Racial and Ethnic Discrimination in Local Consumer Markets: Exploiting the Army's Procedures for Matching Personnel to Duty Locations*

by

Heather Antecol
Department of Economics
Claremont McKenna College

and

Deborah A. Cobb-Clark
Social Policy Evaluation, Analysis, and Research Centre
and
Economics Program
Research School of Social Sciences
Australian National University
and
Institute for the Study of Labor (IZA)

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Abstract:
We use the exogenous assignment of Army personnel to duty locations to analyze the relationship between the characteristics of local markets and the propensity for consumers to be subjected to racial discrimination in their everyday commercial transactions. Overall, one in ten soldiers report that they or their families experienced racial discrimination in finding non-government housing or in patronizing businesses in their local communities in the previous 12 months. Discrimination is related to a community's demographic profile with white and Asian soldiers feeling more unwelcome in local businesses as the local population becomes more heavily weighted towards other groups. Moreover, there is evidence that increased economic vulnerability in the community results in more housing discrimination amongst minorities. While the evidence that increased competition reduces consumer market discrimination is mixed, it is clear that discrimination is related to the nature of a soldier's interaction with the local community.

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1. Introduction

Economists have historically had a great deal to say about the causes and consequences of racial and gender discrimination in employment, however, the impact of discrimination on other economic interactions—in particular those taking place in consumer markets—remains relatively unstudied. Anecdotal evidence would suggest, however, that discriminatory treatment in everyday market transactions is a fact of life for many U.S. consumers who find themselves being unable to obtain (or paying higher prices for) the goods and services they wish to purchase. Consumer market discrimination is insidious because it limits access to fundamental goods and services, contributes to disparities in wealth by raising prices and search costs, diminishes individuals' economic and psychological well-being, and perpetuates inequities within society more generally.

Very little systematic evidence exists regarding the extent of discrimination in commercial transactions in most consumer markets (see Siegleman, 1998; Yinger, 1998a). Audit studies—in which matched pairs of "testers" engage in market transactions—have been used to document the existence of disparate treatment in the markets for housing and automobiles, however. The results suggest that blacks and Hispanics seeking to rent or buy their own homes are informed about fewer opportunities, are more often excluded from existing opportunities, and generally face higher housing search costs than other individuals (Page, 1995; Roychoudhury and Goodman, 1992, 1996; Yinger, 1986, 1997; Choi et al., 2005; and Ondrich et al., 1999). Audit studies have also shown that women and blacks often face higher prices for new cars than do corresponding white men (Ayres, 1991; 1995; Ayres and Siegleman, 1995).[1]

[1] Using Consumer Expenditure Survey data, Goldberg (1996) finds, however, that disparity in dealer discounts is due to car attributes and the nature of the transaction rather than buyer characteristics.

Audit studies are powerful because they allow researchers to "match" pairs of testers on a number of observable characteristics (say, age, education, location) so that the unbiased effect of other characteristics (for example, race or gender) on various commercial transactions can be estimated. Training is used to reduce any potential bias resulting from differences between testers in hard-to-match characteristics like personality (see Yinger, 1986). In this way, audit studies are like regression-based estimation techniques that rely upon a conditional independence assumption to produce unbiased estimates. Unlike regression approaches, however, audit studies do not need to make assumptions about the form of the relationship between the independent and dependent variables (see Yinger, 1998b).

At the same time, audit studies have a number of disadvantages. First, like other experimental methods, audit studies are often limited in their external validity. Consequently, an audit study does not provide evidence on discrimination in general, but rather informs us about discrimination within the specific context defined by the study's sampling frame (Yinger 1998b). Because of this audit studies can be limited in distinguishing the broader circumstances—in particular the market conditions—in which discrimination in commercial transactions might occur. This is unfortunate since identifying the conditions most conducive to consumer market discrimination would provide valuable information to consumers about the prices and search costs they face and would allow enforcement of anti-discrimination measures to be more effectively targeted. Moreover, audit studies are not particularly useful in situations, for example, in shops or restaurants, where the risk of discrimination per transaction is low (Siegleman, 1998) or in measuring the effects of disparate impact discrimination (as opposed to disparate treatment discrimination) (Yinger, 1998a;b).

This paper advances our understanding of consumer market discrimination by analyzing the relationship between the characteristics of local markets and the propensity for consumers to be subjected to racial and ethnic discrimination in their everyday commercial transactions. We offer several innovations on the existing, mainly audit-based, studies of discrimination in the automobile and housing markets. First, we take advantage of a unique survey of active-duty Army personnel—the Armed Forces Equal Opportunity Survey (AF-EOS)—that asks directly about off-base discrimination in patronizing local businesses as well as in acquiring non-governmental housing. This allows us to move beyond the analysis of the housing market to also consider discrimination in other kinds of routine commercial transactions like shopping, eating in restaurants, banking, etc.[2] Second, information extracted from the confidential AF-EOS data file allows us to identify separate Army bases and hence the local communities in which they are located. Consequently, we are able to analyze the extent to which consumer market discrimination is related to the ethnic and racial composition, economic vulnerability, housing market, and social context in the local community. To our knowledge, this paper is the first to assess the impact of these market conditions across a range of representative communities on the propensity to experience discrimination in day-to-day commercial transactions generally.

Our model fits into the class of models designed to estimate the effects of neighborhood characteristics on individual behavior. The key methodological challenge in estimating such models is to isolate the exogenous effects of local communities (neighborhoods) from the effects of correlations in observed, community characteristics and unobserved, individual characteristics that result from individuals' decisions about where to live and work. We are able to avoid this type of selectivity bias because Army personnel are assigned to (rather than select) their installations. Though the Army's assignment procedure is not literally random in the sense that

[2] Siegleman (1998) refers to this as discrimination in "public accommodation".

soldiers are assigned to bases by a lottery, assignments are made solely on the basis of skills without respect to a soldier's race or ethnicity. In fact, the military argues that within rank and occupation all members are equally likely to be assigned to a particular base (Lleras-Muney, 2005). Though there is some scope for personnel to express a preference for duty locations as they advance in rank and gain military experience, it is the case that the Army's needs remain the single overriding factor in the assignment of personnel to specific locations (Lyle, 2006; Lleras-Muney, 2005). In effect, the Army's assignment of personnel is akin to 'ignorable' treatment assignment in the evaluation literature (Rubin 1978) allowing us to use standard regression techniques to generate unbiased estimates of the causal effect of local market conditions on the level of consumer market discrimination.

These innovations allow us to analyze the geographic dimension of discrimination in a way that adds depth to the conclusions drawn from previous studies of racial and ethnic discrimination in commercial transactions. At the same time, the outcome we are investigating (i.e., survey-based reports of discriminatory treatment) is different to that typically encountered in standard, audit studies. As Siegleman (1998) notes, one limitation of survey data in studying discrimination is that respondents are not always aware that they have been discriminated against, while they may also incorrectly attribute certain events—instances of bad service for example—to the effects of race or ethnicity even when the behavior was not racially motivated. Thus, survey responses may under- or over-state the extent of discriminatory treatment that individuals have faced. Despite this, survey reports of discrimination are of interest for at least two reasons.[3] First, enforcement of equal opportunity legislation typically relies upon consumer complaints to identify cases of potential discrimination. Second, the literature suggests that

[3] Survey data have been used to study labor market discrimination (see for example Kuhn, 1987; Antecol and Kuhn, 2000).

individuals' views about the amount of employment discrimination they face influence a range of other outcomes including job satisfaction and job separation (see Antecol and Cobb-Clark, 2005; Johnson and Neumark, 1997) and it is sensible to expect the same to be true of discrimination in the consumer market.

Our results indicate that, overall one in ten soldiers report that they or their families have experienced racial discrimination in finding non-government housing or in patronizing businesses in their local communities. Discrimination is related to a community's demographic profile with white and Asian soldiers feeling more unwelcome in local businesses as the local population becomes more heavily weighted towards other groups. Moreover, there is evidence that increased economic vulnerability in the community results in more housing discrimination amongst minorities. While the evidence that increased competition reduces consumer market discrimination is mixed, it is clear that discrimination is related to the nature of soldier's interaction with the local community.

