Do Landlords Discriminate in the Rental Housing Market? Evidence from an Internet Field Experiment in U.S. Cities

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This paper tests for racial discrimination in the rental housing market using matched pair audits conducted via e-mail for rental units advertised on-line. We reveal home-seekers' race to landlords by sending e-mails from names with a high likelihood of association with either whites or African Americans. Generally, discrimination occurs against African American names; however, when the content of the e-mail messages insinuates home-seekers with high social class, discrimination is non-existent. Racial discrimination is more severe in neighborhoods that are near "tipping points" in racial composition, and for units that are part of a larger building.

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I. Introduction

Inequality in housing market outcomes between African Americans and whites is staggering. African Americans have worse outcomes than whites in terms of housing unit quality and quality of neighborhood.[1] Data from the 2007 American Housing Survey shows that African Americans are 2 times more likely than whites to have recently seen a rat in their unit; 30 percent more likely to report that the water in their unit is unsafe for drinking and cooking; 60 percent more likely to report a serious crime occurring in their neighborhood in the previous year; and 2 times as likely to report being dissatisfied with the neighborhood elementary school.

Unequal outcomes between African Americans and whites could be the result of correlation between race and income, sorting based on the level of local public goods, or difference in preferences across racial groups. A more sinister (and illegal) source of racial inequality in the housing market is discrimination against African Americans, the focus of this paper. This paper identifies discrimination in the rental housing market using matched pair audits, by contacting landlords via e-mail about rental units advertised through a popular on-line venue. We highlight the race of home-seekers to landlords through the name attached to each e-mail inquiry, using names with a high likelihood of association with either whites or African Americans. We also test how the interaction between race and social class effects landlord response to e-mail inquiries by altering the type, in terms of the writing style, spelling, grammar, salutation, and valediction, of e-mail sent to landlords.

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[1] Unit and neighborhood quality are direct outcomes in the housing market. Indirectly, the consequences of racial segregation in the housing market are also important. See Cutler and Glaeser (1997) for an examination of the effects of racial segregation in the housing market on employment and education outcomes. See Cutler, Glaeser, and Vigdor (1999) for an examination of the causes of racial segregation and how it has changed throughout American history.

This paper makes three contributions to the existing literature on racial discrimination in the housing market. First, we use an on-line venue to conduct an audit-style experiment via e-mail correspondence with landlords in the United States. E-mail correspondence is advantageous in an audit-style study because it does not rely on actors, who may have different appearances, styles, or bring personal bias to the study. Second, by manipulating the language in e-mail inquiries, we examine the interaction between race and social class. We create two classes of e-mails, "high" and "low" based on the content of the message and augment our experiment between races to include between class within race and between class across race groups. Third, we test for discrimination across neighborhood and housing unit characteristics, including racial composition.

Overall, our results reveal a net level of discrimination of 4.5 percentage points against African American sounding names, statistically significant at the one percent level and consistent with previous studies of racial discrimination in the housing market. When e-mail inquiries imply the African American is of higher social class, racial discrimination is small and not statistically different than zero- a unique finding in the literature. When e-mail inquiries imply that both races are of lower social class we find a larger (6 percentage points) level of net discrimination against African Americans. The presence and severity of discrimination also varies across cities in our sample and by neighborhood and unit characteristics. Discrimination is more severe in neighborhoods that are close to "tipping points" in racial composition as described in Card, Mas, and Rothstein (2008), and for units advertised as part of a larger apartment building.

The next section of the paper is a discussion of the previous research on discrimination in the housing market and places our work in context. Section III describes our experiment.

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Section IV presents some descriptive statistics of the housing units in our sample and their

surrounding neighborhoods. Section V presents the results of our experiment. Section VI

discusses the robustness and external validity of our results. The final section of the paper

concludes.

II. Previous Research on Racial Discrimination in the Housing Market

The primary method used to test for discrimination in the housing market is an audit, or

matched pair study.[2] In an audit study, two subjects (one from the majority racial group and one

from the minority) are matched based on observable characteristics (excluding race) and trained

how to act toward a real estate agent or landlord. The subjects are sent (in random order) to a

landlord or real estate agent's office to inquire about an advertised housing unit.[3] Typically,

subjects will report if they are shown the advertised unit, if they are shown similar units, how

many additional units they are shown, and potentially several other objective measures of

treatment.[4]

Studies of discrimination using in-person audits include; Yinger (1986), Page (1995),

Ondrich, Stricker, and Yinger (1998), Ondrich, Ross, and Yinger (2000), and Ondrich, Ross, and

Yinger (2003), Zhao (2005), and Zhao, Ondrich, and Yinger (2006). Yinger (1986) examines

the Boston housing market using unique data, the other studies use data from the Housing

Discrimination Study (HDS) conducted by the Department of Housing and Urban Development.

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[2] There are also several studies that attempt to identify housing market discrimination using price differentials (either from transactions or reported values) between racial groups controlling for observable differences in unit and owner characteristics. Unobservable variables at the owner, unit, or neighborhood level have the potential to confound this method of identification. See Knowles-Myers (2004) for a recent example of this method and for a review of previous studies that identify discrimination using price (or reported value) differentials.

[3] Typically, researchers randomly draw housing units from local newspaper advertisements. Geographic coverage of audits has varied substantially, from using a single metropolitan area up to 25 different areas in the same study.

[4] See Ross and Turner (2005) for a listing of all measures used in the 2000 Housing Discrimination study conducted by HUD.

These studies all find significant discrimination against African Americans. These studies show discrimination occurs in terms of being told a unit is available, the number of housing units shown, realtor follow-up communication, and effort on the part of the real estate agent.

Using audits to study discrimination in the housing market has several advantages over methods that do not have a rigorous control-treatment design. First, because the level of observation is the landlord or real estate agent, any personal characteristics that may affect discriminatory outcomes are held constant. Second, audits allow for a direct test of discrimination in the housing market that is not confounded by discrimination in other markets. For instance, discrimination in the lending market confounds using sales price differences to measure discrimination in the housing market. Finally, if done correctly, the race of each auditor is the only characteristic that varies between members of an audit pair.

Despite the benefits of audits, there are problems with using them to study discrimination in the housing market (see Heckman (1998) for a detailed description of the problems with in-person audit studies). Heckman and Siegelman (1993) note that in-person audits rely on how comparable the actors in an audit are. In order for the audit to be truly unbiased, actors must be identical along all dimensions except race. Any matched-pair audit using human subjects certainly violates this assumption, but proper choice and training of actors diminishes the severity of the problem.

In addition, actors in an audit may bias the study with their own personal beliefs about discrimination. For example, if actors from one race have prior beliefs about discrimination, they may be more likely to report discriminatory behavior, or they may act to prompt discriminatory behavior in subjects. In-person audits are also complicated by the time elapse

between visits to the landlord or real estate agent and actors that are not exposed to the same agent despite visiting the same office and making the same inquiry. These problems are almost entirely a function of using actors to perform audits in an in-person setting, rather than the audit design itself.

Ahmed and Hammarstedt (2008) apply the audit technique to housing market interactions that take place via on-line advertisements and e-mail correspondence. Specifically, Ahmed and Hammarstedt examine a Swedish housing advertisement website, Blocket.se, to study racial discrimination between native Swedes and the Muslim minority, and find significant discrimination toward Muslims. More recently, Ahmed, Andersson, and Hamarstedt (2010) and Bosch, Carnero, and Farre (2010) study how the interaction between positive information and race affects landlord discrimination. Ahmed, Andersson, and Hamarstedt (2010) find that while information (including marital status, employment information, age, and education level) does increase the response to minority applicants, it does not decrease the difference in response between native Swedes and the Muslim minority. Bosch, Carnero, and Farre (2010) find discrimination against the Moroccan minority in Spain, and that positive information increases the chance of being contacted, but does not eliminate discrimination.

There are two other studies we are aware of that use on-line housing market interactions in the United States to study discrimination- Carpusor and Loges (2006), and Ewens, Tomlin, and Wang (2009)- although neither uses an audit style design so they cannot completely control for landlord characteristics or determine how often landlords treat auditors equally. Carpusor and Loges (2006) find discrimination against both African American and Muslim sounding names in the Los Angeles rental market. Ewens, Tomlin, and Wang (2009) study a broader range of cities than Carpusor and Loges and vary the information supplied to landlords

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(information about occupation and smoking preference, for instance). They find that African American home-seekers receive 9 responses for every 10 a white home-seeker receives, and that including positive information does not affect the response rate difference between races.

Our paper adds to the existing literature on racial discrimination in the housing market in several ways. First, we apply the audit-style design to an on-line market in the United States. While previous research has applied the audit-style design to on-line markets in other countries, or used an on-line venue to study discrimination in the United States, we are the first to combine these two features. The audit technique is an improvement over other on-line studies of the U.S. markets as it removes any landlord specific effects and allows us to directly observe landlords practicing equal treatment or discrimination.

Second, we introduce the notion of social class into our experiments by changing the language in our e-mail correspondence with landlords. This allows us to test if the interaction between race and social class is important and if discrimination varies with social class. Although, we cannot prevent landlords from inferring traits besides race about the names in our study, we attempt to influence them into inferring something about the social class of the auditors and test how this matters for response. We also perform several robustness checks, excluding names by religious affiliation, uniqueness, or differential responses by geography, to test whether confounding factors associated with the names in our study affect our primary results. Lastly, we test for differences in discrimination across various unit and neighborhood characteristics including racial composition, which has not been done with on-line audits.

For a more complete review of the existing literature on racial discrimination in the housing market see Yinger (1998) and Ross and Turner (2005). Also, see Yinger (1998) and

Antecol and Cobb-Clark (2008) for references to studies of racial discrimination in other markets. Bertrand and Mullainathan (2004) is an excellent example of an audit-style study of discrimination in the labor market, for a review and references to studies of labor market discrimination see Altonji and Blank (1999).

III. Experiment Design

Following the audit-style design used by Yinger (1986), Bertrand and Mullainathan (2004), Ahmed and Hammarstedt (2008), and the studies using the HDS audit data, we design an experiment to test for differential treatment between African American and white home-seekers in the rental housing market. In our experiment, we conduct audits through e-mail correspondence at the landlord level- each prospective landlord receives an e-mail inquiry from two home-seekers.

We manipulate the racial group (African American or white) of home-seekers through the name associated with each e-mail inquiry. The sample of names used to manipulate race comes from Bertrand and Mullainathan (2004), who use Massachusetts birth certificate data from 1974 to 1979 to identify names strongly associated with either white or African American babies to study discrimination in the labor market. They use the likelihood a baby with a given name is white, L(W), and the likelihood a baby with a given name is African American, L(AA), to create a the relative likelihood that a name is white, L(W)/L(AA) or African American, L(AA)/L(W)

The first names we use to represent white home-seekers all have an infinite relative likelihood measure. The relative likelihood measure is infinite because the Massachusetts birth certificate data censor any race-name observations with fewer than five occurrences, so there are fewer than five annual occurrences among African Americans for all of our white names. The

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first names we use to represent African American home-seekers all have a relative liklihood

measure of at least 44.5 (four are infinite). We also used the same last names as Bertrand and

Mullainathan (2004). Table 1 shows a list of all the names and their frequency of use in the

experiment.

One of the difficulties[5] with using on-line audits is that landlords may infer something

other than race from an auditor's name that may influence their decision to respond. One

concern with using names to identify race is that landlords may infer more than race from a

home-seeker's name.[6] Specifically, they may also infer the social class of the individual. This is

particularly problematic for studying racial discrimination using names if African American

sounding names are associated with a lower class, as this would bias the results toward finding

racial discrimination. We confront this problem by introducing a notion of social class directly

into the experiment.[7]

We introduce social class by contacting landlords using several high-class and low-class

e-mail messages (see appendix for examples of each type). Both the high-class and low-class e-

mail messages express interest in a rental property advertised on-line, and both offer to send

references and credit information upon request. The high-class and low-class e-mail messages

differ by how information is conveyed. Low-class e-mails all contain a spelling error, informal

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[5] We address several other possible confounding influences on landlords, including name association with religious beliefs, and name uniqueness in Section VI.
[6] If landlords do not infer *anything* about a home-seeker from their name, we would expect our experiments to show no difference in how inquires from the African American and white sounding names in our sample are treated.
[7] The notion of social class is often used, but generally difficult to precisely define or quantify. In our experiments, we intend for landlords to infer information (besides race) specific enough for them to believe an individual would be a better (high-class) or worse (low-class) tenant for the property, yet vague enough not to be associated with a particular characteristic such as income, occupation, or education. We apply the notion of social class described by Milton Gordon as, "…class has no precise, agreed-upon meaning but is used either as an omnibus term, to designate differences based on wealth, income, occupation, status, group identification, level of consumption, and family background, or by some particular researcher or theorist as resting specifically on some one of these enumerated factors. There is substantial agreement, however, that the stratifications of class are not by definition those of race, religion, and ethnic origin," Gordon (1949), p.1.

or grammatically incorrect sentences, and an informal valediction before the e-mail signature. High-class e-mails suggest that the references they have are "good" and the credit report is "recent".

