G}{p_L} \right). \end{aligned} \quad (9)$$

In the solution, both constraints are binding; they can be simplified to find an expression for the size of the loan to high-quality types:

$$p_G \left(\frac{p_H - p_L}{p_H} \right) = C(1 - L - P) - G(1 - L - P), \quad (10)$$

implying that down payments by high-quality types exceed the efficient level—they receive smaller loans than would be efficient. This aspect of the adverse selection model is unobjectionable. Note however, what happens as L increases: P falls, so that increased wealth causes borrowers to take out smaller loans. Even so, the interest rate on the loans does not change; because of the perfect separation, the interest rate for each type n always equals G/p_n . Note then that in this world a borrower with high wealth, when asking for the same size of loan as a borrower with lower wealth, would find his interest rate higher.⁴²

Model II—Pure Moral Hazard Model

Assume now that the borrower's type (that is, the distribution $\tilde{F}(\cdot)$ and liquid collateral L_n , but not the realization of \tilde{A}) is known by the lender. For simplicity, assume [NIR]. In a competitive market each borrower receives a loan (P, R) which maximizes expected utility [equation (2)] subject to non-negative expected profits [equation (3)] and subject to the following incentive restriction:

$$e = \operatorname{argmax}_{\hat{e}} \int_R^{\infty} (\tilde{A} - R) d\tilde{F}(\tilde{A} | \hat{e}) - \hat{e} \quad (11)$$

42. If comparisons are made across groups for whom the cost of obtaining extra funds vary, the results are similar.

(for simplicity assume that this argmax, $e(R)$, is unique). Let S be the set of types for which the optimal loan dominates autarky:

$$\int_{R_n}^{\infty} (\bar{A} - R_n) d\bar{F}(\bar{A} | e) - e_n > GL_n . \tag{12}$$

As before, borrowers use all their liquid assets as collateral because the benefit from a reduced promised payment more than compensates for the opportunity cost. As before, borrowers default whenever their realized attachment value is less than R . The inability of borrowers to commit to repaying R in low-attachment value states generates deadweight losses from three related phenomena. Without commitment, fewer houses can be purchased because of the high costs of lending to low-collateral borrowers; homeowners with low realized attachment values will choose socially wasteful default; and effort in home maintenance will be lower than optimal because of homeowners' inability to reap the gains from effort in default states. A potential role for government intervention arises because the government can reduce R , and thereby reduce the probability borrowers will choose to default.

Government Intervention. Interventions can take the form of down-payment assistance D_g , loan insurance guarantees I_g , or interest rate subsidies R_g . Without loss of generality, we will treat each of these as if they were paid directly to the lender. Given a combination of these three, the lender breaks even if

$$[1 - \bar{F}(R)](R + R_g) + \bar{F}(R)I_g = G(P - D_g) . \tag{13}$$

With government intervention, the maximization problem is the same as before, except for this new break-even condition. As before, loans are given to all individuals for whom the expected value of the loan is positive.

DEFINITION: A “comprehensive” government program is one that is made available to all individuals who qualify, where qualification is a function of the individual's personal characteristics. In the model as specified, personal characteristics are the distribution $\bar{F}(\cdot)$ and the quantity L_n .

THEOREM 2: Consider any two comprehensive programs made available to the same population. If the programs cost the same amount, they will be equally effective in inducing individuals to purchase homes.

PROOF: Any trio of values (D_g, R_g, I_g) that leaves equation (13) unchanged leaves the maximization problem that describes market equilibrium unchanged, and therefore leaves the agent's willingness to participate and his actions upon participating unchanged. Moreover, since the cost of any program to the government is