2. Consumer Market Discrimination in Military Communities

Given our data, we will have little to say about the differences in consumer market discrimination in military and nonmilitary communities. Rather our interest is in assessing whether the characteristics of military communities are important in explaining disparities in the extent to which consumers face discrimination in their daily commercial transactions. Consequently, it is useful to begin by briefly reviewing the history of the U.S. military's interaction with the local communities surrounding its bases.

In 1948, President Truman issued an executive order prohibiting racial discrimination in the military and beginning the slow and often controversial process of desegregating the armed

forces. Desegregation proceeded unevenly occurring more quickly (and easily) on the base than off it. Minorities who enjoyed equal access to job assignments, training opportunities, housing and schools on the base, were expected to abide by local racial customs—including formal or informal segregation—when operating in the local community nearby. Consequently, black personnel were often unable to access off-base restaurants, theatres, schools and housing (Mershon and Schlossman, 1998).[4] Military leaders were reluctant to address discrimination in local communities arguing that Truman's executive order did not apply off base.

Growing pressure from civil rights leaders and an increasing recognition of the detrimental effect of off-base discrimination on military readiness and troop moral prompted the Department of Defense to issue a directive in 1963 that:

> "Every military commander has the responsibility to oppose discriminatory practices affecting his men and their dependents and to foster equal opportunity for them, not only in areas under his immediate control, but also in nearby communities where they may gather in off-duty hours."

Commanding officers were also authorized to declare businesses, housing projects, and other establishments practicing racial discrimination to be off limits to military personnel. This power was to be used only with the prior approval of the secretary of defense, however (Mershon and Schlossman, 1998, pg. 294). The question of whether it was appropriate to use military authority to end discrimination in nearby communities was debated for years and it was not until 1967 that sanctions against local businesses were first authorized. It took three more years before commanders were given the authority to—without prior approval—declare the housing surrounding U.S. bases off-limits if landlords practiced discrimination (Foner, 1974, pg. 220).

[4] The result was an odd disjuncture in on- and off-base interactions. On the base, blacks and whites used the same recreational facilities, though similar establishments in local communities often continued to exclude blacks. Taxi drivers permitted blacks and whites to ride together while on the base, though at the gate one group or the other was expected to disembark in order to take a separate cab into the local community where segregation remained the norm (Nichols, 1954 as cited in Mershon and Schlossman, 1998, p. 254.)

Although full implementation of the military's policies to end off-base discrimination against military personnel proceeded slowly, today commanding officers have broad powers to deal with discrimination both on and off the base (Dansby and Landis, 2001, pg 16).

Given this history, it is perhaps not surprising that sociologists estimate that there is significantly less racial segregation in military communities—a fact that they attribute in part to the influence of military commanders on the local housing markets (Farley and Frey, 1994). For example, Hershfield (1985) reports that in 1967 only 60 percent of off-base military housing was open to personnel of all races, but by 1968 this had increased to 90 percent. Moreover, the move to equal opportunity housing was more extensive in places where military employment represented a higher proportion of the total workforce.

3. Estimation Strategy

We begin with a conceptual framework in which individuals' propensity to report experiencing consumer market discrimination is driven both by the amount of discrimination an individual is subjected to within the local community as well as his or her tolerance for (or perceptions of) discriminatory behavior. Thus, our model seeks to estimate the factors driving the underlying level of discrimination against minority consumers within the local market, while at the same time accounting for those characteristics that might affect an individual's tendency to attribute his or her experiences to the effects of race or ethnicity. Of course a soldier's propensity to experience discrimination depends also on the nature (and frequency) of his or her contact with the local community. Army personnel who live off base and have families are likely to have very different interactions with their civilian neighbors than are single personnel living on base.

We use the following reduced-form model to assess a soldier *i*'s propensity to experience racial discrimination in community *j* (D_{ij}^{*}):

$$D_{ij}^{*} = Z_j\phi + X_{ij}\beta + \mu_i + \varepsilon_{ij} \quad (1)$$

where Z_j and X_{ij} (discussed below) account for those factors driving community-level discrimination and the individual characteristics capturing both the nature of a soldier's interaction with the community and his or her perceptions of discrimination, respectively. Finally, unobserved, individual characteristics are given by μ_i while ε_{ij} is a random error term.

As discussed in Section 1, the primary methodological difficulty in estimating neighborhood effects models like that in equation (1) is to isolate the exogenous effects of local communities from the effects of unobserved individual characteristics that are correlated with location choice.[5] Specifically, since individuals typically choose where they live, the characteristics of the local community (Z_j) will be correlated with both the observable (X_{ij}) and unobservable characteristics (μ_i) of individuals. This results in an omitted variables problem and implies that standard regression models will produce biased estimates of the neighborhood effects (ϕ).[6]

A variety of econometric methods including instrumental variables and fixed-effects estimation have been used in the literature to deal with this problem. Some researchers have taken advantage of the random assignment of college roommates (Sacerdote, 2001; Foster 2004) or policy experiments in which randomly chosen individuals are offered an incentive to move to a different neighborhood (Ludwig, et al., 2001; Katz, et al., 2001; Kling, et al., 2004). In our case, we exploit the fact that Army personnel are assigned to (rather than choose) their military

[5] Manski (1993) refers to this as "exogenous" effects.
[6] See Plotnik and Hoffman (1996), Dietz, (2002), and Haurin, *et al*., (2002).

installations. Assignments are made on the basis of an individual's skills or training and an installation's specific needs (Lyle, 2006; Lleras-Muney, 2005)—not on the basis of race or ethnicity. This assignment procedure implies that any unobserved characteristics associated with the propensity to report discrimination will be uncorrelated with the characteristics of local communities.[7]

Unfortunately, we cannot provide direct evidence on the nondiscriminatory nature of the Army's procedures for troop assignment. We can investigate this issue empirically however by analyzing the relationship between an individual's race and the characteristics of the community to which he or she is assigned. To do this, we first calculate the average demographic profile across all communities surrounding Army bases. We then use linear probability models to assess whether there are racial disparities in the propensity to be assigned to communities in which ones own racial group is over-represented relative to the average Army community. We find that these racial differences are neither individually nor jointly significant at the five percent level. Moreover, this result is robust across samples and to whether or not we control for a range of individual characteristics.[8] Thus, we can find no evidence that the Army's assignment procedure leads to racial differences in the chances of being assigned to a community in which ones own racial group is more heavily represented. In addition, we regress soldiers' race on fourteen different community characteristics controlling for education, rank, and years of service. In general, we find that our race dummies are neither individually nor jointly significant at the five percent level (see Appendix Table 1). Our joint significance test does suggest that there is a

[7] The Army's personnel assignment process has also been used to assess the impact of pollution on child health (Lleras-Muney, 2005), the effect of parental absences on children's educational attainment (Lyle, 2006), and the effect of work-related absences on divorce rates, spousal employment, and children's disability (Angrist and Johnson, 2000). For more information about military procedures regarding duty locations see http://usmilitary.about.com/cs/joiningup/a/recruiter10.htm.

[8] These results are not presented here, but are available upon request.

significant relationship between an individuals' race and the proportion of the local community that is black, although individuals' race is unrelated to the proportion of the local population in other racial groups (i.e., white, Hispanic, or Asian). Moreover, this effect is very small with black personnel being assigned to communities that have only slightly larger (2.9 percentage points) black populations.[9] Overall, these results suggest that—controlling for rank and skills—Army personnel of different races are equally likely to be assigned to communities with different characteristics.

Given these institutional arrangements and this empirical evidence, we believe it is reasonable to interpret $\hat{\phi}$ as the causal impact of community characteristics on consumer market discrimination rather than an effect stemming from the unobserved characteristics of military personnel living in that community. The propensity to experience consumer market discrimination is unobserved, so we create an indicator variable reflecting the presence or absence of reported discrimination. Specifically,

$$\Pr(D_{ij} = 1) = \Pr(Z_j\phi + X_{ij}\beta + \eta_{ij} > 0) = \Phi(Q\gamma) \tag{2}$$

where $Q = (Z_j, X_{ij})$, $\gamma = (\phi, \beta)$, $\eta_{ij} = \mu_j + \varepsilon_{ij}$, and Φ is the standard normal cumulative density function. Finally, we assume that $\eta_{ij} \sim N(0,1)$ and that η_{ij} is independent of the explanatory variables in equation (2).

