

# The Visible Hand: Race and Online Market Outcomes

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## Abstract

We examine the effect of race on market outcomes by selling iPods through local online classified advertisements throughout the United States in a year-long field experiment. Each ad features a photograph of the product being held by a dark- or light-skinned (“black” or “white”) hand. To provide context, we also consider a group of sellers against whom buyers might statistically discriminate for similar reasons: white sellers with wrist tattoos. Black sellers do worse than white sellers on a variety of market outcome measures: They receive 13% fewer responses and 17% fewer offers. These effects are strongest in the Northeast, and are similar in magnitude to those associated with the display of a wrist tattoo. Conditional on receiving at least one offer, black sellers also receive 2–4% lower offers, despite the self-selected—and presumably less biased—pool of buyers. In addition, buyers corresponding with black sellers exhibit lower trust: They are 17% less likely to include their name in e-mails, 44% less likely to accept delivery by mail, and 56% more likely to express concern about making a long-distance payment. We find evidence that black sellers suffer particularly poor outcomes in thin markets; it appears that discrimination may not “survive” in the presence of significant competition among buyers. Furthermore, black sellers do worst in the most racially isolated markets and markets with high property crime rates, consistent with channels through which we might expect statistical discrimination to operate.

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## 1 Introduction

Economic outcomes in the United States are highly correlated with race, but the causal mechanisms underlying these correlations are not well understood. In particular, it is unclear how much of the correlation is due to discrimination and how much is due to other characteristics that are correlated with race, such as education.

There is an extensive literature on the effect of race on market outcomes, focusing on both labor and goods (including housing) markets. However, “discrimination” is not a monolithic phenomenon, and it is important to investigate its extent and causes in a variety of different contexts (across which they may differ). Our paper asks the following question: When the typical person engages in a consumer transaction (usually as a buyer), does he or she try to avoid dealing with minority sellers, and does she treat minority sellers differently?

This is an important question for at least two reasons. First, a large amount of commerce takes place through these kinds of transactions. Second, discrimination by consumers may in fact underlie other forms of discrimination. For example, if white customers prefer not to deal with black sellers, retailers might avoid hiring black salespeople. Becker (1971) identifies discrimination by consumers, employers, and fellow workers as the three potential sources of the racial disparity in labor market outcomes, and Nardinelli and Simon (1990) note that in a relatively competitive labor market like the United States, consumer discrimination is the most likely cause of the persistent disparity.<sup>1</sup> However, the resulting labor market discrimination is difficult in practice to distinguish from lower ability because both affect observed productivity.

Our study contributes to the literature by examining the effect of consumer discrimination on sellers’ market outcomes using a field experiment that rigorously isolates the effect of sellers’ skin color. This complements existing evidence of discrimination in labor and housing markets which—though striking—does not imply the existence of discrimination in common consumer transactions (though the latter could be one explanation for labor market discrimination). Indeed, we might expect that individuals are more likely to indulge in their taste for anti-black animus when renting a house or hiring an employee than when engaging in the limited interaction of a consumer transaction.

We posted classified advertisements offering an iPod Nano portable digital music player for sale on several hundred locally focused websites throughout the United States, and analyze here the effect of the seller’s skin color on several outcomes of interest. Notably, we signal skin

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<sup>1</sup>Altonji and Blank (1999) summarize the theory and evidence regarding race and the labor market in their Handbook of Labor Economics chapter, and document the persistent black-white gap in earnings, labor participation, and education.

## 1 Introduction

color using photographs instead of one of the more problematic treatments used in previous discrimination studies.<sup>2</sup> By including a photograph of a dark-skinned (black) or light-skinned (white) hand holding the item, we were able to randomly vary the apparent race of the seller while fixing other advertisement and market characteristics.<sup>3</sup> We also compare the effect of race with that of a social signal that can be communicated through the appearance of a seller's hand: a wrist tattoo. Tattooed sellers are likely statistically discriminated against for many of the same reasons as black sellers, so—in addition to providing general context for interpreting the magnitude of the black-white differences we observe—this third group of sellers can serve as a “suspicious” white control group.