The design of our experiments reflects differences in both the home-seekers' race (inferred from the name) and class (inferred from the type of e-mail). The experiments test the effect of race and class separately, as well as jointly. To do this, we randomly assign a pair of e-mails to send a landlord from the following matrix:

Matrix 1: Audit Types

	White	African American
High Class	Type 1	Type 2
Low Class	Type 3	Type 4

In our design, landlords receive a pair of e-mail inquiries from one of the six combinations of types shown in Matrix 1.

Each landlord receives exactly two e-mail inquiries. For example, one landlord may receive an inquiry from a Type 1 home-seeker (white name and high-class e-mail) and a Type 2 home-seeker (African American name and high-class). In this example, the experiment tests only the difference in race. We isolate the effects of race and class by performing audits where the inquires only differ by class (landlords receive either a Type 2 and Type 4 inquiry, or a Type 1 and Type 3 inquiry). We estimate the joint effect of race and class by performing audits where the inquires differ by both race and class (landlords receive either a Type 3 and Type 2 inquiry, or a Type 1 and Type 4 inquiry).

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One immediate concern with the audit-style design of e-mailed experiments is the order of sending inquiries. We control for any ordering effects by sending out all six audit combinations from Matrix 1 both with the white name sending the first e-mail and with the African American name sending the first e-mail. This doubles the total number of audit types to 12, each listed in Table 2. Sending each type of audit with each race sending the e-mail first ensures that we have an approximately equal number of audits where an e-mail is sent first from the white name and from the African American name. Randomly assigning among the set of audit types ensures that order of sending e-mails does not confound our results.

The venue for our experiments is the popular classified advertisement website Craigslist (www.craigslist.org). Craigslist allows participants to place and reply to on-line advertisements specific to local markets for jobs, rental housing, companionship, and other goods and services. We use only the listings pertaining to the rental housing market. Craigslist is widely used; it has more than 50 million unique U.S. visitors, and receives more than 20 billion page views monthly.[8] Landlords may create an advertisement for their unit at no monetary cost, and home-seekers may reply to an unlimited number of advertisements at no monetary cost.[9]

Using an on-line venue for discrimination experiments has several advantages compared to those performed by human actors. The on-line venue ensures that the same landlord receives the same inquiry, and that it is the delivered in the same manner from both auditors. An on-line venue also provides a cost-effective way to increase the sample size of the experiment.

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[8] According to http://www.craigslist.org/about/factsheet
[9] Craigslist puts a notice on every advertisement posted on the site warning that stating a discriminatory preference is illegal and allows users to easily notify them of any such advertisements.

To implement the experiment we first need to create a set of landlords that have properties available for rent. The sample starts with the universe of advertisements[10] posted on Craigslist for a given local market made between 9 A.M. and 9 P.M. on Tuesdays. The experiment uses advertisements posted every Tuesday from July 22, 2009 to October 7, 2009 from the Atlanta, Boston, Chicago, Dallas, Washington, D.C, Houston, Los Angeles, New York, Seattle, and San Francisco local Craigslist pages.[11] We remove repeat landlords by manually scanning each posting and selecting only unique housing units. First, we do this visually by eliminating postings made for the same rental property, and then automatically remove any postings that contain the same landlord contact information.

We randomly select a sample of rental units from the list of unique posted advertisements, and then randomly match each unit with an audit-type.[12] After randomly assigning an audit-type (see Table 2), each posting is randomly matched with the appropriate home-seeker names (signifying race) and e-mail copy (signifying class). We also match to ensure that in the case of a white-white or African American-African American audit we do not send inquires from the same name. We conduct the random assignment of audit-type so that we send the same number of e-mails from each audit-type for each city/day.[13]

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[10] Craigslist identifies each advertisement with a unique posting identification number. We use this number to identify advertisements to match unit characteristics and responses.

[11] The Boston and New York craigslist pages separate housing advertisements between those made by a broker that charges a fee and those that do not. For our experiment, we use only the advertisements listed under the no-fee pages in these cities.

[12] In most cases, the random sample is 252 postings for each city (a large number divisible by 12 audit types). Because of time and resource constraints, in most weeks we chose two cities to draw a sample from. The exception to choosing at least 252 postings is in the Dallas and Houston markets, because the number of unique postings is small. Also, we over-sample New York City in one week because of the large universe of postings (504 postings total postings: 252 from Manhattan, Staten Island, and Northern New Jersey and 252 from Brooklyn, Queens, the Bronx, and Long Island).

[13] The exception to this rule is combining the Dallas and Houston markets because of small sample size.

We send all e-mail inquiries on the Wednesday after the landlord posts the advertisement. We send all inquiries from g-mail account addresses in the following format: *firstname.lastname.###@gmail.com*, where ### is a three-digit number unique to each name. We send e-mail inquires manually according to name of sender, type of e-mail, and order assigned randomly through the audit-type.[14] We reveal the name (race) of the home-seeker to the landlord in three different ways: from the e-mail address, from the name-plate in the landlords' inbox, and in the signature of each e-mail. Each Wednesday we begin sending the first wave of e-mails at 9 A.M and finish with the second wave no later than 12 P.M. Due to concerns of exposing the experiment to landlords, we leave at least one hour between all first and second e-mail inquiries, and at most three hours.

IV. Sample Characteristics of Units and Surrounding Neighborhoods

In total, our experiment consists of 4,728 audits, or 9,456 e-mail inquiries. The overall response rate is 53.9 percent, with 63.7 percent of landlords responding to at least one e-mail inquiry from a given audit pair.[15] Table 3 details the number of audits carried out in each city in our sample, as well as the overall response rate and percentage of landlords who reply to at least one e-mail inquiry. The highest overall response rate is 61.9 percent in the Washington, D.C. area, the lowest is 40.9 percent in the Houston area.[16]

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[14] We send e-mail inquires manually because of problems with spam filters in g-mail and with the anonymous e-mail addresses used by craigslist posters that we encountered in trial experiments.

[15] Our response rate is comparable to recent studies of discrimination. Ahmed and Hammarstedt (2008) have a response rate of between 21 and 56 percent, depending on the race and gender of the individual, using internet housing advertisements in Sweden. Using only advertisements from Los Angeles, Carpusor and Loges (2006) have a 73 percent response rate. Ewens, Tomlin, and Wang (2009) have a response rate of 64 percent, but do not use New York, and include several smaller markets that we do not.

[16] The response rate in a city has only a modest, and not statistically different than zero, correlation with metropolitan area vacancy rates as reported in the 3rd quarter of 2009 by the Housing Vacancy Survey. The response rate in a city is also only modestly correlated with net discrimination, and again not statistically different than zero.

Of the 4,728 rental units in our sample, we are able to obtain information about the characteristics of 3,906 of them.[17] There are no standard information fields on Craigslist, so the information supplied about the unit for rent is up to the discretion of the person placing the advertisement. Table 4 shows the average characteristics for rental units in our entire sample and for each city individually. On average, units in our sample have slightly more than 2 bedrooms and 1.6 bathrooms, and landlords most often describe them as an apartment (47 percent). We also have a substantial share of units described as single family homes (27 percent), as well as some described as shared rooms (3.8 percent), duplexes (3.8 percent), and townhomes (6.9 percent).[18] The average monthly rent is $1,492, and just fewer than 46 percent of the units in our sample rent for more than the median[19] in the city where they are located. The units in our sample average 1,361 square feet, and about 15 percent of them offer some type of discount.[20]

Many of the advertisements in our sample include the address of the rental unit, or a link providing a map of the unit's location. We use the location information provided in the advertisement to match each rental unit to a census tract.[21] A census tract match is valuable because the census maintains detailed information about the residents of tracts so that we can

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[17] We are not able to obtain the characteristics of all rental units in our sample because recording this information is time sensitive. Craigslist deletes some advertisements because of complaints by users; landlords may also delete advertisements (possibly, for instance, if the property rents quickly). We did not want to bias our experiments by purposefully excluding these types of advertisers so we created our sample using all units posted on a given day.

[18] The unit-type categories do not add to 100 percent because categories are not necessarily mutually exclusive. We categorized units according to the description given by the advertisement. For example, the unit advertised as a shared room in a single family home would appear in both of these categories in our data. In addition, not all advertisements describe the type of unit, so there are units that we have some data on (such as the rent) but are not able to determine the type.

[19] Median rents are from fiscal year 2010 estimates by the Department of Housing and Urban Development (HUD). We match a unique median rent to each unit by city and number of bedrooms of the unit to determine if the unit rents for above or below the city median.

[20] The typical discounts offered are reduced rent for an introductory period, a lower security deposit, and including utilities with the advertised rent. The discount variable does not differentiate the type or value associated with a discount.

[21] The Census defines tracts as small, relatively permanent statistical subdivisions of a county that usually have between 2,500 and 8,000 persons designed to be homogeneous with respect to population characteristics, economic status, and living conditions. Tracts are entirely contained by counties and the size (in terms of land area) varies widely depending on population density (www.census.gov).

determine the characteristics of the surrounding neighborhood for rental units.[22] Of the 3,906

units that we have some characteristic information on, we are able to match 3,060 to a census

tract and obtain information on the surrounding neighborhood.

Table 4 shows the average neighborhood characteristics for rental units for our entire

sample, and for each city individually. On average, units in our sample are in neighborhoods

with 68 percent white residents and 14 percent African American residents. The standard

deviation on both the percent of white residents (.2535) and the percent of African American

residents (.2286) is substantial, indicating that we have neighborhoods in our sample that range

from vast majority-white to majority-African American. On average, 13 percent of residents in

the neighborhoods surrounding our units live below the poverty level, while median family

income is $65,134. In addition, 36.5 percent of residents in neighborhoods surrounding the units

in our sample have at least a college education.

Across cities, there are stark differences in the racial composition of neighborhoods

surrounding the units in our sample. In Atlanta (31.7 percent) and Washington, D.C. (27.5

percent), the average surrounding neighborhood has a high percentage of African American

residents relative to other cities. In Boston (5.7 percent), Seattle (4.8 percent), and San Francisco

(6.8 percent), the average surrounding neighborhood has less than 10 percent African American

residents. Surrounding neighborhoods in New York (57 percent) and Los Angeles (59.2 percent)

have the lowest percentage of white residents and a low percent of African American residents

(20 percent in New York and 10 percent in Los Angeles), indicating that those neighborhoods

have a substantial share of residents that are a race other than African American or white.

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[22] We match the units in our sample to census tracts by the address of the unit or the address of the nearest
intersection (if a link to a map is provided) using the census American FactFinder Address Search. This search
allows the user to input a street address, city, state, and zip code and outputs the associated census tract. The address
search is available on-line at http://factfinder.census.gov.

V. Results

Table 5 shows the results of landlord response to our inquiries about advertised rental housing. Columns (1)-(3) of Table 5 present the results by looking at the response rate by race for all e-mails (9,456). Columns (4)-(8) of Table 5 show the results at the audit level using only audits where landlords receive e-mails from both an African American and a white home-seeker (3,153 audits). The response rate for African American home-seekers is 6.3 percentage points lower than for whites, statistically significant at less than the one percent level.[23] Across most cities in our sample, the response rate for African Americans is between 4 and 6 percentage points lower than whites. In Los Angeles and Boston, the response rate difference is significantly larger than in all other cities- especially interesting as these cities were the only ones used in prior studies by Yinger (1986) and Carpusor and Loges (2006), respectively.