4. The Armed Forced Equal Opportunity Survey

We use a sample of Army personnel drawn from the public-use 1996 U.S. Armed Forces Equal Opportunity Survey (AF-EOS). We focus solely on Army personnel, as opposed to personnel from other branches of the military, as the previous literature documents that Army personnel's

[9] In comparison, the average Army community is 24.5 percent black (see Appendix Table 2).

assignments to duty location are closely linked to the needs of the Army and can be treated as exogenous for our purposes (see Lyle, 2006; Lleras-Muney, 2005). The data generalize to Army personnel with at least six months of active-duty service who are below the rank of general. Minority groups were oversampled to ensure adequate numbers of minorities were available for analysis. Questionnaires were mailed to sample members between September of 1996 and January of 1997 and the overall response rate was 52.7 percent (see Elig *et al*., 1997; Wheeless *et al*., 1997 for more details).[10]

The AF-EOS data provide us with information on reports of consumer market discrimination, demographic and human capital characteristics, as well as a variable extracted from the confidential file that allows us to identify separate Army installations. The ability to identify unique Army installations is extremely important for our purposes as it allows us to match Army bases to their surrounding communities.

We restrict our analysis to personnel serving in the United States with non-missing installation codes so as to match individuals to their local communities.[11] Moreover, we only consider installations for which we have a sample of at least 10 active-duty members. Finally, we exclude Native-Americans due to small sample size. These restrictions produce a final sample of 1,545 (white), 2,207 (black), 1,887 (Hispanic), and 1,207 (Asian) Army personnel with non-missing values for the key variables.

[10] A unique feature of the AF-EOS data is that it contains basic demographic information for both respondents and non-respondents. Using this data, we find that while Hispanics and Asians were disproportionately likely to respond to the survey, blacks are under-represented among respondents. These differences—while significant—are generally minor suggesting that the characteristics of the two groups are much the same.

[11] We exclude members serving overseas as approximately 40 percent of overseas personnel have missing installation codes. Approximately 13 percent of members of the Army serving in the United States have missing installation codes.

4.1 The Extent of Consumer Market Discrimination Across Communities

Army personnel captured in the AF-EOS were asked whether – due to race or ethnicity – they or a member of their family had in the previous 12 months: 1) been discriminated against for non-government housing; or 2) been made to feel unwelcome by a local business. We begin by using these data to create a single indicator variable for overall consumer market discrimination which equals one when either of the above is reported (and race/ethnicity was a factor) and zero otherwise. We create indicator variables for the individual components analogously. Means and standard deviations for our aggregate measure and its components are presented in Table 1.

Overall, one in ten soldiers report that they or their families have experienced racial or ethnic discrimination in their day-to-day commercial transactions off the base. Not surprisingly, experiences of discrimination vary substantially across racial groups, with blacks being approximately four times as likely as whites to report consumer market discrimination. Individuals of all races are much more likely to report being made to feel unwelcome when patronizing local businesses than to report discrimination in finding housing. Almost one in four blacks, and approximately one in ten Asians and Hispanics reported experiencing this type of discrimination in the previous twelve months. The low incidence of housing discrimination is perhaps not surprising given the unique history of desegregation in military communities.

A histogram of the incidence of consumer market discrimination across local communities (see Figure 1) illustrates that there is a great deal of geographic variation in the extent to which Army personnel report experiencing discrimination in their day-to-day commercial transactions. Moreover, this variation is largely unexplained by differences in the characteristics of those Army personnel serving in different communities. We examined this by conducting a standard Oaxaca-Blinder decomposition of the disparity in the discrimination rates

of the 15 percent of installations with the highest level of discrimination on the one hand and the 15 percent of installations with the lowest level of discrimination on the other. Our results reveal that less than 5.0 percent of the gap in the incidence of discriminatory encounters can be explained by differences in the characteristics of soldiers. The vast majority of the gap stems from differences across communities in the propensity for personnel with similar characteristics to report experiencing consumer market discrimination.

4.2 Characterizing Local Consumer Market Discrimination

Our conceptual framework suggests that soldiers' reports of racial and ethnic discrimination depend in part on the overall level of consumer market discrimination in the local communities surrounding Army bases. We operationalize this idea by defining the 'local community' surrounding each of the 67 bases identified in our estimation sample to be the set of individual towns, cities, or localities situated within a 10-mile radius of the specific base. Community-level characteristics (drawn from Census data) are matched to each individual city, town or locality within this 10-mile radius and then aggregated up to the 'local community' level weighting by population size.[12] Finally, local community-level characteristics are then assigned to each individual based on his or her installation. This process links soldiers to those dimensions of their communities that may drive the extent to which local businesses discriminate.

What drives the underlying level of consumer market discrimination within communities? Previous researchers have drawn on models commonly used to understand discrimination in employment relationships to shed light on discrimination in commercial relationships (see for example, Yinger, 1998a; Ondrich, et al., 1999; Choi, et al., 2005). Specifically, Becker's (1971) notion of prejudice-based discrimination suggests that differential

[12] See the appendix for more details.

treatment arises because certain groups—in this case merchants, their agents, or even potential customers—find it more costly (or less productive) to trade across racial and ethnic lines. Landlords may discriminate, for example, because they simply dislike renting to individuals of a different race, while restaurant owners might find that their employees demand a higher wage for serving minorities. Any inter-racial animosity on the part of existing or future customers would further strengthen the returns to trading only within racial groups particularly when the specific commercial transaction is public (e.g., housing or restaurants) rather than private (e.g., banking or medical care). Prejudice-based models imply that consumer market discrimination will depend on the racial composition of the local community; not only because this will be correlated with the race of business owners themselves, but also because the community's demographic profile will determine the racial composition of employees and potential customers. Moreover, customer prejudice leads us to expect more discrimination, everything else equal, in those commercial transactions that can be observed by others than in those that cannot. Finally, as usual we would expect consumer market discrimination to be less prevalent in more competitive markets.

Statistical discrimination, on the other hand, is born out of information asymmetries (see Arrow, 1973; Phelps, 1972). Statistical discrimination can also lead to disparities in commercial transactions if, for example, landlords or other business owners believe that future payment streams—conditional on observable characteristics like employment status or income—differ between groups. This type of information asymmetry is almost certain to be more important in on-going commercial relationships than in sporadic transactions. Finally, some researchers argue that competition over scarce resources can also lead to disparities in aggregate outcomes

(see Frijters, 1998; Mason, 1995), raising the possibility that consumer market discrimination might stem from economic vulnerability more generally.[13]

In what follow, racial and ethnic diversity is captured by the share of the local population in various race groups (i.e., white, black, Asian, and other) in community *j*.[14] We begin by aggregating these proportions to calculate the proportion of the total population that is in a racial or ethnic group different to ones own.[15] We then disaggregate this effect by controlling for the population share of each racial group (other than the respondent's) separately. These measures allow us to assess whether consumer market discrimination is related to a community's racial and ethnic profile.[16]

In addition, dimensions of the local housing market (i.e., home ownership rates and median mortgage values) are included in the model of housing discrimination to specifically account for the degree of competition in that market. High home ownership rates are also associated with enhanced social networks (Haurin, et al., 2002) and less crime (Glaeser and Sacerdote, 1999) which may affect consumer market discrimination. We are unable to control directly for competition in other consumer markets. However, we do control for the number of individual cities, towns or localities that make up each local community in order to account for the amount of choice that Army personnel have about where they live and shop.

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[13] Yinger (1998a) reviews the empirical audit-based evidence on the source of consumer market discrimination. He concludes that the available evidence—primarily from the automobile and housing markets—indicates that consumer market discrimination has a variety of multifaceted causes that can differ across behaviors and groups. See also Ondrich, *et al*., 1999 and Choi, *et al*., 2005.