$$(1 - \bar{F}(R))R_g + \bar{F}(R)I_g + D_gG \tag{14}$$

such actions leave the government's costs unchanged. ♠

Randomized Rationing. For any category of purchases, let $S(T)$ represent the number of loans made if all members of the category could receive a subsidy of T . $S(T)$ can be calculated in the model by finding the measure of individuals for whom the optimal contract described above has non-negative value when $D_g = T$; $dS(T)/dT$ is the measure of individuals just indifferent to accepting a contract when $D_g = T$. At a subsidy level T the total cost to the government of the subsidy is $S(T)T$; call this total expenditure Z . Suppose that we increased the subsidy available to each applicant to $T + \Delta T$, but kept the government's total expenditure equal to Z . At $T + \Delta T$ the number of applicants for the subsidy would increase to $S(T + \Delta T)$; in order to keep the total expenditure on the subsidy unchanged, only the fraction $Z/[S(T + \Delta T)(T + \Delta T)]$ of the applicants can be accommodated. The remainder will be forced to find unsubsidized contracts, or no contract at all. Thus the number receiving loans will be

$$\frac{Z}{T + \Delta T} + \left(1 - \frac{Z}{S(T + \Delta T)(T + \Delta T)} \right) S(0) . \quad (15)$$

Taking the derivative of this expression with respect to ΔT and evaluating it at $\Delta T = 0$ we find that a small amount of randomization increases the number of loans made (and hence efficiency since all loans are socially valuable) as long as

$$S'(T) \frac{T}{S(T)} > \frac{S(T) - S(0)}{S(0)} . \quad (16)$$

Intuitively, this condition requires that the elasticity of S with respect to T be sufficiently large, e.g. that the demand for loans is sufficiently responsive to the subsidy.

Deterministic Rationing Schemes. Assume [NIR], [2PD] with identical distributions \bar{F} for all individuals, and let $H(L)$ be the population distribution of down payments. For each L , the optimal loan offer (R, P) is defined by

$$P = 1 - L - D_g \quad \text{and} \quad R = \psi(P) = \frac{GP}{p(e(R))} . \quad (17)$$

The size of the loan, P , is set so that a housing purchase is just feasible. $\psi(P)$, on the other hand, is defined by the lender's zero profit condition. For more general distributions \bar{F} we can define $\psi(P)$ as the minimum value of R such that

$$(1 - F(R|e(R)))R = GP$$

(if no such R exists, set R at infinity). This loan is accepted by the borrower if

$$(A - R)p(e(R)) > GL + M , \quad (19)$$

where M is the cost of an application (borne by the potential borrower). For each

D_g , there is a minimum L (call it $L(D_g)$) such that the borrower accepts the loan. As the subsidy increases, $L(D_g)$ decreases more than one-for-one.

Given that the government can increase the aggregate number of loans made in the economy without changing its costs by increasing the size of the subsidy available to each applicant and rationing its availability, we now turn to the question of how best to ration this limited subsidy. Consider first deterministic mechanisms. One common mechanism is that the government offer subsidies only to those applicants who have previously been rejected for a loan. The following theorem implies that we can consider nonstochastic rationing schemes without reference to restrictions to previously rejected applicants:

THEOREM 3: *A requirement that applicants for government subsidies must first have been rejected from a bank for an unsubsidized loan is an ineffective requirement unless (a) there is randomness in the allocation of government subsidies, (b) different borrowers place different values on the subsidy, and (c) application for a loan is costly.*

PROOF: If it is costless to apply for bank loans, an applicant who knows he has a chance for the loan subsidy will find it desirable to be rejected for an unsubsidized loan and a firm otherwise making zero profits on its loans will find it desirable to do so. This will not be the case if applications are expensive, but as long as allocations of the government subsidy are deterministic, then there will be no doubt as to who the recipient will be and so again there is no excess cost of applying. Even if there is randomness in the procedure, if the value of the subsidy is the same to all individuals, then a fraction will apply such that the expected value of the subsidy equals the cost of the additional application, and the total number of loans made will be unaffected. ♠

With this result in mind, consider what an efficient (nonstochastic) rationing scheme might look like. Such a scheme depends, of course, on the information available to the government. Suppose that the government has complete information about the wealth of each individual and the structure of the market (specifically that the government knows the function $L(D_g)$). Under complete information an efficient rationing scheme would be to provide to each applicant a subsidy just sufficient to make them willing to accept a loan. This scheme would provide no subsidy to individuals with $L \geq L(0)$, and would provide subsidies to less-wealthy individuals in exactly the amount necessary to make them accept a loan, starting with the wealthiest applicants first and stopping when the program's funds are exhausted. This scheme has the advantage that it is both efficient (in the sense that no subsidies are being provided to inframarginal borrowers), and that it increases borrowing by as much as possible (since it funds the least-expensive applicants first).