The market in which we run our experiment facilitates our investigation of consumer discrimination in multiple ways: Buyers have no reason to make offers that they do not anticipate ending in a transaction. They anticipate having to meet a seller in order to complete the transaction—perhaps on the seller's terms—with the non-trivial possibility of deception or theft. Thus, trust plays a key role in the interactions we observe. These are characteristics of many (labor and goods) market transactions that may be less present in the decision to call back a job applicant, bid in an online auction, or make a purchase guaranteed by a third party (such as from a store where the salesperson is merely an employee). Furthermore, the local focus of the online classified advertisements allows us to analyze regional differences as well as variation by local economic and demographic characteristics.

Given the challenges of adequately controlling for unobservable characteristics that may be correlated with race, we are, unsurprisingly, not the first to use an experimental approach. Riach and Rich (2002) offer a useful survey of field experiments designed to assess discrimination. Actor-based audit studies (e.g., Ayres and Siegelman, 1995; Neumark, Bank, and Van Nort, 1996)—in which actors apply for jobs, consider housing, or negotiate sales—attempt to match different-race candidates on as many dimensions as possible, but the match quality will never be perfect. Additionally, these studies are typically not double-blind, and actors' awareness of the object of study and experimental design may bias the results.

One similar study, of discrimination by buyers and sellers in a goods market, is List (2004). As in more typical audit studies, List uses black and white agents who directly signal their race—in this case to dealers at a baseball card show. The agents are drawn from the general population

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<sup>2</sup>Ravina (2008) and Pope and Sydnor (Forthcoming) have also studied race through photographs in online markets, although in non-experimental settings where non-random samples and unobservable characteristics are a concern.

<sup>3</sup>Skin color is clearly highly correlated with race. We believe that discrimination based on skin color is of primary interest when people discuss racism, but there are surely many other relevant components of race that our study ignores.

## 1 Introduction

of show attendees, so they inevitably differ along characteristics other than race. These non-race differences may help explain a disparity between offers made to black and white agents somewhat larger than those we find (average offers 3–30% worse vs. our 2%), although there are many other differences between our market environments. List also offers evidence from complementary experiments that statistical discrimination is the main force explaining black-white gaps; given the large number of card dealers competing for business and their expertise (which could prepare them to effectively discriminate statistically), it is perhaps unsurprising that animus plays less of a role. The online classified advertising market we consider is perhaps more typical of interpersonal negotiation between non-experts where outside options (i.e., what a seller might do with an unsold iPod) are less clear. Although our experimental design does not provide similar opportunities to tease out mechanisms, we do find discrimination is heterogeneous across markets in patterns consistent with some expected channels through which statistical discrimination might operate.

A number of studies have avoided the issues (and costs) associated with hiring actors by signaling race through the use of racially distinctive names. Perhaps the best known application of this approach was conducted by Bertrand and Mullainathan (2004), who responded to job postings in Boston and Chicago using fictitious resumé randomly assigned either a distinctively black or white name. The authors measured whether employers followed up with each application, and found that those with black names had a callback rate one-third lower than those with white names. This difference was remarkably consistent across industries, and persisted for “higher-quality” (i.e., better educated and more experienced) applicants as well as for those randomly assigned mailing addresses in more affluent neighborhoods. Similar studies have been conducted in several other countries considering (for example) Middle Eastern names in Sweden (Carlsson and Rooth, 2007) and Turkish names in Germany (Kass and Manger, 2010). A number of other authors have used racially distinctive names to experimentally investigate the impact of race in online markets including apartment rentals (e.g., Carpusor and Loges, 2006; Ahmed and Hammarstedt, 2008; Ewens, Tomlin, and Wang, 2009; Bosch, Carnero, and Farré, 2010; Hanson and Hawley, 2010) and low-value auctions (Nunley, Owens, and Howard, 2010).

Two primary criticisms of the Bertrand and Mullainathan design have been raised. The first results from the use of names as a proxy for race, rather than a more direct signal. Market actors may have viewed stereotypically black names as signals of socioeconomic status or family background, and responded in a way that they might not have to a more typical black candidate.<sup>4</sup>

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<sup>4</sup>Bertrand and Mullainathan are forthright in recognizing this concern, suggesting even in the paper’s title that their conclusions are fundamentally about applicants with names that are much more common among either blacks or whites (like Lakisha, Jamal, Emily, and Greg).