[14] While Census data do separately identify Hispanics, they are not a mutually exclusive racial group. Alesina, *et al*., (1999) argue, however, that 'other' is a good measure of the Hispanic population. Native Americans are included in the 'white' category.

[15] For Hispanics this equals one minus the Census measure of the Hispanic share of the local population.

[16] Summary statistics for community- and individual-level variables are given in Appendix Tables 2 and 3.

We also control for four measures of economic vulnerability: the unemployment rate, the poverty rate, income inequality, and the crime rate.[17] These variables allow us to assess the role that competition over scarce resources might play in furthering our understanding of the commercial transactions between racial groups. It also seems likely that consumer market discrimination depends on the general social context. Given this, we also include controls for community size[18] and whether the community is located in a southern or Pacific state.

Finally, Army personnel differ in the nature of their interaction with local communities as well as in their tendency to attribute their experiences to the effects of race. Consequently, our estimation model also includes an extensive list of individual-level characteristics that previous research would suggest are likely to be related to the propensity to report consumer market discrimination. Specifically, we include demographic characteristics (indicator variables for female, currently married, interracial marriage, and the presence of children), education levels (indicator variable for a college degree), and job characteristics (indicator variables for years of service, officer status, and living off base).

5. Consumer Market Discrimination in Local Communities

We begin by estimating reduced-form, probit models of business and housing discrimination as specified in equation (2).[19] Although the effects of both individual and community-level characteristics are estimated together, for convenience we present and discuss each separately. We report marginal effects (evaluated at means) and standard errors (calculated using the delta

[17] Income inequality is measured as the log of the ratio of per capita income for the racial group with the highest income and the income of the racial group with the lowest income in a local community. In this case, we separately identify the 'white' category from the 'Native American' category. We also consider the level of violent crime which is calculated as (the number of violent crimes/the fbi population)*100,000. Therefore, it measures – at the county level – crimes per 100,000 of the population.

[18] This is measured as the natural log of the total population/1000.

[19] Estimation is conducted separately by race. Given the very small number of white personnel who report housing discrimination, we estimate the housing model only for minorities.

method) in Table 2.[20] For ease of interpretation however, we discuss the elastiticies implied by these results. [21]

5.1 The Effect of Community Characteristics on Community-Level Discrimination

5.1.1 Demographic Profiles:

White and Asian personnel's chances of experiencing race discrimination in patronizing local businesses increase as the demographic composition of the local community becomes more heavily weighted towards other racial and ethnic groups. For whites and Asians these demographic effects are quite large. The effect of a marginal change in the proportion of the local population that is not white on the propensity for white personnel to report business discrimination is 0.165 (see Table 2). In elasticity terms this implies that a one percent increase in the non-white population results in a 0.98 percent increase in the likelihood that a white soldier reports experiencing discrimination when patronizing local businesses off the base. A similar increase in the non-Asian population leads to a 2.5 percent increase in the propensity of Asian soldiers to feel unwelcome in local businesses. Asian personnel also report significantly more housing discrimination in communities in which the non-Asian population is larger and this effect quite large in magnitude. A one percent increase in the non-Asian population implies a 3.6 percent increase in the propensity for Asians to report housing discrimination. Interestingly, a one percent increase in the non-black population results in a 1.2 percent decrease in the proportion of black soldiers reporting racial discrimination for non-government housing.

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[20] In all models, we have accounted for clustering on communities when calculating standard errors.

[21] These elasticities are calculated as:

$$\partial y \Big/ \partial x \left(\frac{\bar{y}}{\bar{x}} \right)$$

using the marginal effects presented in Table 2, the mean level of discrimination (see Table 1), and mean community-level characteristics (see Appendix Table 2).

Disaggregating the overall effect of being different by race and ethnicity highlights the differences in the relationships between specific racial groups (see Table 3). In particular, whites are more likely to face discrimination from local businesses in communities with higher numbers of Asian and Pacific Islanders, while Asians are more likely to feel unwelcome at local businesses as the relative size of the white and black population grows. Blacks, on the other hand, experience less housing discrimination in markets where the proportion of others (who are predominately Hispanics) is larger.

Consistent with previous research in the housing market (see for example Yinger 1986; Page 1995), our results also confirm the importance of a community's demographic profile in understanding consumer market discrimination.[22] At the same time, it is also clear that inter-group interactions are quite complex and that it is important to consider relationships between specific groups in detail. Audit studies, in contrast, often characterize neighborhoods solely along black-white lines only occasionally taking Hispanics into account and failing completely to consider the experiences of Asian consumers. This is likely to be particularly problematic in housing markets as a lack of variation in the racial and ethnic composition of neighborhoods limits the ability of audit studies to uncover racial and ethnic steering (Yinger, 1998b).

5.1.2 Economic Vulnerability, Housing Markets, and the Social Context:

Interestingly, the propensity for white soldiers to report consumer market discrimination appears to be driven solely by the demographic composition—specifically the proportion of Asians and Pacific Islanders—of the local community. We can find no evidence that economic vulnerability, high crime, poor housing market in the local community are related to the extent to which whites are discriminated against when patronizing local businesses.

[22] In contrast, audit studies of the market for cars find that neighborhood effects have virtually no effect in explaining discrimination (Ayres, 1991; 1995; Ayers and Siegleman, 1995).

There is evidence, however, that increased economic vulnerability results in more housing discrimination amongst minorities. Black soldiers, for example, find it more difficult to obtain non-government housing in poorer communities, while higher crime rates are associated with more housing discrimination amongst Hispanics. Thus, housing market discrimination—like labor market discrimination—may result in part from competition between racial and ethnic groups for access to scarce resources (see Frijters, 1998; Mason, 1995). At the same time, Hispanics report less housing discrimination as the poverty rate increases, while discrimination by local businesses seems generally unrelated to a community's economic vulnerability. Economic vulnerability seems to be more important in understanding discrimination for some groups than others as well as in understanding housing transactions which (unlike many other commercial transactions) are by and large both ongoing and public.

Interestingly, home ownership rates and average house values are generally unrelated to incidents of housing discrimination amongst minority personnel though Asians appear to be an exception. Moreover, Army personnel do not report significantly more housing discrimination where the number of individual cities, towns or localities making up their local area is smaller. Thus, incidents of housing discrimination do not appear to be tied to the extent of competition in the local housing market. This is consistent with the view that military policy may have been effective in minimizing widespread, systematic housing discrimination in military communities (see Farley and Frey, 1994a). At the same time, Choi, et al., (2005) also find that homeownership rates and median house values are unrelated to housing discrimination in audits using black-white testers suggesting that this relationship may hold more widely. Still, black soldiers are less likely to report being unwelcome in local businesses when they have more choice about the local cities, towns, and localities that they can patronize, though Hispanic

personnel are more likely to report this type of discrimination when they have more choice. Thus, the evidence for increased competition reducing consumer market discrimination is mixed. On the one hand, this may imply that commercial relationships—unlike employment relationships—are not sensitive to the overall level of competition in the market. More likely, these results indicate that our measures may not adequately capture market competition.

There are regional differences in levels of consumer market discrimination, though not surprisingly these effects differ across racial and ethnic groups. While black soldiers are less likely to feel unwelcome in local businesses in the South, Hispanics report less business discrimination in the Pacific region of the United States. Blacks also report less discrimination in acquiring non-government housing in Southern or Pacific communities. Finally, community size is positively related to housing discrimination for Hispanics and Asians, but is negatively related to housing discrimination for blacks.