We argue that such a scheme is not feasible over the long run. Even if the government does know the structure of the market when developing the program, once the rules are in place market participants will have incentives to change their behavior. In particular, lenders and borrowers will have an incentive to deny loans to previ-

ously marginal applicants so that they can take advantage of the subsidies. In other words, there is an incentive for $L(0)$ to “drift.”

Furthermore, while the government might be able to obtain information about each borrower’s liquid wealth, it is unlikely that it will be able to gain a really complete understanding of the function $L(D_g)$ (the “market”). Under these circumstances, if the government were to subsidize the wealthiest borrowers first, it would end up wasting resources on inframarginal borrowers (that is, those who did not need a subsidy to borrow in the first place). Depending on the cap on the program, such a scheme might induce *no* additional borrowing, and hence be ineffective. Even if it initially does induce additional borrowing on the margin, the “drift” problem mentioned above will still exist, and over time the subsidy will accrue to only inframarginal borrowers.

An alternative scheme which avoids this “drift” problem is one that provides a subsidy first to the most needy borrowers (those with the lowest L). Such a mechanism would start with the application of the individual who values the subsidized scheme at 0, namely, the individual with wealth $L(D_g)$, where D_g is the cap on the program. It will subsidize all wealthier individuals up to the point where funds run out. This scheme is efficient if the last individual subsidized has wealth $L(0)$. If he has greater wealth, then funding was wasted in the sense that it went to individuals who did not require it in order to borrow; if he has less wealth, then there was waste in the sense that there is a range of individuals who are not borrowing but who could be induced to borrow at less cost than those currently subsidized. Although this mechanism will be efficient, it will be very costly. That is, by providing a subsidy to the poorest applicants first it uses scarce resources on those borrowers who are the most costly to help.

Either of the above options requires that the government have access to information about the liquid wealth each borrower has available for a down payment and the structure of the market. If such information is not at the government’s disposal, it may find that a *random* rationing scheme which requires applicants to have been rejected elsewhere can effectively discourage purchasers from applying for subsidies if they would have purchased without subsidies, provided that applications are expensive and the subsidy has different value to different borrowers.⁴³ The scheme we consider provides a fixed subsidy to K individuals who have been rejected for a loan by private lenders. To analyze the scheme, define

$$U(Z) = \int_R^\infty (\bar{A} - R) d\bar{F}(\bar{A}), \quad (20)$$

where $R = \psi(1 - Z)$. In other words, $U(Z)$ is the utility of a borrower who receives a zero profit loan of size $1 - Z$ (a borrower who is able to put up a down payment of size Z). With the option of a subsidy, the borrower receives

43. Note that the above deterministic schemes could just as well have restricted subsidies to applicants previously denied loans. The previous theorem indicated that such a restriction was irrelevant to these mechanisms.

$$\max \{U(D_g + L) - M, GL\} . \quad (21)$$

Suppose that the individual has a probability t of receiving a subsidy and that subsidies are given only to individuals who have been denied unsubsidized loans. The real teeth of the latter provision come from the fact that if rejected for the subsidy the borrower will have to apply again in order to receive a nonsubsidized loan. Thus if he tries for a subsidized loan, his expected payoff is

$$t[U(D_g + L) - M] + (1 - t)\max\{U(L) - 2M, GL - M\} . \quad (22)$$

If he chooses an unsubsidized loan, his payoff is $U(L) - M$. Thus, the smaller the value of the subsidy $U(D_g + L) - U(L)$ the less he is willing to chance having to make a second application. With minor restrictions it will be the case that the value of the subsidy decreases monotonically with L (intuitively this is a consequence of the fact that the efficiency losses from default are most damaging for low values of wealth). This establishes an upper boundary level of wealth L_H defined by

$$U(D_g + L_H) - U(L_H) = \frac{1 - t}{t} M , \quad (23)$$

such that the only applicants for subsidy have wealth below this boundary. The lower bound on wealth for applying for a subsidy, L_L , is in turn determined by

$$U(D_g + L_L) - GL_L = \frac{1}{t} M . \quad (24)$$

And finally, t is defined by

$$\frac{K}{H(L_H) - H(L_L)} = t , \quad (25)$$

where K is the number of subsidies to be allocated and $H(L_k)$ is the number of borrowers in the population with liquid wealth of L_k or less.