Nearly 80 percent of landlords in the experiment either respond to both inquiries or to neither inquiry, as shown in Columns (4) and (5) of Table 5. Although we count these landlords to represent equal treatment, it is possible that they do not infer anything about race from the names we use. Columns (6) and (7) of Table 5 present the proportion of landlords that respond differently to white or African American home-seekers, respectively. For the full sample, 12.5 percent of landlords respond only to the inquiry from a white sounding name, while about 8 percent respond only to an African American sounding name. Column (8) shows the p-value for a difference in proportions test between Column (6) and (7), which measures the net incidence of discrimination at the landlord level. For the full sample, we reject the null hypothesis that the

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[23] All p-values reported in the tables are generated from a z-test and reflect the null hypothesis that the difference in proportions between two independent groups equals zero. A p-value of 0.0001 means that we easily reject that the difference in proportions equals zero.

proportion responding only to white home-seekers equals the proportion responding to only African American home-seekers.

The level of discrimination we find is generally lower than what other studies using an internet venue report. Carpusor and Loges (2006) find a response rate difference of 33 percentage points using rental properties posted on craigslist for the Los Angeles market. Ewens, Tomlin, and Wang (2009) also report higher levels of discrimination using rental properties posted on craigslist– almost a 10 percentage point lower response rate for African American males (although the difference shrinks to 5.9 percentage points for females). In addition, Ahmed and Hammarstedt (2008) report net discrimination of 24.8% favoring Swedish male names over Arabic/Muslim male names.

Although our outcome (response) is not directly comparable to most studies that use in-person audits, we find lower levels of discrimination than most of these studies. Ondrich, Stricker, and Yinger (1998) find the probability of receiving a call back from real estate agents is 4.6 percentage points lower for African Americans. Yinger (1998) reports net discrimination of 7.7% for follow-up calls in sales audits and a net discrimination of 10.7% for exclusion from available units in the rental audits. Additionally, Zhao (2005) finds that real estate agents show African Americans 30% fewer homes than whites. It is difficult to say if the smaller magnitude of our results is a function of removing the bias from in-person audits, or other factors such as using the internet for search or the fact that our research takes place nearly 30 years[24] after some of these studies.

Response by Race and Class

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[24] Yinger (1986) studies audits conducted in Boston in 1981.

Table 6 summarizes the response to inquiries for advertised rental housing units by race *and* class of home-seekers. The low-class e-mails from white sounding names have the highest response rate at 57.6 percent, while the low-class e-mails from African American sounding names have the lowest response rate at slightly more than 49 percent. Comparing the response rates shows that high-class e-mails from African American sounding names perform better than low-class e-mails from the same set of names, but still not as well as white sounding names from either class type. The pair that receives equal treatment least often is when a landlord receives a high-class e-mail from a white sounding name and a low-class e-mail from an African American sounding name (77.3 percent of the time). We find strong evidence of discrimination against African American home-seekers when both inquiries are made using low-class e-mails. [25]

When a landlord receives e-mail inquiries that are both high-class, they are only slightly more likely to respond to only the white sounding name (11.27 percent vs. 9.49 percent). Furthermore, we cannot reject the null hypothesis that the net level of discrimination between African American and white home-seekers equals zero when both inquiries use a high-class e-mail. Although overall, we do not find statistically significant net discrimination when we send high-class e-mails from African American and white home-seekers, Panel (1) of Figure 1 shows that in Los Angeles there is statistically significant net discrimination for this pairing. When landlords receive a low-class e-mail from both races, they tend to only respond to the home-seeker with a white sounding name; however, as shown in Panel (6) of Figure 1, this difference is only statistically significant in Boston, Los Angeles, and Washington, D.C.

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[25] Due to the lower number of observations, the power of these tests is lower than tests using the full sample. We are able to reject a difference of about 3 percentage points between groups, well within the full sample estimate of 4.5 percentage point difference between groups.

Another way of demonstrating the marginal effects of race and class and their interactions on the likelihood of landlord response is to examine the coefficients of probit regressions at the e-mail level. In these regressions the dependent variable equals one if the e-mail receives a response, and zero if it does not. We represent race of the sender with a dummy variable equal to one if we send the e-mail from an African American sounding name. We represent class of the sender with a dummy variable equal to one if we send the e-mail using a low-class e-mail, and we use a dummy variable for order that equals one when we send the e-mail second.

Table 7 shows the marginal effects calculated from probit regressions. We calculate all p-values shown in Table 7 from standard errors clustered at the landlord level. The marginal effects in Columns (3), (6), and (9) of Table 7 include landlord fixed effects and correspond to the landlord response differences in Tables 5 and 6. The results with landlord fixed effects show a much larger marginal effect of race than the response rate results. The size of the coefficient is larger and the number of observations is smaller in these regressions because they identify the marginal effect of race on response from landlords who only reply to one e-mail (landlords that reply to both or neither e-mail perfectly predict the outcome and are dropped from the probit). The marginal effect of an African American name (-0.222) on response is exactly equivalent to the difference in response rates for whites (394/645, or 61 percent) and African Americans (251/645 or 39 percent) for landlords that only reply to one e-mail shown in Table 5. As with the landlord level results these results are not subject to omitted variables at the unit, landlord, or neighborhood level that may plague the results that do not use fixed effects.

Columns (1), (4), and (7) of Table 7 show marginal effects from probit regressions that do not control for any observable unit or neighborhood characteristics in our dataset. Columns

(2), (5), and (8) show marginal effects from probit regressions using the full set of control variables, [26] thus the number of observations is substantially smaller. The marginal effects without landlord fixed effects correspond to the response rate differences shown in Tables 5 and 6. Column (4) of Table 7 shows that the marginal effect of race, after removing the effect of class and the joint effect of race and class, is somewhat smaller than the effect shown in Column (1) without controlling for class. In Column (4), the marginal effect of sending an e-mail from an African American sounding name is a 4 percentage point reduction in the likelihood of response, statistically significant at conventional levels.

The marginal effect of race shrinks further when we control for the order of the e-mail inquiry and the interactions between race, order, and class. Column (7) shows that when we control for class, order, and the interaction between them and race, the marginal effect of sending an e-mail from an African American sounding name is a 3.6 percentage point reduction in the likelihood of response, with only marginal statistical significance (p-value of 0.077). The results in Columns (2), (5), and (8) that control for the full set of information on the unit and neighborhood also reduce or eliminate the importance of race; however, these results rely on a small sub-sample of the data- only 830 observations.

Response by Neighborhood and Unit Characteristics

Using the information on unit characteristics from the posted advertisements and the neighborhood from our census tract match, we can test for differences in discrimination across

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[26] We use the following control variables in these models: an indicator of the city where the local craigslist advertisement is placed (we exclude the indicator for Seattle), number of bedrooms and bathrooms, the square footage of the unit, if the unit is an apartment or single family home, monthly rent, an indicator if the monthly rent is above the median, the percentage of residents living below the poverty line, the percentage of residents with at least a college degree, the percentage of white residents, and an indicator if the neighborhood is a "tipping" neighborhood (between 80 and 95 percent white).

characteristics and examine how they may impact discrimination on the margin. Looking across characteristics can more accurately demonstrate where discrimination occurs. It also offers some insight as to why discrimination occurs.

Card, Mas, and Rothstein (2008), suggest that the absolute share of minorities in an area has a substantial effect on out-migration of white residents. They suggest that neighborhoods exhibit tipping behavior when the minority share is between five and 20 percent- at that point white residents move almost entirely out of neighborhoods. If this is true, and landlords want to prevent neighborhood tipping, they may be more likely to discriminate in neighborhoods where the share of non-whites is between five and 20 percent, than in other neighborhoods. Other researchers have tested for differential discrimination in tipping neighborhoods including Page (1995) who finds a sharp increase in discrimination for neighborhoods that are exactly 20 percent African American, and Yinger (1986) who finds differential discrimination by racial composition for neighborhoods in Boston.

We augment the test of discrimination to determine if landlords of properties in neighborhoods with between five and 20 percent minority residents discriminate more than in other areas. Table 8 shows the results, augmented by the absolute percentage of white residents, support the idea that landlords discriminate more in neighborhoods that are in the five to 20 percent tipping point range described by Card, Mas, and Rothstein (2008). For both the response rate and landlord level tests, we find that discrimination is most severe in neighborhoods that are between 80 and 95 percent white.[27]

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[27] Similar to Page (1995), we also test for sharp changes in discrimination across neighborhood racial composition by estimating the following probit model,

$$Y = e^{\alpha + \beta_1 (D=1 \text{ if } pctnon > \bar{X}) * (D=1 \text{ if } AA) + \beta_2 (D=1 \text{ if } pctnon=\bar{X}) * (D=1 \text{ if } AA) + \beta (pctnon) * (D=1 \text{ if } AA) + \varepsilon}$$

where Y is a zero-one dummy variable indicating response or non-response to our e-mail inquiry, "pct non"

Discrimination is also sensitive to the type of unit advertised on Craigslist, as shown in Table 9. We find no evidence of either response differences or landlord net discrimination for units advertised as single family homes, duplexes, or townhomes. We find strong evidence, both in response rate difference and landlord net discrimination, for units advertised as condominiums or apartments. The difference in discrimination between the different types of units may reflect landlords' beliefs about current or future tenant prejudice.[28] If landlords advertising apartments or condominiums are concerned with being able to rent additional units in the same building and they believe current or future tenants are prejudice, then they may be more likely to discriminate. Landlords advertising free standing units (or units with fewer tenants) may be less concerned with renting additional units, and therefore may not take preferences of current or future neighbors into account.

To more fully understand the effect of unit and neighborhood characteristics on discrimination we estimate probit regressions at the e-mail level, where the dependent variable equals one if the landlord replied, and zero if they did not. Each regression includes a dummy variable indicating if the sender has an African American sounding name, the characteristic of interest, and an interaction between the African American name indicator and the characteristic of interest. Table 10 shows the marginal effects[29] of the interaction between the African American sounding name indicator and each characteristic listed in the first column.

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measures the percentage of non-white residents in a neighborhood, and "AA" indicates that the e-mail is sent from an African American name. We estimate this model for X equal to 5, 10, 15, 20, 25, and 30 percent, respectively. Only the results (available upon request from the authors) with X equal to 10 percent non-white show a statistically significant jump in discrimination.

[28] This is the customer-prejudice hypothesis; see Ondrich, Stricker, and Yinger (1998) and Zhao (2008) for a more complete explanation and additional evidence.

[29] We calculate marginal effects at the mean value of the dependent variable. Marginal effects reflect the percentage point change in the probability of response given a 1 unit change in the characteristic, or going from the absence of the characteristic to the presence of the characteristic for indicator variables.

Table 10 reveals that the only statistically significant predictors of landlord response (besides race, class, and order of e-mail inquiry) are the size of the unit, the number of bedrooms, whether the unit is an apartment or single family home, and if the unit is in a neighborhood identified as a "tipping" neighborhood as defined by Card, Mas, and Rothstein (2008). The number of bedrooms, the square footage of the unit, and listing the unit a single family home have a positive marginal effect on response for e-mails we send from African American sounding names. Being in an apartment building and being located in a "tipping" neighborhood has a negative marginal effect on the likelihood of response for e-mails we send from African American sounding names.

Intensity of Response

We find evidence that landlords discriminate by responding more often or only to e-mail inquiries we send from home-seekers with white sounding names. It is true, however, that nearly 40 percent of landlords in our experiment respond to both the white and African American sounding names. Responding to both inquiries does not necessarily mean that landlords treat each one the same. To determine if landlords that respond to inquiries from white and African American sounding names treat those inquires the same we examine the intensity of each response. We measure the intensity of a response by whether the landlord describes the unit as available, and whether the landlord invites the home-seeker to view the unit.

Table 11 shows the results of testing for net discrimination in terms of whether the landlord described the unit as available.[30] Nearly 69 percent of landlords who respond mention that the unit is still available to both groups, while almost 20 percent did not mention availability

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[30] We use only the experiments where a landlord replied to e-mail inquiries from both an African American and white home-seeker; this is 1,356 landlords.

to either group. The net difference in landlords describing the unit as available between whites and African Americans is not statistically different that zero for the entire sample, or in any of the cities in our sample individually.

Table 12 shows the results measuring net discrimination by the difference in whether the landlord invited the home-seeker to view the unit. To avoid double-counting discriminating landlords, we use only the sample of landlords that describe the unit as available to both inquiries for these tests (935 audits). More than 58 percent of landlords who described the unit as available invited both home-seekers for a showing, while nearly 28 percent invited neither for a showing. As shown in Column 5, we cannot reject the null hypothesis that there is no net discrimination in inviting home-seekers to view the unit for the full sample and almost all cities individually- the exception being Seattle where African Americans are invited to view more often than whites.