5.2 The Effect of Individuals' Characteristics on Community-Level Discrimination

Our conceptual framework suggests that consumer market discrimination depends not only on the characteristics of the local community itself, but also on the way in which individuals interact with the local community and the extent to which they are inclined to attribute any unpleasant interactions to the effects of race or ethnicity. Thus, it is not surprising that ones family situation and living arrangements are also related to the experiences of discriminatory treatment when patronizing local businesses. Married personnel are between 20.6 (blacks) and 92.1 percent (Hispanics) more likely than single personnel to report feeling unwelcome in local businesses because of their race. This is perhaps not surprising given that personnel are reporting incidents that either they or their families have experienced. At the same time, Hispanics who are married

to non-Hispanics report only somewhat more discrimination in their daily commercial transactions than Hispanics who are not married, while the presence of children actually reduces the incidence of business discrimination for black and Hispanic soldiers. Similarly, white soldiers living off the base feel relatively more comfortable in patronizing local businesses than their counterparts living on the base. Clearly, many incidents of consumer market discrimination may be related to the nature of soldiers' interaction with the local community. Having children or living in the local community seems to lead soldiers and their families to feel more comfortable in patronizing local businesses. Still, problems in acquiring non-government housing are not in general greater for personnel who are married or have children.[23] This is surprising given that the type of housing that one desires is likely to depend on family structure.

Individuals' human capital and job characteristics are also related to the propensity to report experiencing consumer market discrimination. Hispanic and Asian officers face less housing discrimination and are less likely to feel unwelcome in local businesses than their enlisted counterparts, while blacks living off the base report more housing discrimination. Finally, business discrimination is occasionally related to individuals' education level and Army tenure, though again the effects are not generally consistent across racial and ethnic groups.

6. Alternative Notions of Local Communities

Our preferred notion of a 'local community' is the set of individual towns, cities, or localities situated within a 10-mile radius of the specific installation. This definition of a local community—while sensible—is also ad hoc, and it is important to test the sensitivity of our results to alternative definitions of what constitutes the local community surrounding a military

[23] The exception is that married, black soldiers report significantly more housing discrimination than their single black counterparts.

base. We do this first by considering two alternative notions of local community; one that is narrower (towns, cities, localities within a 5-mile radius of the base) and one that is wider (the county in which the military base is located) than our current definition. Finally, we also consider the extent to which the 'local community' might be the military installation itself.

To identify the places situated within 5 miles of our Army installations we followed a similar procedure to that outlined in Section 4.2 and in the data appendix. Depending on the location of the installation, this technique led to many fewer cities, towns, and localities being identified as constituting the local community of the military base. The characteristics of each individual place were then aggregated up using a weighted average by population size to the local community level for each of the 65 installations included in our analysis.[24]

We also identified the county in which each of our 67 military installations is located using the procedure described in the data appendix. We then used Census information at the county-level to characterize the local communities surrounding military installations.

Using these two alternative definitions of local communities, we re-estimated equation (2).[25] Most of our substantive conclusions remain unchanged. Experiences of consumer market discrimination are related to the nature of an individual's interaction with the local community no matter which definition of the local community we consider. The relationship between economic vulnerability and housing becomes even stronger when we use either the five-mile or county-level definition of community, while the effects of the demographic composition of the population on both types of discrimination also become stronger when we consider communities within five miles of the installation. There is, however, less evidence that competition (as

[24] The 5-mile definition has two fewer installations relative to the 10-mile and county definitions, as two installations have no towns within a 5-mile radius.
[25] These results are not presented here, but are available upon request.

measured in the number of different localities within a community) affects consumer market discrimination when we use our five-mile definition of communities.

Finally, our previous research indicates that measures of an installation's equal opportunity climate, demographic composition, and social prescriptions regarding inter-racial relations explain between 35 and 40 percent of the installation-specific variation in the on-base harassment of military personnel (Antecol and Cobb-Clark, 2005). As there is a one-to-one match between installations and local communities, it seems reasonable to assess whether or not we are estimating the effects of the local communities per se or whether it is the case that community-level factors are simply reflecting the nature of the installations themselves.

We test this proposition by using a linear probability model to re-estimate equation (2) dropping our community-level variables and instead including a number of controls for installation-specific characteristics. Specifically, we estimate the effect of the installation's equal opportunity climate, social prescriptions, and demographic characteristics on reported incidents of community-level harassment. These installation-specific characteristics are described more fully in the data appendix and in Antecol and Cobb-Clark (2004; 2005). Moreover, we re-estimated an unrestricted version of equation (2) including only our individual characteristics and a full set of indicator variables for specific local communities. Given the one-to-one match between communities and bases this set of indicator variables also completely accounts for bases.

The results of this exercise are reported in Table 5. We find that while installation characteristics explain at most 9.4 percent of the variation in consumer market discrimination, the characteristics of local communities between 17.7 and 55.6 percent of the variation in

consumer market discrimination across communities.[26] In every case, community characteristics are substantially more important than installation characteristics in explaining reported discrimination in patronizing local businesses. In particular, community characteristics explain 52.8 percent of the variation in the consumer market discrimination reported by whites and 17.9 percent of the discrimination reported by blacks. In contrast, installation characteristics only explain 4.2 and 2.2 percent, respectively. Thus, it appears to be the case that while on-base harassment is best explained by the nature of race relations on the military base, off-base discrimination depends on the characteristics of the surrounding communities themselves. Furthermore, Breusch-Pagan (1980) tests indicate that any remaining (unobserved) heterogeneity in local communities themselves is unimportant in understanding discrimination levels once the characteristics of those communities are controlled.[27]

7. Conclusions

Anecdotal evidence suggests that many consumers routinely experience discrimination in their day-to-day commercial transactions. Consumer market discrimination is problematic because it

[26] To gauge the predictive power of our community- and installation-specific controls, we used a linear probability model to estimate a base model that included individual characteristics only. (This is specification one in Table 5.) We then estimated an unrestricted model in which a complete set of indicator variables for communities/installations were added to the base model to control for fixed effects associated with installations and the surrounding communities. (This is specification two.) We then estimate two alternative restricted models, specifications three and four, in which we replace the complete set of indicator variables for communities/installations with installation-specific controls and community-specific controls, respectively. We compared the R-squared from this unrestricted model to both the base and two alternative restricted models as follows:

$$\% \text{ Explained by Characteristics } = \frac{(R_R^2 - R_B^2)}{(R_U^2 - R_B^2)}.$$

We used a linear probability model as opposed to a probit model due to the unstable nature of probit models when fixed effects are included.

[27] We investigated this issue by using an unweighted, linear probability model including an unobserved, community-specific effect in equation (2). We fail to reject the hypothesis that the variance of the community-specific effects is equal to 0.

limits access to fundamental goods and services, leads to wealth inequalities, and reduces consumers' wellbeing more generally.

This paper advances our understanding of consumer market discrimination by analyzing the relationship between the ethnic and racial composition, economic vulnerability, housing market, and social context of the local community, on the one hand, and the propensity for consumers to be subjected to racial and ethnic discrimination in their everyday commercial transactions on the other. A unique survey of active-duty Army personnel allows us to move beyond the analysis of the housing market to also consider discrimination in other kinds of routine commercial transactions like shopping, eating in restaurants, banking, etc. As Army personnel are assigned to (rather than select) their installations, we are able to avoid the selectivity bias normally encountered when studying the effects of neighborhood characteristics on individual behavior. Consequently, we are able to study the causal effect of local market conditions on consumer market discrimination.

Our results indicate that, consumer market discrimination is quite widespread with one in ten soldiers indicating that they (or their families) experienced racial or ethnic discrimination in finding non-government housing or in patronizing local businesses in the previous twelve months. Consumer market discrimination is related to a community's demographic profile though the relationship is complex and depends on inter-racial interactions between specific groups. Increased economic vulnerability in the community appears to result in more housing discrimination amongst minorities. Finally, the evidence that increased competition reduces consumer market discrimination is mixed, however, discrimination is clearly related to the nature of soldier's interaction with the local community.

Our focus on the geographic dimension of consumer market discrimination adds depth to the conclusions drawn from previous audit-based studies of racial and ethnic discrimination in the housing and automobile market. While audits are extremely useful in understanding the extent of disparate treatment in commercial transactions, it is also important to understand the process that leads consumers to feel that they have been discriminated against (i.e., disparate impact). After all, enforcement of equal opportunity legislation is reliant upon consumer complaints to identify cases of potential discrimination and it is sensible to expect perceptions of consumer market discrimination to influence a range of other outcomes of interest including, search behavior, location choice, etc.