For a fixed expenditure by the government, this mechanism targets its subsidies to precisely that segment of population that would not otherwise obtain loans, thereby increasing homeownership by more than would a program that was available to all applicants.

INFORMATION AND SOCIAL AFFINITY

Assume [2PD], [NHA], and [NIR]. Also assume all individuals have zero wealth. The probability of placing a high ex post value on homeownership, p , depends on the characteristics of the borrower. We write $p(s, t, c)$ where s and t are two noisy signals and c is the borrower's race. The two races are denoted W and B .

The distribution of p conditioned only on race is identical across the two races; however, the correlations between the signals and p differ across races. For members of W race the signal s is more informative than the signal t in the sense that s is a sufficient statistic for p . The reverse is true for members of the B race. In other words, in attempting to determine the characteristic p for any individual if both signals were available, a Bayesian would only use signal s in dealing with W individuals and signal t in dealing with B individuals. We will assume the distributions are symmetric in the following sense: the joint distribution of (p, s, t) given B is identical to the joint distribution of (p, s, t) given W . The expectation of p is increasing in s and t .

Banks can freely observe the race of the individual loan applicant; at a cost they can also observe the signals. They also know the distributions. On the other hand, loan applicants, while they know their own race, do *not* observe the signals (or equivalently, do not know the relation of signals to distributions).⁴⁴ Thus each bank is essentially a monitoring technology. We assume that for a fixed cost of I , a bank can monitor signal s on up to K applicants; alternatively, for a fixed cost of $J > I$, the bank can monitor signal t on up to K applicants.⁴⁵ Furthermore, we assume that each bank is limited in size and can monitor no more than K applicants.

Parametric Restrictions

The distribution of signals induces a distribution of posterior expectations of p . We will call the distribution induced by signal s $F(p | c)$ (with density $f(p | c)$) and the distribution induced by signal t $Q(p | c)$ (with density $g(p | c)$). Let p^e be the expected value of p in the population (of either race) without conditioning on the level of any signal. Assume

$$E[s] = E[t] = p^e = E[p | s = p^e] = E[p | t = p^e] . \quad (\text{A1})$$

Suppose in addition that

$$p^e A < G , \quad (\text{A2})$$

so that it is not profitable to lend without screening.

We assume that the noisiness of the signals s and t have the following impact on the distribution F (the opposite conditions will hold for the distribution Q):

$$F(p | B) > F(p | W) \quad \forall p > p^e \quad (\text{A3})$$

44. This is an important departure from standard models. Although it is conventional to assume that borrowers have an informational advantage in being able to determine their own likelihood of repayment, it seems to us that the reverse assumption herein employed is closer to the truth.

45. In the standard manner, we will abuse the law of large numbers by assuming that in monitoring any sample of size K , the bank observes an empirical distribution of signals identical to the theoretical distribution.

and

$$\frac{f(p | B)}{1 - F(p | B)} > \frac{f(p | W)}{1 - F(p | W)} \quad \forall p > p^e . \tag{A4}$$

Essentially these two conditions imply a strong form of second-order stochastic dominance. The first condition says any individual of race *B* receiving an “above average” signal is more likely to default than is an individual of race *W* receiving the same signal. The second condition is that the “hazard function” is greater for race *B* for all *p* above the average. In other words, the chance of being an individual whose probability of repaying the loan is exactly *p* given that it is at least *p* is greater for those of race *B*. Both of these conditions follow from the idea that signal *s* is less informative for race *B* since it “clumps” all its observations to look more like the average.