VI. Robustness of Primary Findings

The audit style of our experiment removes many of the factors that confound identifying racial discrimination. Most importantly, it controls for any fixed factors about the landlord. We also eliminate bias that may arise with in-person audits by conducting our experiment via e-mail correspondence. There are, however, still a few important factors in our experiment that suggest some robustness checks.

One choice we have not justified is the use of last names associated with each race. The last names we choose are from Bertrand and Mullainathan (2004), who offer no justification for last name choice other than that the last names sound like they are more likely to be associated with whites or African Americans. To test how much the choice of last name matters, we

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purposefully used the last name Jones associated with both an African American (Rasheed) and a white (Todd) first name in our experiments. The overall response rate for Todd Jones is 58 percent, while the overall response rate for Rasheed Jones is 49.4 percent, a difference of 8.6 percentage points, statistically significant at the one percent level.[31] The difference based only on first name choice is only slightly larger than the full sample difference; we therefore conclude that last names are not a decisive factor in our experiment.

There are three other concerns with using the first names from Bertrand and Mullainathan (2004) that we address here. The first is that some of the African American names are not only associated with race, but are also distinctly of Muslim origin- Hakim, Jamal, Kareem, and Rasheed are all linked to Muslim origin.[32] The second is that our names may not only be associated with race, but also with uniqueness- and landlords may treat unfamiliar names differently. The third concern is the names come from birth certificate data in Massachusetts, and our experiment is nation-wide. If the names we use are more/less common across the cities in our sample, or more/less likely to be associated with only one race, our cross-city comparisons may not be valid.

To address the concern that a Muslim association with some of our African American names may be driving our results we exclude e-mails sent from the names Hakim, Jamal, Kareem, and Rasheed and re-estimate our primary results. The first row of Table 13 shows our re-estimates excluding these names using the response rate (excluding all e-mails from these names) and landlord level (excluding all audits that use these names). These results suggest a slightly higher level of discrimination towards African Americans than the full sample results.

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[31] The number of Todd Jones paired with Rasheed Jones audits is only 36. Of those 36 audits, 16 landlords replied to both e-mail inquiries, 15 landlords replied to neither, 3 replied only to Rasheed Jones, and 2 replied only to Todd Jones. The difference in landlord level response is not statistically different that zero.
[32] We thank a particularly thoughtful referee for pointing this fact out.

At the landlord level, net discrimination happens from almost 6 percent of landlords, as opposed to 4.5 percent in the full sample. At the e-mail level, African Americans have a lower response rate by 7.2 percentage points, as opposed to only 6.3 percentage points using the full sample.

To address concerns with the uniqueness of names in our sample, we use data from the Social Security Administration on names of babies born during the years 1974-1975 (following the Bertrand and Mullainathan birth certificate data). The data show the most common names nationally and for all the states in our sample. Table 14 presents the average ranking for all of the names we use in our experiment. As shown in the first column, all of the names in our sample appear in the 1,000 most common male names (these ranking are for the full population, not particular to any race). Not surprisingly, almost all of the white names in our sample are more common than African American names- the exceptions being Tyrone and Jermaine. Table 14 also shows the popularity ranking by state in our sample (city level data is not available) for the names in the top 100. Again, in most cases the white names are far more common that the African American names, which are often not in the 100 most popular names.

We re-estimate our primary results excluding several combinations of common and unique names, shown in Table 13. First, we exclude both the two most common (Matthew and Todd) and two most unique (Hakim and Rasheed) names and re-estimate. Row 2 of Table 13 shows that this restriction does not change our primary results. We further restrict the sample to exclude the four most common (Matthew, Todd, Brett, Brad) and four most unique (Rasheed Hakim, Tremayne, Kareem) names and find a reduction in our measure of discrimination. Excluding these names reduces measured discrimination at the landlord level by 1.5 percentage points and by almost a half percentage point in the response rate difference.

We further test how these names drive our results by examining only the sample of audits that uses either one of the four most common the four most unique names, shown in Row 4 of Table 13. These results show a higher level of measured discrimination than the full sample results- almost 5.5 percent of landlords as opposed to 4.5 percent in the full sample, and a response rate difference of more than 7.5 percent as opposed to 6.3 percent in the full sample.

As shown in Table 14, the uniqueness of the names we use differs across the geographic areas of our study. As a test of how sensitive our results are to name uniqueness by location, we re-estimate our results excluding either names among the 50 most common (Row 5 of Table 13) or 100 most common (Row 6 of Table 13) by state level location. Excluding names among the 50 most common shows a slight increase in discrimination at the e-mail level, and a slight decline at the landlord level. Excluding names among the 100 most common causes a drop of more than 1 percentage point in the response rate difference, but almost no change in discrimination measured at the landlord level.

On balance, these results suggest that uniqueness of names may play a role in the magnitude of our findings, but that discrimination still exists even when excluding the most unique and most common names. Furthermore, the African American names we use, while less common for the general population, are still among the most common names for African Americans, and are therefore representative of the actual treatment an African American using Craigslist could expect.

A third concern with the names we use is that the names come from birth certificate data in Massachusetts, and our experiment is nation-wide. If the names we use are less (more) common across the cities in our sample, or less (more) likely to be associated with only one race,

our cross-city comparisons may not be valid. We compare the response rate by name and city relative to the response rate by race and city, to see if certain names garner a differential response in some cities.[33] Table 15 reports p-values for tests of symmetry between the response rate of a particular name/city combination and the response rate of all names in that race/city combination. For example, Row (1), Column (1) of Table 15 is the p-value for a test of symmetry between the response rates for e-mails sent from Brad Davis to advertisements made in Atlanta and e-mails sent from all other white sounding names to advertisements made in Atlanta. In most cases, we cannot reject the null hypothesis that the response rate between any one name/city combination and the corresponding race/city combination are equivalent. As Table 15 shows, there are cases where a particular name from either race did better or worse than other names of the same race for that city.

We test if the performance of particular names is driving our results by excluding all statistically different name/city combinations.[34] Table 16 shows that excluding unusual performing names from the sample does not change the overall results, we find only a slightly lower response rate gap and landlord level difference. Measuring discrimination by the response rate difference, we find more discrimination in Atlanta (now statistically significant), less discrimination in Boston and Los Angeles (still statistically significant), and less discrimination in Houston and San Francisco (still not statistically significant). Using the landlord level

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[33] Note that we are not comparing the same name across cities, which would pick up the difference in discrimination that exists between those two cities. Our comparison picks up any differential treatment within the city and race across names.

[34] We exclude all e-mails for the response rate difference and all audits where either e-mail contains one of the unusual performing names. For this robustness check, we exclude results for Leroy Parker in Atlanta, Tyrone Cooper in Boston, Brett Murphy in Dallas, Rasheed Jones in Dallas, Tyrone Cooper in Houston, Jamal Robinson in Los Angeles, and Jermaine Jackson in San Francisco.

response, we cannot reject no net discrimination in Houston, and lose the marginal significance of net discrimination in San Francisco.[35]

External Validity Concerns

Although the audit style experiment we conduct using e-mail inquiries eliminates most concerns about the internal validity of our results, there are some concerns about how valid our results are outside of the set of landlords and rental units posted on craigslist. We can think of a few concerns about the external validity of our results.

The first concern about external validity is that we only respond to one posting per landlord, even though many landlords make multiple advertisements (both for the same unit and for other units they own or manage). As part of our experimental design, we deliberately attempted not to inquire about rental housing from the same landlord in more than one audit. We decided to only include one audit for repeat landlords in our experiment after running pilot experiments in the Nashville, TN and Philadelphia, PA markets. During these pilots, we found some landlords mentioned receiving multiple inquires from the same set of names and seemed suspicious of this. We saw this as a tradeoff between accurately identifying discrimination by not exposing the experiment and measuring a more representative level of discrimination. Unfortunately, we do not know how many postings (or how many units) these landlords make, so we cannot assign weights to our data. If landlords with multiple units listed on craigslist are

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[35] We also test our Table 5 results excluding the names in cities that have a different response rate than other names from the same city/race group at the ten percent level. For these results, the overall level of discrimination increases by .5 percentage points in response rate difference and the net level of discrimination at the landlord level increases by .13 percentage points. Atlanta, Washington, D.C, Los Angeles, and New York all show slightly higher levels of discrimination, while San Francisco shows less discrimination and the significance at the 10 percent level goes away.

more(less) likely to discriminate than others this means we under(over) estimate the true level of discrimination.

Using the internet to identify racial discrimination may also affect the external validity of our results because landlords can interact with home-seekers anonymously.[36] Our data provides an opportunity to test if discrimination is more severe when landlords maintain a higher degree of anonymity because Craigslist gives landlords the option to use an anonymous e-mail address. The craigslist e-mail address offers no identifying information to home-seekers, and can be set up to forward inquires to an e-mail address of the landlords choosing.

Table 17 shows the results of our experiment for only landlords that use the anonymous craigslist e-mail address instead of a personal or professional e-mail. Using only anonymous e-mail addresses we find slightly less (0.39 percentage points) net discrimination at the landlord level, and slightly more (0.08 percentage points) discrimination in response rates.[37] The biggest difference using anonymous e-mail addresses is that discrimination is no longer evident in the Washington, D.C. market.

Another concern with how our results translate to the housing market outside of rental units advertised on craigslist is how similar the landlords, housing units, and neighborhoods are to the larger market. Ideally, we would be able to compare the characteristics of landlords that use craigslist to landlords that do not; however, this is not possible as craigslist does not collect this information- anyone can post an advertisement without approval, and anyone can reply to a

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[36] An alternative explanation as to why anonymity matters is that landlords who are more likely to discriminate select into advertising on craigslist (as opposed to other venues) because of the anonymous nature of contact with home seekers. Either explanation would result in correlation between discrimination and landlord anonymity.
[37] We also separately test for discrimination among the sample of landlords that use a non-anonymous e-mail address. These results show slightly more discrimination at the landlord level (1.5 percentage points) and slightly less discrimination in response rates (.35 percentage points) than the full sample.

posting without registering. To get an idea of how representative the housing units and neighborhoods in our sample are, we compare characteristics of our rental units to characteristics of rental units in the metropolitan areas we use sampled by the American Housing Survey,[38] and characteristics of our neighborhoods with all neighborhoods in our cities using census tract data from the 2000 Census.

Table 18 shows the unit and neighborhood characteristics for our sample compared with AHS and Census data. Table 18 shows that, in general our craigslist sample varies considerably from the AHS sample of housing units. Our units are larger and have more bedrooms and bathrooms- probably because our sample is much more likely to include single family homes and much less likely to include apartments. Given the larger size of units in our sample, it is not surprising that they rent for over $450 more per month than units in the AHS. Table 18 also shows that the neighborhoods surrounding our units have more white residents, higher median family income, and a greater percentage of college graduates.

Given our results show landlords of apartments are more likely to discriminate, African Americans may be subject to more discrimination in searching for housing in the pool of rental units available outside of craigslist than we find here. If we re-weight our results by unit type to match the distribution of home types in the AHS survey, putting a larger weight on our apartment results and a smaller weight on our single family home results, we do in fact find more discrimination against African Americans. Weighted this way, our results suggest that the

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[38] The unit of observation in the AHS is the dwelling. The AHS data consists of householder responses to survey questions on the actual dwelling and the composition of the occupants of the dwelling. The homes surveyed in the AHS include a core sample of homes that has not changed since 1985 and newly constructed dwellings added to the core annually by sampling addresses from building permits data. The data contain a wealth of information about the dwelling, including if it is owner-occupied. We use only renter-occupied units to create our sample statistics.

response rate difference is 8.48 percent (as opposed to 6.3), and net discrimination occurs in 5.58 percent of landlords (as opposed to 4.54).

Finally, minorities may not use Craigslist to find rental housing so that they would not find themselves subject to the discrimination we expose in our experiment. We have no data to test whether minorities are more or less likely to use craigslist than other venues; however, we feel that this is a reason why in-person audit studies and audit studies using other venues are necessary to uncover discrimination in the housing market.

VII. Conclusion

Our results show significant discrimination by landlords against e-mail inquires made from African American names in the rental housing market. Discrimination goes away when both e-mail inquiries use a high-class e-mail, and is stronger when both e-mail inquiries use a low-class e-mail. We also find that discrimination is more severe for housing units advertised as part of a building where the landlord potentially owns multiple units (apartments and condominiums) and in neighborhoods prone to shifting away from a white-majority.