This concern applies for most “correspondence” studies, since names are typically the most appropriate way of signaling race to a potential buyer, seller, or employer in an experimental setting. Second, the measured outcome—callbacks, for instance—is often not the ultimate outcome of interest. While the number of callbacks is interesting, it does not tell us how many of those applicants might have been offered a job or apartment rental, or what wage or price they might have received.

Our experimental design attempts to address these concerns in two ways. First, by signaling race through the inclusion of a photograph, we can vary race while holding constant all other signals sent about attributes of the seller.<sup>5</sup> Second, the fact that online transactions are brought near completion without face-to-face contact makes it possible to consider outcome measures that are relatively “close” to the true outcomes of economic interest. One attractive feature of the classified advertising market we consider relative to online auctions is that buyers expect that completing their transaction will involve face-to-face interaction with the black or white seller; as this is typical of many non-online transactions, we expect that our results will be informative about discrimination offline.

The paper proceeds as follows: We begin with an overview of our experimental procedure, including discussion of local classified advertising markets, the contents and timing of our ads, and the manner in which we negotiated with respondents (Section 2). Next, we compare the response to white, black, and tattooed sellers’ advertisements along a number of dimensions (Section 3). Black (and tattooed) sellers receive fewer, less trusting responses and fewer, less valuable offers. Section 4 considers whether the outcome differences vary systematically across markets. Black sellers seem to fare particularly poorly in less competitive markets, in the Northeast, and in markets with highest degrees of racial isolation or property crime. Section 5 concludes.

## 2 Procedure

The goal of this paper is to rigorously isolate the effect of race on market outcomes via a carefully constructed field experiment. We have developed a procedure that avoids several confounding factors present in other studies, and which is replicable in a variety of settings. We posted online classified advertisements on locally focused websites throughout the United States over the

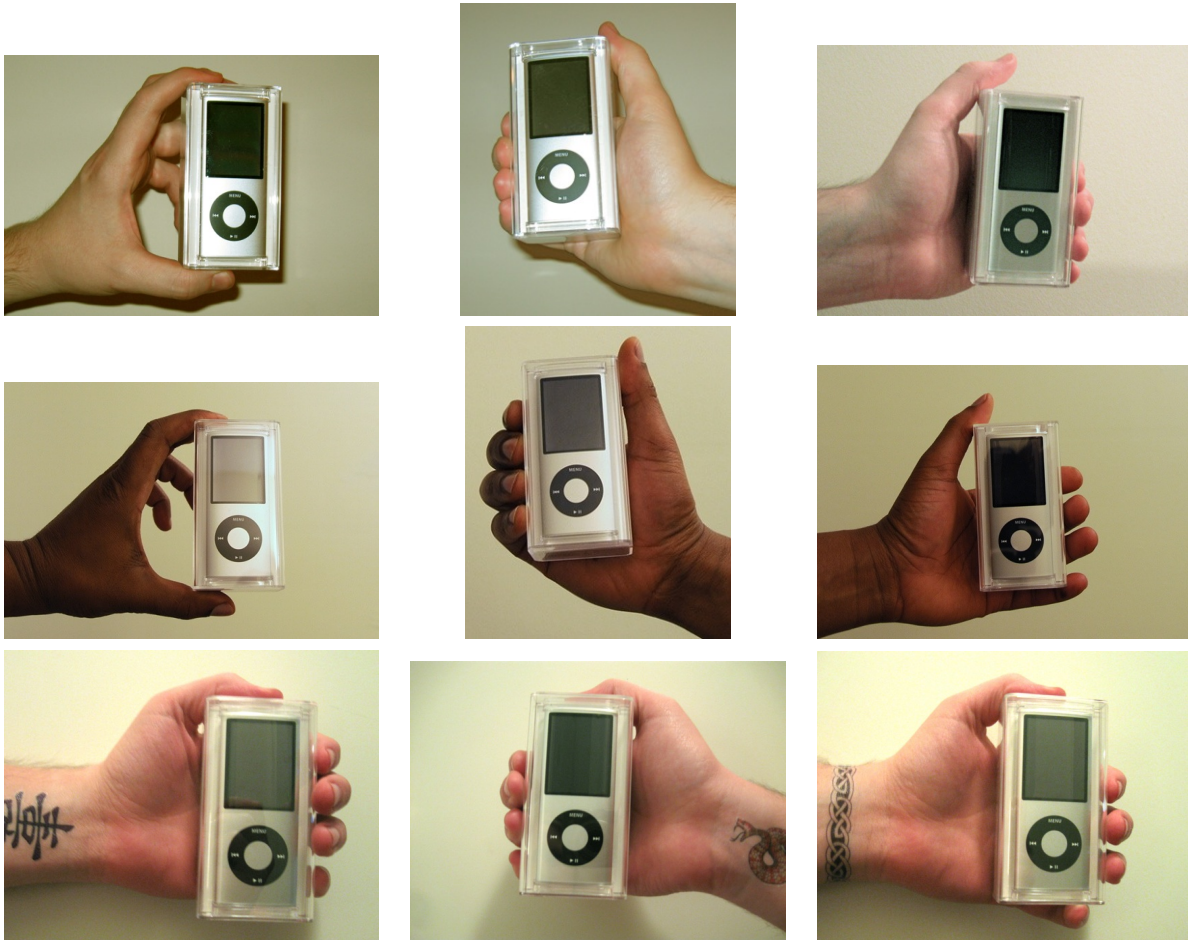
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<sup>5</sup>Of course, our treatment does signal that the seller has chosen to show her hand—and thus reveal her race. Approximately 16% of the iPod Nano ads on the websites we consider with personal photos include the seller’s hand, suggesting the practice is not uncommon (though not typical). To the extent that buyers interpret this as a signal of the seller’s confidence or naïveté, for instance, this could be a confounding factor, though we do not believe it has a large effect on our results. We would also note that it is impossible to hide one’s race in most market transactions.