Regime I: Laissez Faire

In the absence of any governmental restrictions the market works as follows: Each bank offers a policy (*a*, *R*) which specifies that it will monitor *K* applicants, accept *a* of them for loans, and charge each successful applicant an interest rate *R*. In return the applicant agrees to take the loan if accepted. Banks compete by varying the terms (*a*, *R*).

It is clear in this world that in a laissez faire equilibrium, banks will use at most one of the signals; there is no advantage to a bank from making loans to members of both races. We begin by considering the optimal arrangement offered by banks whose only applicants are of race *W*.

Let *U* be the reservation utility of a individual contemplating accepting an arrangement at a bank. It is clear that the bank will monitor signal *s*, and offer loans to the *a* individuals with the best signals. Thus the bank’s choice is equivalent to choosing *R* and a cutoff level of signal *s** to maximize

$$K \int_{p(s^*)}^1 (pR - G) dF(p | W) - I \tag{26}$$

subject to the restriction that⁴⁶

$$\int_{p(s^*)}^1 p(A - R) dF(p | W) \geq U . \tag{27}$$

46. Strictly speaking, this constraint assumes that the borrower can commit ex ante to accept a loan if it is offered. This is not a necessary assumption, but makes the analysis more tractable. This commitment problem can be overcome in more complicated models by contracts which allow for application fees for borrowers. We provide a brief discussion of such complications below.

The left side of the restriction represents the expected utility of a random individual of type W including the probability that he is accepted for a loan and the probability that he has a high valuation of the house if he is accepted. The first-order conditions for this maximization problem can be derived by solving the restriction for the expected interest rate and substituting it into the objective function:

$$\max_{p(s^*)} K \int_{p(s^*)}^1 (pA - G) dF(p | W) - I - KU, \tag{28}$$

leading to the first-order condition $p(s^*)A = G$. In other words, social efficiency determines the cutoff level for funding applicants—the expected value of the house to the applicant must be equal to or greater than its cost.

The interest rate charged is determined by the number of banks in the market relative to the number of loan applicants. In the simple story we have been following, as long as the number of banks times K is less than the number of applicants, the interest rate is A (the banks extract all social surplus from the borrowers). On the other hand, if there is free entry into banking the interest rate charged for a loan falls until each bank’s revenue from lending equals its fixed cost I (so that all banks make zero profit in equilibrium).

The decision of a bank working with customers of race B is more complicated. First, such a bank must decide in which signal technology to invest (no bank will invest in both technologies since it can only monitor K applicants). Even if all of the banks customers are of race B it might still decide to use signal s if J is sufficiently large; regardless of which signal is used, if all of the bank’s customers are of race B , the optimization problem is identical to that described above, with the obvious changes. If a bank serves both races and invests in signal s its objective function becomes

$$\begin{aligned} \max_{s_W^*, s_B^*} K_W \int_{p(s^*|W)}^1 (pA - G) dF(p | W) \\ + K_B \int_{p(s^*|B)}^1 (pA - G) dF(p | B) - I - KU, \end{aligned} \tag{29}$$

where K_c is the number of members of race c the bank serves.

If all banks choose to invest in signal s we have the following results:

- THEOREM 4:** 1. *The proportion of members of race B accepted is lower than the proportion of members of race W .*
 2. *The average probability of default is greater among members of race B than among members of race W ; the marginal probability of default (that is, the probability of default by the least-qualified individual accepted) is the same for both races.*

PROOF: The first-order conditions of this problem imply that the marginal probability of default is the same for both races (that is, that $p(s_W^*) = p(s_B^*)$). By assumption this p^* is greater than p^e and so $1 - F(p^*)$ is larger for race B , proving the first claim. The second conclusion can be seen by showing that among those offered a loan the average probability of repaying it is higher for race W than it is for race B :

$$\int_{p^*}^1 p \frac{f(p | W)}{1 - F(p^* | W)} dp > \int_{p^*}^1 p \frac{f(p | B)}{1 - F(p^* | B)} dp . \tag{30}$$