The difference in discrimination by class of e-mail and across unit and neighborhood characteristics suggests the source of discrimination may be statistical in nature rather than based on landlord preferences for discrimination.[39] Under statistical discrimination, a landlord discriminates because they have imperfect information about potential tenants and use observable characteristics to make inference about the type of tenant the applicant will be. Statistical discrimination should occur because landlords are maximizing profits under uncertainty, not because of personal preference. Our results suggest landlords may infer

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[39] Either type of discrimination is illegal in the United States under the Civil Rights Act of 1968.

information about the characteristics of a home-seeker from a racial-sounding name that they believe useful in determining their merit as a tenant. As we demonstrate, when a landlord is offered something else to infer characteristics from (how an e-mail is written), and the information is positive, they do not base their response on the race associated with our inquiries.

We find that landlords advertising units as apartments and condominiums discriminate, while those advertising single family homes, duplexes, and townhomes do not. If landlords believe current or future tenants are prejudiced, then statistical discrimination could explain discrimination in larger buildings. In the case of landlords who operate in apartments or condominiums, they bear the full costs of having an African American tenant move in if the other tenants are displeased (neighbors may move out or rents may decrease); while landlords of single family homes may share the cost with other landlords in the neighborhood. An alternative explanation could be that landlords who rent out apartment buildings are more likely to practice taste based discrimination.

It is difficult to truly separate landlord prejudice from perceived customer preference. Increased discrimination in neighborhoods with a racial composition near a tipping point suggests landlords appear to have current and future customer preferences in mind when they discriminate. While discrimination occurs in neighborhoods across the racial composition distribution, it is strongest in neighborhoods that are close to tipping (between five and 20 percent minority share). This suggests landlords discriminate to prevent white residents from leaving the neighborhood.

Although we do not present a formal link between discrimination and housing outcomes between races, it seems reasonable to assume African Americans are less likely to find a housing

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unit that matches their preferences if they face discrimination. Indeed, Bradburd et al. (2005) show that in housing markets where search and bargaining take place, racial discrimination can reduce renter's consumer surplus by as much as 25 percent (depending on reservation price of renters and the level of discrimination). Applying the level of discrimination we uncover (approximately 5 percent of landlords) and assuming a reservation price between 50 and 100 percent of actual rents, the Bradburd et al. results imply that consumer surplus in the rental market is between 4.5 and 9 percent lower for African Americans than it would be without discrimination.

Finding discrimination against African Americans in the on-line rental housing market confirms what the previous literature demonstrates. Our study comes to this conclusion using e-mail communication, which is not likely subject to the bias that may come from using actors in an in-person audit. This is especially troubling considering the low bar of compliance and low cost involved in e-mail communication.

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Appendix: Examples of "high-class" and "low-class" e-mail inquires we send to landlords

<u>High-Class</u>

Hi there,

I'm interested in the rental you posted on Craigslist, would you tell me if it is still available?
If you need them, I have good references and I could also send a recent credit report.
Thanks for your time.

Sincerely,

First and last name of home-seeker

<u>Low-Class</u>

Hi,

I saw the place on the internet. Is the place still avialbe?
Do you need references or credit scores? I can send those if you want.

C U Later,

First and last name of home-seeker

Appendix: Examples of "high-class" and "low-class" e-mail inquires we send to landlords

High-Class

Hi there,

I'm interested in the rental you posted on Craigslist, would you tell me if it is still available?
If you need them, I have good references and I could also send a recent credit report.
Thanks for your time.

Sincerely,

First and last name of home-seeker

Low-Class

Hi,

I saw the place on the internet. Is the place still avialbe?
Do you need references or credit scores? I can send those if you want.

C U Later,

First and last name of home-seeker

Table 1: Names Used in Discrimination Experiment

White Names	Frequency of Occurrence	Percentage of e-mails
Brad Davis	474	5.01
Brendan Ryan	513	5.43
Brett Murphy	554	5.86
Matthew O'Brien	522	5.52
Neil Baker	500	5.29
Geoffrey McCarthy	526	5.56
Todd Jones	529	5.59
Greg Young	561	5.93
Jay Wright	550	5.82
African American Names		
Darnell Johnson	557	5.89
Hakim Washington	557	5.89
Jamal Robinson	503	5.32
Jermaine Jackson	549	5.81
Kareem Hall	509	5.38
Leroy Parker	513	5.43
Rasheed Jones	514	5.44
Tremayne Williams	539	5.70
Tyrone Cooper	486	5.14

Notes: The names in our experiment come from Bertrand and Mullainathan (2004) who identify names that have a high likelihood of association with only one race. They determine the likelihood a name is assoicated with a race by examining Massachusetts birth certificate data from 1974-1979. Two e-mails are sent to each landlord in our sample, one from each race group. All e-mails were sent to landlords on Wednesday mornings, in response to advertisements posted on Tuesdays. We conducted our experiment from July 22 to October 7, 2009.

Table 2: Audit Types

Sent First	Sent Second
White Name/High Class e-mail	African American Name/High Class e-mail
African American Name/High Class e-mail	White Name/High Class e-mail
White Name/Low Class e-mail	African American Name/Low Class e-mail
African American Name/Low Class e-mail	White Name/Low Class e-mail
White Name/High Class e-mail	African American Name/Low Class e-mail
African American Name/Low Class e-mail	White Name/High Class e-mail
African American Name/High Class e-mail	White Name/Low Class e-mail
White Name/Low Class e-mail	African American Name/High Class e-mail
White Name/High Class e-mail	White Name/Low Class e-mail
White Name/Low Class e-mail	White Name/High Class e-mail
African American Name/High Class e-mail	African American Name/Low Class e-mail
African American Name/Low Class e-mail	African American Name/High Class e-mail

Notes: Audit types reflect all six possible combinations of the elements in Matrix 1, each combination is sent to landlords in standard and reverse order for a total of 12 audit types. We reveal the race of the potential tenant through the name assoicated with the e-mail inquiry. We reveal the class of the potential tenant through the context of the e-mail inquiry.

Table 3: Number of Audits and Response Rate Across Cities

	Number of Audits	Overall Response Rate	Responded to At Least One Inquiry
Full Sample	4728	53.94%	63.66%
Atlanta	504	59.23%	68.85%
Boston	504	58.04%	67.86%
Chicago	503	49.40%	59.44%
Dallas	160	51.56%	63.75%
Washington D.C.	504	61.90%	72.42%
Houston	296	40.88%	47.97%
Los Angeles	492	52.95%	62.60%
New York	756	46.56%	57.41%
Seattle	504	60.22%	69.05%
San Francisco	504	55.46%	64.09%

Notes: The number of audits conducted in each city is generally 504, or 252 carried out on two separate occasions. In both Los Angeles (12) and Chicago (1) we had some audits that were unusable because we inadvertently chose duplicate landlords. Dallas and Houston did not have enough unique postings to meet our audit goals individually, so they were combined. We doubled the number of audits in New York in one week (to 504) to take advantage of the large number of postings in that city.

Table 4: Unit and Neighborhood Characteristics for Rental Properties in our Sample

	Full Sample	Atlanta	Boston	Chicago	Dallas	Washington D.C.	Houston	Los Angeles	New York	Seattle	San Francisco
Total Housing Units	4728	504	504	503	160	504	296	492	756	504	504
Data on Unit Available	3906	456	464	425	150	420	264	445	419	458	405
Census Tract Match	3060	349	359	344	98	317	178	382	290	388	355
Unit Characteristics											
Multiple Units Listed	0.0220	0.0219	0.0259	0.0141	0.0133	0.0524	0.0417	0.0112	0.0095	0.0262	0.0049
	(.1468)	(0.1466)	(0.1589)	(0.1181)	(0.1151)	(0.2231)	(0.2002)	(0.1055)	(0.0974)	(0.1599)	(0.0702)
Bedrooms	2.04	2.66	1.94	1.88	2.49	2.21	2.10	1.90	1.63	2.22	1.62
	(1.1195)	(1.1130)	(0.9636)	(0.9976)	(1.0722)	(1.1398)	(1.1248)	(1.0314)	(1.0903)	(1.1227)	(1.0903)
Bathrooms	1.61	1.99	1.32	1.60	1.96	1.88	1.83	1.44	1.21	1.64	1.27
	(.7699)	(.7414)	(0.5975)	(0.6491)	(0.6074)	(0.8407)	(0.7665)	(0.7746)	(0.7106)	(0.6712)	(0.7023)
Single Family Homes	0.2724	0.5744	0.1514	0.0921	0.5248	0.2030	0.3843	0.2921	0.0309	0.4155	0.1898
	(.4453)	(.4950)	(0.3589)	(0.2895)	(0.5012)	(0.4027)	(0.4875)	(0.4553)	(0.1733)	(0.4934)	(0.3927)
Duplex	0.0384	0.0395	0.0314	0.0384	0.0780	0.0198	0.0262	0.0520	0.0254	0.0728	0.0142
	(.1922)	(.1951)	(0.1747)	(0.1923)	(0.2692)	(0.1395)	(0.1601)	(0.2223)	(0.1574)	(0.2601)	(0.1183)
Townhouse	0.0689	0.1119	0.0447	0.0384	0.0567	0.1931	0.0480	0.0644	0.0084	0.0659	0.0227
	(.2533)	(.3156)	(0.2070)	(0.1923)	(0.2322)	(0.3952)	(0.2143)	(0.2457)	(0.0915)	(0.2484)	(0.1490)
Condo	0.1250	0.1349	0.1021	0.1830	0.0638	0.2451	0.1223	0.0891	0.0337	0.1103	0.1136
	(.3308)	(.3420)	(0.3032)	(0.3871)	(0.2453)	(0.4306)	(0.3283)	(0.2853)	(0.1807)	(0.3137)	(0.3178)
Apartment	0.4725	0.1512	0.6990	0.6487	0.2766	0.3102	0.4148	0.4406	0.8596	0.3357	0.5369
	(.4993)	(.3586)	(0.4593)	(0.4780)	(0.4489)	(0.4631)	(0.4938)	(0.4971)	(0.3479)	(0.4728)	(0.4993)
Shared Room	0.0381	0.0138	0.1388	0.0095	0.0000	0.0374	0.1533	0.0137	0.0220	0.0047	0.0077
	(.1915)	(.1169)	(0.3461)	(0.0972)	(0)	(0.1900)	(0.3609)	(0.1165)	(0.1467)	(0.0681)	(0.0874)
Monthly Rent	$1,492	$1,072	$1,379	$1,390	$1,075	$1,835	$937	$1,633	$1,882	$1,246	$2,071
	(811)	(416)	(499)	(583)	(587)	(837)	(454)	(943)	(917)	(535)	(1080)
Greater than Area Median Rent	0.4594	0.3400	0.3075	0.7214	0.2905	0.5246	0.4458	0.3761	0.5870	0.3208	0.6106
	(.4984)	(.4742)	(0.4620)	(0.4488)	(0.4556)	(0.5000)	(0.4981)	(0.4850)	(0.4930)	(0.4673)	(0.4882)
Square Footage	1361	1649	1154	1298	1417	1820	1398	1442	928	1288	1086
	(1209)	(956)	(397)	(545)	(701)	(3045)	(843)	(1057)	(467)	(689)	(514)
Advertised Discount	0.1537	0.1272	0.2112	0.2476	0.0600	0.1576	0.1742	0.1371	0.1535	0.1444	0.0647
	(.3607)	(.3336)	(0.4086)	(0.4322)	(0.2383)	(0.3648)	(0.3800)	(0.3443)	(0.3609)	(0.3519)	(0.2463)
Neighborhood Characteristics											
% African American Residents	0.1438	0.3167	0.0565	0.1276	0.1115	0.2752	0.1345	0.1036	0.2098	0.0478	0.0680
	(0.2286)	(0.3212)	(0.1036)	(0.2190)	(0.1253)	(0.3067)	(0.1823)	(0.1478)	(0.2908)	(0.0726)	(0.1239)
% White Residents	0.6847	0.6238	0.8327	0.7252	0.7468	0.6011	0.7184	0.5924	0.5708	0.8225	0.6377
	(0.2535)	(0.3171)	(0.1625)	(0.2293)	(0.1643)	(0.2891)	(0.2198)	(0.2286)	(0.3150)	(0.1288)	(0.1983)
% Residents Under Poverty Line	0.1306	0.1278	0.1156	0.1303	0.1207	0.1098	0.1198	0.1796	0.1832	0.1058	0.1074
	(0.1045)	(0.1125)	(0.0941)	(0.1050)	(0.0955)	(0.1019)	(0.0857)	(0.1193)	(0.1197)	(0.0831)	(0.0746)
Median Family Income	$65,134	$61,698	$65,877	$73,339	$56,169	$73,257	$65,147	$54,257	$62,403	$60,344	$74,197
	(32154)	(31425)	(26990)	(34312)	(25680)	(32519)	(31973)	(32133)	(41752)	(18432)	(33824)
% College Educated	0.3650	0.3298	0.3872	0.4283	0.2867	0.4241	0.3543	0.2849	0.3312	0.3450	0.4252
	(0.1943)	(0.1876)	(0.1904)	(0.2112)	(0.1693)	(0.1896)	(0.1862)	(0.1764)	(0.2212)	(0.1623)	(0.1731)

Notes: Standard deviations are shown in parenthesis. Unit characteristics are recorded from advertisements made on Craigslist.org. Neighborhood characteristics are from the 2000 census for units where we are able to match the address (or map link) to a census tract. Median rents are from fiscal year 2010 estimates by the Department of Housing and Urban Development (HUD). We match a unique median rent to each unit by city and number of bedrooms of the unit to determine if the unit rents for above or below the city median.