At the same time, we are limited in our understanding of several important aspects of the discrimination that individuals face in the consumer market. Specifically, we know nothing about the specific incidents that individuals have in mind when they report that their race or ethnicity limited their ability to acquire non-government housing or freely patronize local businesses. Knowing the race of the perpetrator would allow us to make more headway in sorting out the source of consumer market discrimination, for example (see Yinger, 1998a). Similarly, knowing more about the nature of the businesses that consumers are patronizing would allow us to investigate how discrimination might vary across different types of commercial transactions. Finally, a better understanding of those transactions in which discrimination is relatively common would allow us to directly assess the power of increased competition to reduce consumer market discrimination.

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Data Appendix: Definitions of Local Communities

A.1 Measured within 10-miles of Installation

Our preferred definition of 'local community' includes all those towns, cities, and localities within a 10-mile radius of each installation. We determined if a community is within 10 miles of an installation using "ePodunk", which is a search engine that allows one to map the distance between locations.[28] In particular, ePodunk lists military installations by state and provides links to information about the base including the names of local communities near the installation.[29] Most importantly for our purposes, users can specify within how many miles of the installation the local community must be.[30] Depending on the location of the installation, this technique could lead to as few as one community within the 10-mile radius or to over 80 communities within 10 miles of the base.

We then matched the list of communities drawn from ePodunk to their community-level characteristics (discussed in the text) using Geolytics CensusCD and Maps 1990, henceforth referred to as CensusCD.[31] Specifically, we manually assigned each community in ePodunk the "areakey" from CensusCD and the "baseid" from the AF-EOS. Next, we merged the ePodunk data with CensusCD data by areakey. This resulted in a data set that included community-level characteristics for all communities located within 10 miles of the Army installations in the AF-

[28] ePodunk collects its information on communities from the 2000 U.S. census. For more information go to: http://www.epodunk.com/.

[29] ePodunk also provides information on, the branch of service, the installation website (if available), 4-year colleges in the area, school districts on or near the installation, and nearby recreational activities.

[30] Unfortunately, some of our military installations were not listed in ePodunk. For these installations we used zipcode as our starting point in ePodunk, and then selected communities within 10 miles of that zipcode.

[31] Some communities identified by ePodunk were not included in CensusCD. This was not extremely problematic in most cases because many of these communities were in fact already counted within other communities identified to be part of the same local community surrounding a given installation that were included in CensusCD. For example, ePodunk listed La Jolla as a community near one of our installations. While La Jolla is not included in CensusCD, San Diego is and La Jolla is represented in the San Diego counts.

EOS.[32] We then collapsed the community-level characteristics using population weights by baseid. This ensured that each installation is assigned the population weighted average characteristics of the communities that are within 10 miles of it, so if there is only one community within 10 miles of an installation than that installation is assigned the characteristics for that community only but if there is more than one community within 10 miles than the installation is assigned the population weighted average characteristics of those communities. Finally, we merged this data into the AF-EOS by baseid such that the local community-level characteristics were assigned to each active-duty member based on his or her installation.

All community-level characteristics are measured using the procedure described above with the exception of our crime measure. This characteristic is aggregated to the county level as the underlying data are not available at more disaggregated levels (see below for a more detailed discussion of our county level definition of local community).

A.2 Measured within 5-miles of Installation

To determine if a community was within 5 miles of a military installation we followed a similar procedure to that outlined for the 10-mile definition. Specifically, we used ePodunk to determine the communities that were within 5 miles of an installation and matched those communities to the community-level characteristics in CensusCD. Depending on the location of the installation, this technique could lead to as few as 1 community within 5 miles to 16 communities within 5 miles.[33] This is in sharp contrast to the 10-mile definition where some bases had more than 80 communities within 10 miles. The characteristics by community were then aggregated up to the local community level using population weights for each of the 65

[32] This process drops all other communities in the CensusCD that are not included in the AF-EOS data.
[33] Two bases did not have any communities within a 5-mile radius and were dropped from this part of the analysis.

Army installations included in our analysis. These local community level characteristics were then assigned to each active-duty member based on his or her installation.

A.3 Measured at the County Level

The county where the military installation is located is based on information from "ZIPCodeWorld", which is a search engine that allows one to input a zipcode and then gives the user detailed information about that zipcode, including, but not limited to, the name of the city, the name of the state, the name of the county, and the county fipscode attached to that zipcode.[34,35] To ensure accuracy we also went to each military installation's homepage (if available) to verify the county in which they state their installation is located. We did this for each of our 67 Army installations and then matched the county to the community-level characteristics in CensusCD by countyfips codes. Finally, these local community level characteristics were then assigned to each active-duty member based on his or her installation.

A.4 Installation-Specific Measures

We control for equal opportunity climate through the following aggregate measures: 1) the overall quality of race relations; and 2) the proportion of installation personnel who are white. These aggregate variables are calculated by assigning each individual the weighted average rate of the variable of interest of his or her installation.[36]

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[34] For more information go to: http://www.zipcodesdatabase.com.

[35] ZIP Code information is derived from the United States Postal Service (USPS) ZIP Code Lookup tool (http://zip4.usps.com/zip4/welcome.jsp). Specifically, we used the Lookup a ZIP Code by City tool to find the ZIP Code of each military installation.

[36] In calculating these measures we first created two indicator variables as follows: 1) positive race relations—equaling one if the respondent to a (very) large extent believes race relations are good on their installation/ship; and 2) white—equaling one if the respondent is white. In all other cases—including item non-response—these two indicator variables are coded as zero. Weighted, installation-specific averages are then calculated and assigned to each individual.

Moreover, we control for social prescriptions governing how different racial groups should interact with each other by creating an installation-level index based on information in the AF-EOS data. In particular, respondents reported the extent to which: 1) they felt pressure from service members belonging to their own racial group not to socialize with members of other racial groups; (2) people feel free to sit wherever they choose in the dining halls regardless of race; (3) people feel free to use any recreation facilities regardless of race; (4) members of a racial group are treated as if they are "trouble" when they get together; and (5) personnel prefer to socialize with members of their own racial group when they are off duty. Higher values of the index indicate fewer constraints on inter-racial interactions. The installation level index is then calculated by assigning to each individual the weighted average of the aggregate social prescriptions index of his or her installation.[37] Descriptive statistics for these measures are presented in Appendix Table 2.

[37] Specifically, each question was answered on a 1 (not at all) to 5 (to a very large extent) scale. We rescaled (1), (4) and (5) in the opposite direction so that higher values reflect fewer constraints on inter-racial interactions. We then create an aggregate index ranging from 5 to 25 for each respondent by adding up the individual's responses to each of the five questions. If the respondent did not answer all 5 questions, then for the question(s) they missed they were given their mean response from the question(s) they did answer.