We provide a sketch of the derivation here. At $p = 1$ the probability of repayment is the same for both races. Suppose our conclusion is true for some \hat{p} . Define $\tilde{p} = \hat{p} - \Delta p$. The expectation of p for race c given $p \geq \tilde{p}$ is equal to

$$\int_{\tilde{p}}^{\hat{p}} p \frac{f(p | c)}{1 - F(\tilde{p} | c)} dp + \int_{\tilde{p}}^1 p \frac{f(p | c)}{1 - F(\tilde{p} | c)} dp . \tag{31}$$

Thus, this expectation is the weighted average of the expectation of p for $\tilde{p} \leq p < \hat{p}$ (which is larger for race W by assumption) and the expectation of p for $p \geq \hat{p}$. Compared to the expectation when $p \geq \hat{p}$, the second piece lowers the average probability of repaying the loan. Assumption (A4) implies that the weight placed on this piece is larger for race B . Since $p^* > p^e$, the same logic can be used inductively to prove the second claim. ♠

Alternatively, if the difference between the cost of investing in the two signals is not too great, then banks serving members of race B will find it advantageous to invest in the better signal (t). In this case, the frequency of acceptance and the loan experience will be identical for both races, and we have:

THEOREM 5: *Assume J is sufficiently small for signal t to be used. If there is free entry, interest rates for race B will be higher than interest rates for race W . If the number of banks is sufficiently limited, no banks will serve members of race B .*

PROOF: The second claim is obvious since the signal s is less costly to use and since it and the restriction on entry causes banks to make higher profits on loans to members of race W . If there is free entry all banks will find it profitable to specialize in serving members of one race or the other. But since signal t is more costly to implement than is signal s , the zero profit interest rate implied by t is higher. ♠

Essentially, serving members of race B is more costly because of the difference in costs of screening tools, or, if the same screen is used on both races, its relative inefficiency in handling members of race B .

Note the subtle form that discrimination takes in this economy. On one hand, it is true that members of race B default more on average than members of race W ; therefore by Becker's criterion, no discrimination is occurring. On the other hand, if we take two individuals each of whom under the best information available is equally likely to default and each of whom, under the best information available, would be

given the loan, the member of race *B* is less likely to receive the loan than the member of race *W*.

Note on Alternative Versions of the Model

In this equilibrium, it is assumed that all lenders offer a single price to borrowers, and that borrowers commit not to apply at a second location if turned down at the first. It turns out that, provided the lender can commit to the number of loans it will grant, neither of these other two restrictions is binding. In particular, the fact that loans are given to all individuals for whom, given information available *ex post*, such loans are socially efficient means that an arrangement in which the bank had a portfolio of loans at various prices to offer (much as airlines have portfolios of tickets at various prices) would be of no advantage—borrowers would be indifferent provided the expected interest rate were unchanged. If we modified the model to allow for borrower risk aversion, then there would be a positive reason for making all loans have the same interest rate.

The ability to commit the applicant to accept a loan if offered is socially valuable. If this commitment were not possible, the equilibrium described would be undermined. Once the borrower has been accepted by one lender, he knows that his own probability is at least as great as the minimum socially desirable. He could then take this information to a second lender and use it to bargain for better terms; however, since there is no social benefit from this attempt, the equilibrium that results will be strictly inferior to the one that would occur with commitment. In other words, if commitment is available, it will be used.

In fact, commitment is available. For instance, in some cases banks charge application fees that are refunded if the loan is not granted and which (at least implicitly) are used to reduce the interest charges if the loan is granted and accepted. This prepayment effectively ties the borrower to the first bank it deals with.

Finally, we should note the effects of relaxing the assumption that the firm can commit to the proportion of applicants provided with funding. Reputation could sustain this commitment as long as the acceptances were observable by individual borrowers. Thus the most natural way that an inability to commit would arise would be for each applicant to observe only the disposition of his own application. In such an environment the only feasible arrangement would take the form of a commitment to a single interest rate for all successful applications with the foreknowledge by both parties that this interest rate would in turn determine the minimal level of application accepted. In the zero profits outcome, at the interest rate calculated in the previous section, the lender would prefer, *ex post* to deny additional applications, since the interest rate lies below the social value of the loan. In anticipation of this, the equilibrium will have somewhat higher interest rates than would occur with commitment, and somewhat lower levels of acceptance. With these complications the general results would continue to hold.