Table 5: Response Rate and Landlord Level Response by Race of Home-Seeker, Across Cities

	Overall Response Rate				Response at Landlord Level				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	White	African American	(1) - (2)	Respond to Neither	Respond to Both	White Only	African American Only	(6) - (7)
All Audits	57.12%	50.81%	6.30%	36.50%	43.04%	12.50%	7.96%	4.54%
	[4729]	[4727]	p=0.0000	[1151]	[1357]	[394]	[251]	p=0.0000
Atlanta	61.71%	56.75%	4.96%	29.76%	51.19%	9.82%	9.23%	0.60%
	[504]	[504]	p=0.1096	[100]	[172]	[33]	[31]	p=0.7927
Boston	64.09%	51.98%	12.10%	33.93%	44.35%	14.88%	6.85%	8.04%
	[504]	[504]	p=0.0000	[114]	[149]	[50]	[23]	p=0.0008
Chicago	51.89%	46.92%	4.97%	39.70%	39.70%	12.54%	8.06%	4.48%
	[503]	[503]	p=0.1150	[133]	[133]	[42]	[27]	p=0.0566
Dallas	51.85%	51.27%	0.59%	39.09%	34.55%	13.64%	12.73%	0.91%
	[162]	[158]	p=0.9165	[43]	[38]	[15]	[14]	p=0.8420
Washington D.C.	64.88%	58.93%	5.95%	27.98%	49.40%	14.29%	8.33%	5.95%
	[504]	[504]	p=0.0518	[94]	[166]	[48]	[28]	p=0.0149
Houston	43.20%	38.59%	4.61%	53.09%	31.44%	10.82%	4.64%	6.19%
	[294]	[298]	p=0.2543	[103]	[61]	[21]	[9]	p=0.0226
Los Angeles	58.62%	47.25%	11.37%	36.47%	42.86%	14.59%	6.08%	8.51%
	[493]	[491]	p=0.0004	[120]	[141]	[48]	[20]	p=0.0003
New York	49.47%	43.65%	5.82%	42.26%	35.71%	13.10%	8.93%	4.17%
	[756]	[756]	p=0.0233	[213]	[180]	[66]	[45]	p=0.0346
Seattle	62.30%	58.13%	4.17%	32.74%	47.92%	10.42%	8.93%	1.49%
	[504]	[504]	p=0.1767	[110]	[161]	[35]	[30]	p=0.5141
San Francisco	57.54%	53.37%	4.17%	36.01%	46.13%	10.71%	7.14%	3.57%
	[504]	[504]	p=0.1835	[121]	[155]	[36]	[24]	p=0.1045

Notes: The number of observations, denoted with [] in columns (1) and (2) reflect the number of e-mails sent. The number of observations in columns (4)-(7) reflect the number of landlords that respond to an inquiry from neither, both, or one of the racial groups. The denominator for the percentages in columns (1) and (2) are e-mails sent by each respective racial group. The denominator for the percentages in columns (4)-(7) are the total number of African American/white audits.

Table 6: Response Rate and Landlord Level Response by Race and Class of Home-Seeker

	Overall Response Rate			Response at Landlord Level				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Group 1	Group 2	(1) - (2)	Respond to Neither	Respond to Both	Group 1 Only	Group 2 Only	(6) - (7)
White, High / African American, High	56.63%	52.62%	4.01%	37.97%	41.27%	11.27%	9.49%	1.77%
	[2368]	[2364]	p-value=0.0058	[300]	[326]	[89]	[75]	p=0.2485
White, High / White, Low	56.63%	57.60%	-0.97%	31.22%	51.78%	9.01%	7.99%	1.02%
	[2368]	[2361]	p-value=0.5029	[246]	[408]	[71]	[63]	p=0.4700
White, High / African American, Low	56.63%	49.01%	7.62%	36.42%	40.86%	15.74%	6.98%	8.76%
	[2368]	[2363]	p-value=0.0001	[287]	[322]	[124]	[55]	p=0.0001
White, Low / African American, High	57.60%	52.62%	4.98%	36.34%	47.01%	9.15%	7.50%	1.65%
	[2361]	[2364]	p-value=0.0006	[266]	[370]	[72]	[59]	p=0.2355
African American, High / African American, Low	52.62%	49.01%	3.62%	40.66%	38.12%	11.05%	6.73%	4.32%
	[2364]	[2363]	p-value=0.0129	[320]	[300]	[87]	[53]	p=0.0026
African American, Low / White, Low	49.01%	57.60%	-8.60%	35.28%	43.02%	7.87%	13.83%	-5.96%
	[2363]	[2361]	p-value=0.0001	[278]	[339]	[62]	[109]	p=0.0001

Notes: The number of observations, denoted with [] in columns (1) and (2) reflect the number of e-mails sent. The number of observations in columns (4)-(7) reflect the number of landlords that respond to an inquiry from neither, both, or one of the racial groups. The denominator for the percentages in columns (1) and (2) are e-mails sent by each respective race-class group. The denominator for the percentages in columns (4)-(7) are the total number of audits for that combination.

Table 7: Marginal Effects on the Likelihood of Response by Race, Class, and Order

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Race= 1 if African American	-0.0630	-0.0559	-0.222	-0.0401	-0.0190	-0.119	-0.0364	0.0271	-0.256
	[0.000]	[0.079]	[0.000]	[0.002]	[0.670]	[0.003]	[0.077]	[0.709]	[0.001]
Class= 1 if Low				0.0098	0.0365	-0.0585	-0.0265	-0.0251	-0.185
				[.01293]	[0.401]	[0.160]	[0.200]	[0.725]	[0.013]
Order= 1 if Second							-0.0851	-0.0834	-0.47
							[0.000]	[0.228]	[0.000]
Race*Class				-0.0459	-0.1851	-0.188	-0.0328	-0.0911	-0.122
				[0.012]	[0.237]	[0.001]	[0.262]	[0.369]	[0.241]
Race*Order							-0.0077	-0.0707	0.208
							[0.808]	[0.525]	[0.086]
Class*Order							0.0715	0.1200	0.157
							[0.024]	[0.240]	[0.179]
Race*Class*Order							-0.0258	0.0168	-0.0571
							[0.569]	[0.913]	[0.739]
N	9456	830	1838	9456	830	1838	9456	830	1838
Pseudo R2	0.0029	0.0570	0.0251	0.0034	0.0579	0.0400	0.0067	0.0633	0.1145

Notes: All coefficients are expressed in terms of marginal effects. Columns (1), (3), (4), (6), (7) and (9) show estimates without control variables, of these columns (3), (6), and (9) show estimates with landlord fixed effects . Columns (2), (5), and (8) control for the city, number of bedrooms and bathrooms, square footage of the unit, an indicator if the unit is an apartment or single family home, monthly rent, an indicator if the monthly rent is above the median, percentage of residents living below the poverty line, percentage of residents with at least a college degree, percentage of white residents, and an indicator if the neighborhood is a "tipping" neighborhood (between 80 and 95 percent white). Standard errors in all Probits are clustered at the landlord level, and p-values are shown in [].

Table 8: Response Rate and Landlord Level Response by Absolute Percentage of White Residents in Surrounding Neighborhood

	Overall Response Rate				Response at Landlord Level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	White	African American	(1) - (2)	Respond to Neither	Respond to Both	White Only	African American Only	(6) - (7)
Less than .50	56.98%	48.58%	8.41%	39.07%	38.84%	13.95%	8.14%	5.81%
	[630]	[632]	p=0.0028	[430]	[168]	[167]	[60]	p=0.0065
.50 to .80	61.29%	56.46%	4.83%	50.29%	32.43%	10.86%	6.43%	4.43%
	[1072]	[1068]	p=0.0233	[700]	[352]	[227]	[76]	p=0.0032
.80 to .95	61.87%	51.25%	10.62%	44.77%	33.42%	14.41%	7.40%	7.02%
	[1154]	[1202]	p=0.0001	[784]	[351]	[262]	[113]	p=0.0001
.95 to 1	51.84%	48.00%	3.84%	39.23%	39.95%	11.70%	9.12%	2.58%
	[1873]	[1825]	p=0.0195	[1239]	[486]	[495]	[145]	p=0.0353

Notes: The number of observations, denoted with [] in columns (1) and (2) reflect the number of e-mails sent. The number of observations in columns (4)-(7) reflect the number of landlords that respond to an inquiry from neither, both, or one of the racial groups. The denominator for the percentages in columns (1) and (2) are e-mails sent by each respective race. The denominator for the percentages in columns (4)-(7) is the total number of African American/white audits. The percentage of white residents in a census tract comes from the 2000 census.

Table 9: Response Rate and Landlord Level Response by Type of Rental Unit

	Overall Response Rate				Response at Landlord Level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	White	African American	(1) - (2)	Respond to Neither	Respond to Both	White Only	African American Only	(6) - (7)
Single Family	59.67%	56.44%	3.23%	47.54%	32.65%	10.14%	9.67%	0.48%
	[977]	[939]	p=0.1521	[300]	[206]	[64]	[61]	p=0.7774
Duplex	56.52%	51.61%	4.91%	42.11%	36.84%	10.53%	10.53%	0.00%
	[115]	[155]	p=0.4238	[40]	[35]	[10]	[10]	p=1.0000
Townhouse	63.52%	61.67%	1.86%	51.88%	29.38%	8.75%	10.00%	-1.25%
	[244]	[240]	p=0.6728	[83]	[47]	[14]	[16]	p=0.7013
Condominiums	65.56%	56.47%	9.09%	50.50%	27.72%	16.83%	4.95%	11.88%
	[453]	[425]	p=0.0057	[153]	[84]	[51]	[15]	p=0.0001
Apartment	57.26%	47.58%	9.68%	40.56%	38.50%	13.52%	7.43%	6.09%
	[1647]	[1673]	p=0.0001	[453]	[430]	[151]	[83]	p=0.0001
Shared Room	64.47%	52.24%	12.23%	47.96%	31.63%	15.31%	5.10%	10.20%
	[152]	[134]	p=0.0360	[47]	[31]	[15]	[5]	p=0.0183

Notes: The number of observations, denoted with [] in columns (1) and (2) reflect the number of e-mails sent. The number of observations in columns (4) - (7) reflect the number of landlords that respond to an inquiry from neither, both, or one of the racial groups. The denominator for the percentages in columns (1) and (2) are e-mails sent by each respective race. The denominator for the percentages in columns (4) - (7) are the total number of African American/white audits. The type of rental unit is identified by the authors from the description in the unit advertisement.

Table 10: Marginal Effects of Unit and Neighborhood Characteristics on Response to e-mail Inquiries from African American Sounding Names

Unit Characteristics	N	Marginal Effect on Response for African American Names	p-value
Percentage of Median Rent	7586	-0.0014	[0.378]
Square Footage (in thousands)	1454	0.0574	[0.024]
Discount	7768	0.0303	[0.293]
Address Included	7810	-0.0225	[0.371]
# of Bedrooms	7650	0.0194	[0.037]
# of Bathrooms	5074	0.0204	[0.218]
Apartment	7024	-0.0478	[0.027]
Single Family Home	7032	0.0513	[0.031]
Shared Room	7502	-0.0602	[0.288]
Neighborhood Characteristics			
Percent White	5908	0.0035	[0.938]
Tipping Neighborhood	5908	-0.0525	[0.028]
Percent College Educated	5908	0.0572	[0.334]
Median Income (in thousands)	5908	0.0003	[0.366]
Percent Below Poverty	5908	-0.1540	[0.177]
Employment Rate	5908	0.1065	[0.318]
Percent Migrants	5908	0.1103	[0.178]

Notes: Probit regressions are at the e-mail level and cluster all standard errors at the landlord level. The marginal effect of all characteristics is calculated from a probit regression of the respond variable on a dummy for an African American sounding name, the characteristic, and the interaction between the characteristic and the African American sounding name dummy. We report the marginal effect of the interaction term. The percent of migrants in a neighborhood is measured using the number of residents who lived elsewhere in 1995, divided by total residents in 2000.