Figure 1. Histogram of Consumer Market Discrimination

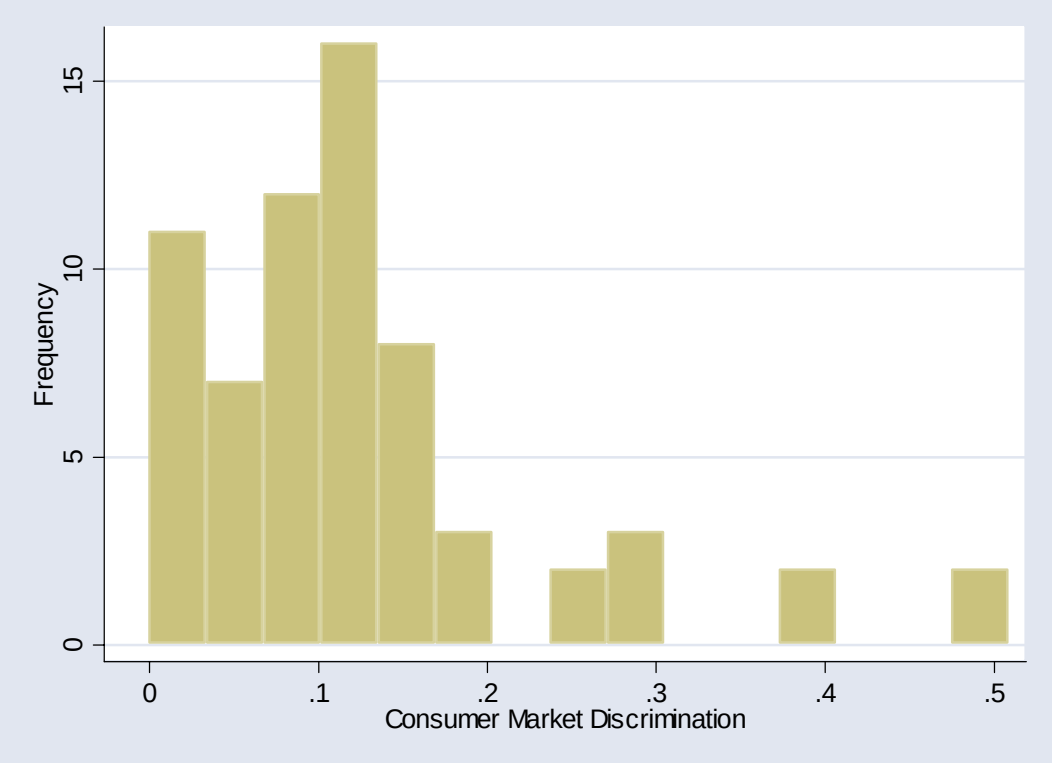

Table 1. Consumer Market Discrimination and its Components by Race

	Overall	White	Black	Hispanic	Asian
Consumer Market Discrimination	**0.118**	**0.059**	**0.239**	**0.165**	**0.113**
	(0.323)	(0.236)	(0.427)	(0.372)	(0.317)
	[6846]	[1545]	[2207]	[1887]	[1207]
Unwelcomed by Local Business	0.112	0.059	0.221	0.157	0.105
Due to Your Race/ Ethnicity	(0.315)	(0.235)	(0.415)	(0.364)	(0.307)
	[6838]	[1545]	[2201]	[1886]	[1206]
Discriminated Against for Non-Government Housing	0.022	0.004	0.061	0.029	0.020
Due to Your Race/ Ethnicity	(0.146)	(0.063)	(0.240)	(0.167)	(0.140)
	[6841]	[1544]	[2205]	[1886]	[1206]

Notes: Sampling weights used. Standard deviations in parentheses. Sample size in brackets. Consumer market discrimination coded as 1 if respondent reported experiencing at least one of the respective behaviors and said his/her race was a factor, and 0 otherwise. Individual components of consumer market discrimination coded analogously.

Table 2. Determinants of Consumer Market Discrimination: Community-Level Characteristics (Probit Marginal Effects and Standard Errors)

	Local Business Market Discrimination				Housing Market Discrimination			
	White	Black	Hispanic	Asian	White	Black	Hispanic	Asian
Racial/Ethnic Diversity								
% Not Your Race/Ethnicity	**0.165**	-0.059	0.067	**0.286**		-0.095	-0.005	**0.078**
	(0.033)	(0.113)	(0.099)	(0.095)		(0.054)	(0.028)	(0.022)
Economic Vulnerability								
Income Inequality	-0.005	-0.044	**-0.175**	0.012		-0.036	0.002	-0.014
	(0.032)	(0.077)	(0.080)	(0.098)		(0.040)	(0.030)	(0.017)
Poverty Rate	-0.099	0.021	-0.085	-0.275		**0.315**	**-0.367**	0.024
	(0.177)	(0.346)	(0.335)	(0.402)		(0.153)	(0.117)	(0.075)
Civilian Unemployment Rate	0.026	0.218	0.139	0.359		-0.483	0.262	0.159
	(0.243)	(0.452)	(0.439)	(0.606)		(0.327)	(0.288)	(0.110)
Violent Crimes^,^^	-0.006	0.012	-0.026	-0.021		-0.010	**0.030**	-0.006
per 100,000 Population	(0.014)	(0.026)	(0.032)	(0.037)		(0.013)	(0.010)	(0.007)
P-Value of Joint Test	0.887	0.935	0.065	0.765		0.281	0.016	0.220
Housing Market								
Home Ownership Rate						0.109	0.086	0.067
						(0.111)	(0.108)	(0.045)
Ln(Median Mortgage)						-0.009	-0.010	**0.037**
						(0.013)	(0.007)	(0.017)
P-Value of Joint Test						0.553	0.230	0.099
Social Context								
South	0.021	-0.073	-0.005	-0.029		**-0.068**	-0.009	0.004
	(0.014)	(0.044)	(0.037)	(0.052)		(0.017)	(0.009)	(0.005)
Pacific	0.026	-0.075	-0.070	0.031		-0.023	-0.013	0.037
	(0.029)	(0.046)	(0.037)	(0.060)		(0.013)	(0.008)	(0.024)
Ln(Total Population/1000)	-0.001	-0.007	-0.007	0.010		-0.009	**0.008**	0.003
	(0.006)	(0.010)	(0.013)	(0.014)		(0.005)	(0.003)	(0.002)
Number of Communities	0.000	-0.002	0.002	-0.001		-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.000)	(0.000)
Observations	1545	2201	1886	1206		2205	1886	1206

Notes: All specifications also includes controls for individual characteristics (see Table 4). ^ Measured at the county level. ^^All crime variables are included in the probit as crime/1000. Sampling weights used. Standard errors are adjusted for clustering by installation. Bold (shaded) indicate significant at the 5 (10) percent level.

Table 3. Consumer Market Discrimination: Alternative Measure of Racial/Ethnic Diversity (Probit Marginal Effects and Standard Errors)

	Local Business Market Discrimination				Housing Market Discrimination			
	White	Black	Hispanic	Asian	White	Black	Hispanic	Asian
Percent White		0.034	0.027	**0.284**		-0.044	0.100	**0.035**
		(0.152)	(0.336)	(0.095)		(0.073)	(0.119)	(0.014)
Percent Black	0.072		0.228	0.173			0.064	**0.065**
	(0.075)		(0.279)	(0.175)			(0.097)	(0.027)
Percent Asian/	**0.180**	-0.153	0.103			-0.068	0.155	
Pacific Islander	(0.037)	(0.162)	(0.334)			(0.091)	(0.130)	
Percent Other	-0.212	-0.420		0.337		-0.334		-0.009
	(0.188)	(0.368)		(0.417)		(0.177)		(0.038)
P-Value of Joint Test	0.000	0.399	0.235	0.009		0.038	0.274	0.000
Observations	1545	2201	1886	1206		2205	1886	1206

Notes: Sampling weights used. Standard errors are adjusted for clustering by installation. Bold (shaded) indicate significant at the 5 (10) percent level. See Tables 2 and 4 for additional control variables

Table 4. Determinants of Consumer Market Discrimination: Individual Level Characteristics (Probit Marginal Effects and Standard Errors)

	Local Business Market Discrimination				Housing Market Discrimination			
	White	Black	Hispanic	Asian	White	Black	Hispanic	Asian
Family Situation								
Married	**0.055**	0.046	**0.145**	0.019		**0.033**	0.014	-0.019
	(0.015)	(0.026)	(0.039)	(0.031)		(0.012)	(0.010)	(0.012)
Mixed Marriage	0.013	-0.025	**-0.087**	0.002		0.020	-0.013	0.018
	(0.018)	(0.031)	(0.033)	(0.036)		(0.019)	(0.008)	(0.012)
Presence of Kids	0.006	-0.052	**-0.110**	0.016		-0.017	-0.005	0.011
	(0.013)	(0.030)	(0.048)	(0.020)		(0.011)	(0.008)	(0.006)
Education								
College	**-0.037**	0.005	**0.096**	0.002		0.000	0.016	0.006
	(0.013)	(0.047)	(0.044)	(0.031)		(0.028)	(0.025)	(0.009)
Female	0.006	0.006	0.006	-0.011		0.001	0.006	-0.005
	(0.016)	(0.030)	(0.037)	(0.035)		(0.016)	(0.014)	(0.004)
Years of Active Service								
6 or less	**0.026**	**-0.046**	0.011	-0.003		-0.007	-0.009	0.001
	(0.011)	(0.020)	(0.036)	(0.028)		(0.012)	(0.009)	(0.006)
Officer	0.013	-0.019	**-0.115**	-0.042		-0.009	**-0.018**	**-0.010**
	(0.019)	(0.039)	(0.022)	(0.024)		(0.022)	(0.009)	(0.004)
Lives Off-Base	**-0.021**	0.014	0.010	-0.034		**0.041**	-0.010	0.002
	(0.010)	(0.027)	(0.030)	(0.023)		(0.016)	(0.013)	(0.006)
Observations	1545	2201	1886	1206		2205	1886	1206

Notes: Based on the results presented in Table 2. Sampling weights used. Standard errors are adjusted for clustering by installation. Bold (shaded) indicate significant at the 5 (10) percent level.