Effects of Government Intervention

First consider the effects of a government requirement of process equity. That is, that banks cannot specialize in either race, that loans to both races have the same

interest rates, and that the cutoff criterion must be the same for both races. The firm then solves the following maximization problem ($\alpha > 1/2$ is the proportion of race W in the population):

$$\begin{aligned} \max_{R, s^*} \quad & \alpha K \int_{p(s^*|W)}^1 (pR - G) dF(p | W) \\ & + (1 - \alpha)K \int_{p(s^*|B)}^1 (pR - G) dF(p | B) - I, \end{aligned} \tag{32}$$

subject to the individual rationality condition for W types. Note that as a result of cross-subsidization, the lender is not concerned with the individual rationality constraint for B types.

THEOREM 6: *Compared with laissez faire, imposition of egalitarian standards has the following effects:*

1. *Lenders never find it advantageous to invest in signals relevant to B types.*
2. *The (uniform) standards lie between the laissez faire standards for the two races.*
3. *The default rates for the two races diverge further.*

PROOF: The first claim follows from the fact that lenders cannot specialize in serving one race and the fact that race W comprises a majority of the population. The second claim is simply a reflection of the fact that the standards in this case are a weighted average of the standards for the two races without intervention. Since s^* is the same for both races and s is a less informative signal for race B , we know that $p(s^* | B) < p(s^* | W)$ (that is, the marginal probability of default is higher for race B). From the previous theorem we know that the average probability of default is higher for race B even when the marginal borrowers are equal, so adding even lower-quality borrowers to the set of race B individuals who receive loans lowers their average probability even further, which proves the final claim. ♠

If instead the government imposes egalitarian *outcomes* by in effect requiring racial quotas for accepted loans, then the bank's problem can be analyzed as follows. For W loans, the firm maximizes

$$\alpha K \int_{p(s^*|W)}^1 (pR - G) dF(p | W) \tag{33}$$

subject to the individual rationality condition for type W . For B loans, the firm compares profits from the analogous maximization problem for type B s (given the noisiness of the signal) with the profits that result from paying for the extra investment and using the better signals. The difference between profits under these two possibilities establishes the critical level of J used in the following theorem:

THEOREM 7: *With imposition of egalitarian outcomes, one of two possibilities arises:*

1. *If J is larger than a critical value, then no bank will invest in signal t and the equilibrium involves higher disparities in default rates, as well as lower lending to type W s.*
2. *If J is smaller than that critical value, then all banks invest in both signals and the equilibrium involves no disparity in default rates.*

PROOF: Suppose that J exceeds its critical value. That no bank will invest in signal t is a consequence of the costliness of the technology. Equal outcomes in this model means that the same proportion of each race receives loans, that is, that $F(p_W^* | W) = F(p_B^* | B)$. Since for both races $p^* > p^e$ by assumption (A3) we have $p_B^* < p_W^*$. The first assertion then follows from the same argument used in the proof of the last theorem. Since banks must meet their quotas by making unprofitable loans to some type B borrowers (the marginal type B loan will earn negative profit) the marginal borrower of race W must earn positive profits. Hence, a smaller proportion of type W borrower receive loans than did without governmental intervention.

Now suppose J is less than its critical value. The final claim is then obvious since signal t is equally effective in providing information about type B individuals as is signal s for type W s (our assumption of symmetry). ♠

As long as J exceeds the critical level, imposition of egalitarian quotas on all firms is a cost-minimizing way of achieving equal outcomes. But if J is less than the critical value, requiring the individual firms to maintain the quotas on a firm-by-firm basis may require that each firm invest in both types of signal detection. The efficient way to achieve the quota would be to have a proportion of firms invest in signaling technology effective for B borrowers. This outcome can be achieved by subsidizing firms specialized for B lending—or equivalently, by permitting firms that lend to too many W types to fulfill their quota obligations by subsidizing firms specializing in B lending:

THEOREM 8: *A system of transferable quotas achieves the target lending at minimum cost.*

This result holds whether J is high or low. As part of delegation of B lending, the subsidizers will take into account cost minimization.

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