Table 11: Landlord Level: Describes Unit as Available by Race of Home-Seeker

	(1) Neither	(2) Both	(3) White Only	(4) African American Only	(5) (3) - (4)
All Audits	19.68%	68.98%	6.12%	5.16%	0.96%
	[267]	[936]	[83]	[70]	p=0.2793
Atlanta	19.19%	66.28%	7.56%	6.40%	1.16%
	[33]	[114]	[13]	[11]	p=0.6721
Boston	10.07%	77.85%	7.38%	4.70%	2.68%
	[15]	[116]	[11]	[7]	p=0.3307
Chicago	30.08%	55.64%	9.02%	5.26%	3.76%
	[40]	[74]	[12]	[7]	p=0.2339
Dallas	13.16%	71.05%	5.26%	10.53%	-5.26%
	[5]	[27]	[2]	[4]	p=0.3949
Washington D.C.	15.06%	75.90%	5.42%	3.61%	1.81%
	[25]	[126]	[9]	[6]	p=0.4279
Houston	22.95%	70.49%	3.28%	3.28%	0.00%
	[14]	[43]	[2]	[2]	p=1.0000
Los Angeles	22.70%	63.12%	8.51%	5.67%	2.84%
	[32]	[89]	[12]	[8]	p=0.3534
New York	31.67%	55.00%	5.56%	7.78%	-2.22%
	[57]	[99]	[10]	[14]	p=0.3980
Seattle	14.29%	78.88%	2.48%	4.35%	-1.86%
	[23]	[127]	[4]	[7]	p=0.3574
San Francisco	14.84%	77.42%	5.16%	2.58%	2.58%
	[23]	[120]	[8]	[4]	p=0.2389

Notes: The number of observations reflect the number of landlords that describe the rental unit as available to an inquiry from neither, both, or one of the racial groups. The denominator is landlords who are sent inquires from both African American and white potential tenants and reply to both.

Table 12: Landlord Level: Invites Home-Seeker For Viewing by Race of Home-Seeker

	(1) Neither	(2) Both	(3) White Only	(4) African-American Only	(5) (3) - (4)
All Audits	27.81%	58.07%	7.27%	6.84%	0.43%
	[260]	[543]	[68]	[64]	p=0.7180
Atlanta	39.47%	46.49%	7.89%	6.14%	1.75%
	[45]	[53]	[9]	[7]	p=0.6041
Boston	25.86%	57.76%	9.48%	6.90%	2.59%
	[30]	[67]	[11]	[8]	p=0.4726
Chicago	27.03%	54.05%	8.11%	10.81%	-2.70%
	[20]	[40]	[6]	[8]	p=0.5743
Dallas	33.33%	44.44%	11.11%	11.11%	0.00%
	[9]	[12]	[3]	[3]	p=1.0000
Washington D.C.	24.60%	59.52%	8.73%	7.14%	1.59%
	[31]	[75]	[11]	[9]	p=0.6411
Houston	46.51%	37.21%	9.30%	6.98%	2.33%
	[20]	[16]	[4]	[3]	p=0.6933
Los Angeles	25.84%	61.80%	8.99%	3.37%	5.62%
	[23]	[55]	[8]	[3]	p=0.1196
New York	23.23%	65.66%	7.07%	4.04%	3.03%
	[23]	[65]	[7]	[4]	p=0.3520
Seattle	28.35%	58.27%	3.15%	10.24%	-7.09%
	[36]	[74]	[4]	[13]	p=0.0238
San Francisco	19.17%	71.67%	4.17%	5.00%	-0.83%
	[23]	[86]	[5]	[6]	p=0.7576

Notes: The number of observations reflect the number of landlords that describe the rental unit as available to an inquiry from neither, both, or one of the racial groups. The denominator is the landlords who are sent e-mail inquires from both African American and white potential tenants, reply to both, and describe the unit as available in their response.

Table 13: Results Excluding Religious or Unique Names

	Overall Response Rate			Response at landlord level				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	White	African-American	(1) - (2)	Respond to Neither	Respond to Both	White Only	African-American Only	Ho: Rw-RAA=0
Excluding Muslim Sounding Names (Hakim, Jamal, Kareem, Rasheed)	57.14%	49.96%	7.18%	37.01%	42.24%	13.36%	7.40%	5.95%
	[4727]	[2644]	p= 0.0000	[665]	[759]	[240]	[133]	p= 0.0000
Excluding two most unique and two most common names (Matthew, Todd, Rasheed, Hakim)	57.00%	50.82%	6.18%	36.80%	43.42%	12.13%	7.65%	4.48%
	[4200]	[3656]	p= 0.0000	[789]	[931]	[260]	[164]	p= 0.0000
Excluding four most unique and four most common names (Matthew, Todd, Brett, Brad, Hakim, Rasheed, Tremayne, Kareem)	56.27%	50.42%	5.85%	38.71%	42.49%	10.90%	7.90%	3.00%
	[3172]	[2608]	p= 0.0000	[451]	[495]	[127]	[92]	p= 0.0130
Audits that only contain either a top four most common or most unique name	58.83%	51.30%	7.53%	35.21%	43.36%	13.43%	8.00%	5.43%
	[1557]	[2119]	p= 0.0000	[700]	[862]	[267]	[159]	p= 0.0000
Excluding names ranked in the top 50 most common by State	57.70%	50.81%	6.88%	36.09%	43.38%	12.42%	8.11%	4.31%
	[3489]	[4727]	p= 0.0000	[837]	[1006]	[288]	[188]	p= 0.0000
Excluding names ranked in the top 100 most common by State	56.01%	50.83%	5.18%	38.11%	42.63%	11.81%	7.45%	4.36%
	[1948]	[4295]	p=0.0001	[455]	[509]	[141]	[89]	p=0.0003

Notes: The number of observations, denoted with [] in columns (1) and (2) reflect the number of e-mails sent. The number of observations in columns (4)-(7) reflect the number of landlords that respond to an inquiry from neither, both, or one of the racial groups. The denominator for the percentages in columns (1) and (2) are e-mails sent by each respective racial group. The denominator for the percentages in columns (4)-(7) are the total number of African American/white audits. Name popularity or uniqueness is according to rankings of the most popular names for babies born between 1974 and 1979 inclusive (the years of the Bertrand and Mullainathan birth certificate data) and comes from the Social Security Administration website at: http://www.ssa.gov/OACT/babynames/

Table 14: First Name Popularity at National and States in Sample Level

Name	National	Georgia	Massachusetts	Illinois	Texas	D.C	California	New York	Washington
Matthew	8	12	5	7	14	11	9	11	6
Todd	50	89	42	43	NA	74	73	48	50
Brett	103	NA	78	82	NA	NA	NA	88	83
Brad	109	65	81	51	66	91	100	88	62
Jay	122	NA	86	NA	NA	NA	NA	NA	89
Tyrone	155	89	NA	NA	NA	59	NA	94	NA
Neil	169	NA	84	NA	NA	NA	NA	NA	NA
Jermaine	174	88	NA	NA	NA	67	NA	91	NA
Geoffrey	182	NA	93	NA	NA	NA	NA	NA	99
Greg	252	31	34	34	47	23	38	29	46
Brendan	258	NA	68	NA	NA	94	NA	99	NA
Leroy	264	NA	NA	NA	NA	NA	NA	NA	NA
Jamal	336	NA	NA	NA	NA	68	NA	NA	NA
Darnell	349	NA	NA	NA	NA	86	NA	NA	NA
Kareem	403	NA	NA	NA	NA	NA	NA	NA	NA
Tremayne	669	NA	NA	NA	NA	NA	NA	NA	NA
Rasheed	767	NA	NA	NA	NA	NA	NA	NA	NA
Hakim	882	NA	NA	NA	NA	NA	NA	NA	NA

Name popularity rankings are average rankings for babies born between 1974 and 1979 inclusive. Popularity rankings for the nation reflect an appearance in the top 1,000 most common names, popularity rankings by state reflect an appearance in the top 100 most common names. All popularity rankings are specific to males and are taken from the Social Security Administration at http://www.ssa.gov/OACT/babynames/

Table 15: P-value of Tests for Difference in Response Rate Between Specific Name and Other Names of Same Race Within City

Name	ATL	BOS	CHI	DAL	DC	HOU	LA	NYC	SEA	SF
Brad Davis	[0.7680]	[0.4371]	[0.3929]	[0.5454]	[0.2828]	[0.8050]	[0.8897]	[0.4258]	[0.8229]	[0.6294]
Brendan Ryan	[0.7292]	[0.1093]	[0.6879]	[0.3797]	[0.2130]	[0.5360]	[0.6915]	[0.4047]	[0.8313]	[0.4655]
Matthew O'Brien	[0.6854]	[0.6933]	[0.6006]	[0.2157]	[0.3999]	[0.7506]	[0.1393]	[0.6787]	[0.7189]	[0.5645]
Todd Jones	[0.6741]	[0.4623]	[0.3601]	[0.8814]	[0.3748]	[0.8217]	[0.1253]	[0.8289]	[0.4389]	[0.9902]
Brett Murphy	[0.6547]	[0.9472]	[0.9608]	**+[0.0169]**	[0.6629]	[0.8866]	[0.4998]	[0.5548]	[0.2429]	[0.5403]
Neil Baker	[0.2763]	[0.5366]	[0.4403]	[0.6177]	[0.8395]	[0.5446]	*-[0.0820]*	*-[0.0650]*	[0.4096]	[0.6087]
Geoffrey McCarthy	[0.2956]	[0.4957]	[0.6209]	[0.3172]	[0.3557]	[0.6902]	[0.5740]	[0.2700]	[0.6496]	[0.9457]
Greg Young	[0.5122]	[0.6689]	[0.7642]	[0.5363]	[0.4757]	[0.3858]	[0.7606]	[0.7649]	[0.7760]	[0.9897]
Jay Wright	[0.4102]	[0.2809]	[0.7997]	[0.7903]	[0.8383]	[0.2252]	[0.1475]	[0.7591]	[0.5793]	[0.7054]
Jermaine Jackson	[0.1022]	[0.1046]	[0.1081]	[0.2567]	[0.2140]	[0.6245]	[0.5218]	[0.2017]	[0.9765]	**-[0.0383]**
Kareem Hall	[0.7352]	[0.1751]	[0.9486]	[0.8955]	*+[0.0865]*	[0.9896]	[0.3568	[0.5095]	[0.1463]	[0.8641]
Leroy Parker	**+[0.0563]**	[0.1309]	[0.2823]	[0.7615]	[0.5129]	[0.3412]	[0.8024]	[0.2145]	[0.4218]	[0.9399]
Hakim Washington	[0.4377]	[0.6892]	[0.6562]	[0.9234]	[0.9099]	[0.9040]	[0.4944]	[0.4278]	[0.4255]	[0.2135]
Jamal Robinson	[0.5187]	[0.6615]	[0.5736]	[0.7416]	[0.5824]	[0.6117]	**+[0.0544]**	[0.1142]	[0.8607]	[0.7280]
Darnell Johnson	[0.6434]	[0.5919]	[0.5644]	[0.6366]	[0.6058]	[0.2382]	[0.4605]	[0.7306]	[0.5989]	[0.1550]
Rasheed Jones	[0.5528]	[0.7307]	[0.4101]	**+[0.0312]**	[0.4749]	[0.2428]	[0.1406]	[0.2057]	[0.7993]	[0.7932]
Tremayne Williams	[0.6195]	[0.5581]	[0.2386]	[0.1553]	[0.2428]	[0.7195]	[0.4450]	[0.8198]	[0.7982]	[0.7527]
Tyrone Cooper	[0.8644]	**-[0.0551]**	[0.4747]	[0.8333]	[0.5374]	**-[0.0499]**	[0.7009]	[0.1429]	[0.4939]	[0.6133]

Notes: Table reports p-values for a test of symmetry between the response rate from e-mail inquires made from a specific name in a specific city and all other names in that race/city grouping. P-values shown in **bold** are statistically significant at the 5 percent level, those shown in *italics* are statistically significant at the 10 percent level. A (+) next to a p-value means that particular name has a more favorable response rate than other names representing the same race in that particular city. A (-) next to a p-value means that particular name has a less favorable response rate than other names representing the same race in that particular city.