Table 5. Determinants of Consumer Market Discrimination: Installation-Level Characteristics vs. Community-Level Characteristics (Linear Probability Models)

	Local Business Market Discrimination				Housing Market Discrimination			
	White	Black	Hispanic	Asian	White	Black	Hispanic	Asian
Specification One								
R-Squared	0.024	0.006	0.050	0.013		0.018	0.005	0.010
Individual Characteristics	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Community-Level Characteristics	No	No	No	No		No	No	No
Installation-Level Characteristics	No	No	No	No		No	No	No
Community Fixed Effects	No	No	No	No		No	No	No
Specification Two								
R-Squared	0.137	0.061	0.103	0.115		0.074	0.042	0.056
Individual Characteristics	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Community-Level Characteristics	No	No	No	No		No	No	No
Installation-Level Characteristics	No	No	No	No		No	No	No
Community Fixed Effects	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Specification Three								
R-Squared	0.028	0.008	0.054	0.019		0.019	0.007	0.014
Individual Characteristics	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Community-Level Characteristics	No	No	No	No		No	No	No
Installation-Level Characteristics	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Community Fixed Effects	No	No	No	No		No	No	No
Specification Four								
R-Squared	0.083	0.016	0.064	0.031		0.032	0.014	0.036
Individual Characteristics	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Community-Level Characteristics	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Installation-Level Characteristics	No	No	No	No		No	No	No
Community Fixed Effects	No	No	No	No		No	No	No
Observations								

See Tables 2 and 4 for a complete list of individual characteristics and community-level characteristics, respectively. Installation-level characteristics include percent white, race relations good, and social presciptions. Racial/ethnic diversity is based on the alternative measure presented in Table 3.

Appendix Table 1. Test for Random Assignment

		Full Sample of Respondents			Estimation Sample of Respondents		
		Coeff	St. Err.	P-Value Of Joint Test on Race	Coeff	St. Err.	P-Value Of Joint Test on Race
Dependent Variable	**Independent Variable**						
Percent White	Black	**-0.020**	0.010	0.156	-0.016	0.010	0.472
	Hispanic	-0.014	0.009		-0.010	0.010	
	Asian	-0.010	0.014		0.000	0.012	
Percent Black	Black	**0.029**	0.010	0.001	**0.027**	0.010	0.001
	Hispanic	0.008	0.008		0.006	0.008	
	Asian	**-0.021**	0.009		**-0.026**	0.008	
Percent Hispanic	Black	-0.003	0.004	0.256	-0.007	0.006	0.388
	Hispanic	0.014	0.007		0.011	0.007	
	Asian	0.003	0.007		0.002	0.008	
Percent Asian/	Black	-0.010	0.009	0.241	-0.010	0.009	0.332
Pacific Islander	Hispanic	0.000	0.009		0.000	0.010	
	Asian	**0.030**	0.015		0.025	0.013	
Income Inequality	Black	-0.006	0.012	0.194	0.007	0.009	0.149
	Hispanic	-0.011	0.012		-0.007	0.009	
	Asian	**-0.030**	0.014		-0.022	0.011	
Poverty Rate	Black	0.003	0.002	0.073	0.002	0.002	0.244
	Hispanic	0.004	0.002		0.001	0.003	
	Asian	-0.005	0.003		-0.005	0.003	
Civilian Unemployment	Black	0.002	0.002	0.438	0.001	0.002	0.880
Rate	Hispanic	0.001	0.002		0.001	0.002	
	Asian	-0.001	0.002		-0.001	0.002	
Violent Crimes	Black	0.001	0.028	0.953	0.010	0.029	0.531
per 100,000 Population	Hispanic	0.004	0.029		-0.001	0.026	
	Asian	-0.012	0.034		-0.036	0.026	
Home Ownership Rate	Black	-0.005	0.003	0.254	-0.004	0.004	0.344
	Hispanic	-0.002	0.004		-0.005	0.004	
	Asian	-0.005	0.005		-0.004	0.005	
Ln(Median Mortgage)	Black	-0.031	0.023	0.546	0.000	0.011	0.368
	Hispanic	0.024	0.022		0.035	0.025	
	Asian	0.030	0.024		0.028	0.024	
South	Black	**0.077**	0.025	0.015	**0.065**	0.027	0.068
	Hispanic	0.047	0.025		0.031	0.028	
	Asian	-0.041	0.035		-0.048	0.035	
Pacific	Black	-0.031	0.016	0.030	-0.031	0.017	0.045
	Hispanic	0.006	0.021		0.009	0.024	
	Asian	**0.085**	0.036		**0.072**	0.034	
Ln(Total Pop./1000)	Black	-0.030	0.056	0.578	-0.064	0.054	0.260
	Hispanic	0.073	0.078		0.084	0.075	
	Asian	0.002	0.072		-0.031	0.069	
Number of Communities	Black	-0.454	0.484	0.736	-0.036	0.453	0.712
	Hispanic	-0.103	0.728		0.455	0.707	
	Asian	-0.365	0.944		-0.445	0.651	
Number of Obs.		8322			6858		

Notes: The regressions also include controls for education, years of service, and rank. Bold indicates significant at the 5% level.

Appendix Table 2. Summary Statistics for Installation-Level and Community-Level Characteristics

	Mean	Std. Dev.
Installation-Level Mean Characteristics		
Percent White	0.598	0.084
Racial Relations Good	0.580	0.082
Social Presciptions	19.018	0.827
Community-Level Characteristics		
Racial/Ethnic Diversity		
Percent White	0.652	0.160
Percent Black	0.245	0.150
Percent Asian/Pacific Islander	0.070	0.159
Percent Other	0.033	0.041
Economic Vulnerability		
Income Inequality	0.673	0.172
Poverty Rate	0.146	0.044
Civilian Unemployment Rate	0.091	0.030
Crime^		
Violent Crimes per 100,000 Population	624.578	453.700
Housing Market		
Home Ownership Rate	0.403	0.076
Ln(Median Mortgage)	6.532	0.396
Social Context		
South	0.698	0.459
Pacific	0.144	0.351
Ln(Total Population/1000)	3.969	1.145
Number of Communities	8.449	12.528
Number of Observations	6,858	

Notes: Sampling weights used. ^ Measured at the county level.

Appendix Table 3. Summary Statistics for Individual Characteristics by Race

	White		Black		Hispanic		Asian	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Family Situtation								
Married	0.670	0.470	0.657	0.475	0.692	0.462	0.572	0.495
Mixed Marriage	0.087	0.282	0.120	0.325	0.264	0.441	0.320	0.467
Presence of Kids	0.461	0.499	0.588	0.492	0.547	0.498	0.458	0.498
Education								
College	0.274	0.446	0.119	0.324	0.130	0.336	0.322	0.467
Female	0.111	0.314	0.261	0.440	0.114	0.317	0.185	0.388
Years of Active Service								
6 or less	0.521	0.500	0.397	0.489	0.510	0.500	0.550	0.498
Officer	0.253	0.435	0.088	0.283	0.104	0.305	0.259	0.438
Lives Off-Base	0.490	0.500	0.488	0.500	0.460	0.499	0.478	0.500
Number of Observations	1,547		2,214		1,888		1,209	

Notes: Sampling weights used. Standard deviation in parentheses.