Table 16: Response Rate and Landlord Level Response by Race of Home-Seeker, Excluding Names with Unusual Performance (significant at 5 percent level)

| | Overall Response Rate | | | | Response at Landlord Level | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
	White	African American	(1) - (2)	Respond to Neither	Respond to Both	White Only	African American Only	(6) - (7)
All Audits	57.01%	50.83%	6.18%	36.54%	42.94%	12.50%	8.02%	4.48%
	[4708]	[4474]	p=0.0000	[1084]	[1274]	[371]	[238]	p=0.0000
Atlanta	61.71%	55.19%	6.52%	30.74%	49.66%	10.81%	8.78%	2.03%
	[504]	[453]	p=0.0409	[91]	[147]	[32]	26]	p=0.4068
Boston	64.09%	53.51%	10.58%	33.11%	45.03%	14.57%	7.28%	7.28%
	[504]	[456]	p=0.0009	[100]	[136]	[44]	[22]	p=0.0041
Chicago	51.89%	46.92%	4.97%	39.70%	39.70%	12.54%	8.06%	4.48%
	[503]	[503]	p=0.1149	[133]	[133]	[42]	[27]	p=0.0566
Dallas	47.89%	47.45%	0.44%	44.44%	33.33%	12.22%	10.00%	2.22%
	[142]	[137]	p=0.9411	[40]	[30]	[11]	[9]	p=0.6353
Washington D.C.	64.88%	58.93%	5.95%	27.98%	49.40%	14.29%	8.33%	5.95%
	[504]	[504]	p=0.0517	[94]	[166]	[48]	[28]	p=0.0148
Houston	43.20%	40.44%	2.76%	52.00%	33.14%	9.71%	5.14%	4.57%
	[294]	[272]	p=0.5067	[91]	[58]	[17]	[9]	p=0.1030
Los Angeles	58.62%	45.74%	12.88%	37.12%	41.14%	15.38%	6.35%	9.03%
	[493]	[446]	p=0.0001	[111]	[123]	[46]	[19]	p=0.0004
New York	49.47%	43.65%	5.82%	42.26%	35.71%	13.10%	8.93%	4.17%
	[756]	[756]	p=0.0233	[213]	[180]	[66]	[45]	p=0.0346
Seattle	62.30%	58.13%	4.17%	32.74%	47.92%	10.42%	8.93%	1.49%
	[504]	[504]	p=0.1766	[110]	[161]	[35]	[30]	p=0.5141
San Francisco	57.54%	55.30%	2.23%	34.35%	47.62%	10.20%	7.82%	2.38%
	[504]	[443]	p=0.4888	[101]	[140]	[30]	[23]	p=0.3134

Notes: The number of observations, denoted with [] in columns (1) and (2) reflect the number of e-mails sent. The number of observations in columns (4)-(7) reflect the number of landlords that respond to an inquiry from neither, both, or one of the racial groups. The denominator for the percentages in columns (1) and (2) are e-mails sent by each respective racial group. The denominator for the percentages in columns (4)-(7) is the total number of African-American/white audits. These results exclude e-mails sent and audits containing at least one e-mail from the following name/city combinations: Leroy Parker in Atlanta, Tyrone Cooper in Boston, Brett Murphy in Dallas, Rasheed Jones in Dallas, Tyrone Cooper in Houston, Jamal Robinson in Los Angeles, and Jermaine Jackson in San Francisco.

Table 17: Response Rate and Landlord Level Response by Race of Home-Seeker, Using only anonymous e-mail addresses

	Overall Response Rate				Response at Landlord Level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	White	African American	(1) - (2)	Respond to Neither	Respond to Both	White Only	African American Only	(6) - (7)
All Audits	54.63%	48.25%	6.38%	39.23%	40.51%	12.20%	8.05%	4.15%
	[3778]	[3780]	p=0.0000	[984]	[1016]	[306]	[202]	p=0.0000
Atlanta	62.50%	54.68%	7.82%	30.74%	48.15%	11.85%	9.26%	2.59%
	[400]	[406]	p=0.0242	[83]	[130]	[32]	[25]	p=0.3269
Boston	61.92%	50.12%	11.80%	36.30%	41.64%	14.59%	7.47%	7.12%
	[407]	[419]	p=0.0006	[102]	[117]	[41]	[21]	p=0.0071
Chicago	49.11%	43.00%	6.11%	43.97%	36.19%	12.84%	7.00%	5.84%
	[395]	[393]	p=0.0853	[113]	[93]	[33]	[18]	p=0.0269
Dallas	50.00%	49.28%	0.72%	40.43%	30.85%	15.96%	12.77%	3.19%
	[134]	[138]	p=0.9049	[38]	[29]	[15]	[12]	p=0.5327
Washington D.C.	63.50%	58.76%	4.74%	28.57%	49.60%	12.70%	9.13%	3.57%
	[400]	[388]	p=0.1725	[72]	[125]	[32]	[23]	p=0.1985
Houston	41.92%	32.74%	9.19%	54.30%	29.80%	11.26%	4.64%	6.62%
	[229]	[223]	p=0.0436	[82]	[45]	[17]	[7]	p=0.0334
Los Angeles	53.19%	44.82%	8.37%	41.53%	38.31%	13.31%	6.85%	6.45%
	[376]	[386]	p=0.0208	[103]	[95]	[33]	[17]	p=0.0170
New York	46.28%	40.94%	5.35%	44.93%	33.18%	12.67%	9.22%	3.46%
	[646]	[640]	p=0.0532	[195]	[144]	[55]	[40]	p=0.1029
Seattle	59.38%	55.88%	3.49%	36.59%	46.75%	8.94%	7.72%	1.22%
	[384]	[374]	p=0.3306	[90]	[115]	[22]	[19]	p=0.6246
San Francisco	55.04%	50.85%	4.19%	38.55%	44.73%	9.45%	7.27%	2.18%
	[407]	[413]	p=0.2295	[106]	[123]	[26]	[20]	p=0.3554

Notes: The number of observations, denoted with [] in columns (1) and (2) reflect the number of e-mails sent. The number of observations in columns (4)-(7) reflect the number of landlords that respond to an inquiry from neither, both, or one of the racial groups. The denominator for the percentages in columns (1) and (2) are e-mails sent by each respective racial group. The denominator for the percentages in columns (4)-(7) is the total number of African-American/white audits. These results include only e-mails sent to landlords using anonymous craigslist e-mail addresses of the form, hous-aaaa-##########@craigslist.org, where aaaa is a four character letter code and # is the posting id of the advertisement.

Table 18: Unit and Neighborhood Characteristics for Rental Properties in our Sample Versus the Population of Rental Units
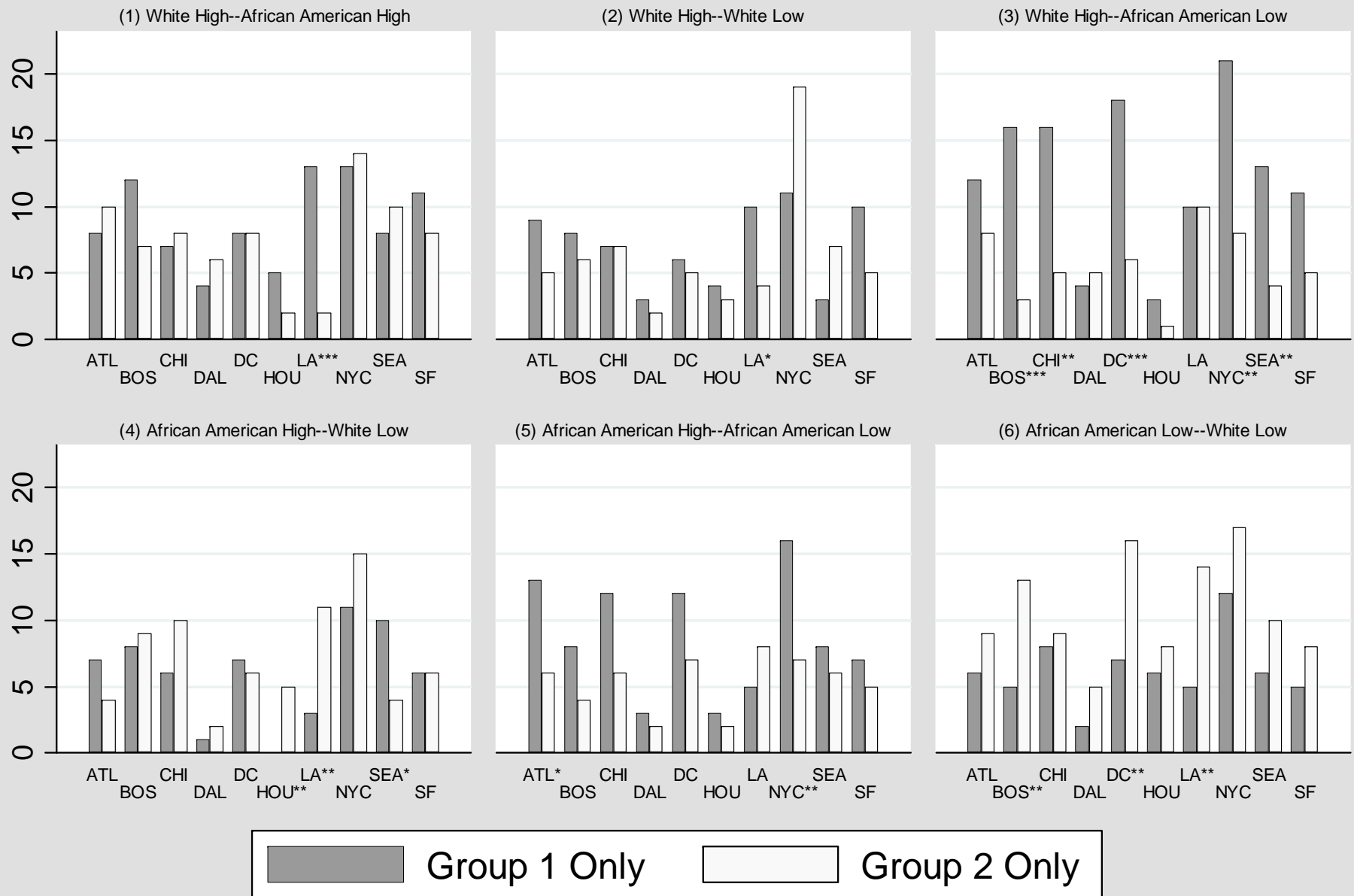
	Craigslist Sample	AHS/Census*	Statistically Different
Total Housing Units	4728	2835 actual, 6,724,157 weighted	
Bedrooms	2.04	1.78	Yes
	(1.1195)	(0.9435)	
Bathrooms	1.61	1.23	Yes
	(.7699)	(0.4963)	
Single Family Homes	0.2724	0.1321	Yes
	(.4453)	(0.3387)	
Townhouse	0.0689	0.0438	No
	(.2533)	(0.2048)	
Condo	0.1250	0.0898	No
	(.3308)	(0.2859)	
Apartment	0.4725	0.7397	Yes
	(.4993)	(0.4389)	
Monthly Rent	$1,492	$1,025	Yes
	(811)	(666)	
Greater than Median Area Rent	0.4594	0.2608	Yes
	(.4984)	(0.4391)	
Square Footage	1361	1149	Yes
	(1209)	(2020)	
% African American Residents	0.1438	0.1647	No
	(0.2286)	(0.2632)	
% White Residents	0.6847	0.6267	Yes
	(0.2535)	(0.2904)	
% Residents Under Poverty Line	0.1306	0.1237	No
	(0.1045)	(0.1175)	
Median Family Income	$65,134	$60,881	Yes
	(32154)	(30404)	
% College Educated	0.3650	0.2624	Yes
	(0.1943)	(0.1761)	

*AHS Sample includes only units identified as part of the Metropolitan Statistical Areas from our Craigslist sample, Census sample includes all census tracts identified as part of these same areas.

The AHS does not seperately identify homes as duplexes or shared rooms, so these categories are omitted

The column statistically different is based on a difference in means t test between the means of the craigslist and AHS/Census samples

Figure 1: Landlord Level Response by Race and Class Across Cities