## 2 Procedure

course of one year, with variation along three key dimensions: race or social group of the seller (as indicated by a photograph), asking price, and the “quality” of the advertisement text. The photographs used are shown in Figure 1. Table 14 (in Appendix A) tabulates these advertisement characteristics which—along with the markets in which the ads are posted and our posting and negotiation procedures—are discussed in greater detail below.

**Figure 1:** Advertisement photographs



Note: These photographs have been slightly scaled down from the size included in our advertisements.

### 2.1 Overview: Online classified advertisements

We posted advertisements for new Apple iPod Nano 8 GB Silver portable digital music players<sup>6</sup> on local classified advertising websites in approximately 300 geographical markets. The sites together compose a network that is a major national source of online classified advertising. All sites are publicly accessible and fee-free for those looking to buy or sell items. We used all sites available in the network as of March 2009.

Potential buyers responded via advertisement-specific, anonymized e-mail addresses. We then followed typical practice in these markets, where a seller replies to individual buyers to negotiate a final price and—if they reach agreement—arrange to complete the transaction. An ad might receive zero responses or a dozen, depending on the market demand for a particular good, the contents of the advertisement, and any number of idiosyncratic factors. The ensuing negotiations are, in general, ad hoc; that is, there is no formal bidding mechanism, and either party can cease communication at any time without facing any consequences.<sup>7</sup>

Among the experimental advantages of considering classified advertising in this setting are the local focus and the lack of information each potential buyer has about other buyers and their offers. Given the local focus of the sites on which we posted, buyers generally assume that sellers are local. In addition, the network of sites provides no facility for viewers to browse or search for advertisements across multiple markets, further encouraging local use. This is in contrast to online auctions like eBay, where it is normal to do national searches. The local focus allows us to analyze regional differences as well as variation by local economic and demographic characteristics; it also made it feasible to post multiple advertisements in a limited time frame while minimizing the risk that our analysis of any given advertisement is contaminated by our other postings. Clearly, potential buyers' bids are affected not only by how much the iPod is worth to them, but their assumptions about the seller and the other buyers who might be bidding.

### 2.2 Local markets

Over the course of the experiment we posted at least three advertisements in each market available in the network,<sup>8</sup> which collectively covers the geography of all fifty states and Washington, D.C. There are over 300 local sites, which include a wide variety of locations—from small

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<sup>6</sup>Apple released an updated iPod Nano model in the midst of our experiment. Our advertisements offer the current model—the “4th generation” (model MB598LL/A) before September 9, 2009, and the “5th generation” (model MC027LL/A) after that date. The two models appear almost identical in their packaging.

<sup>7</sup>Indeed, our experience confirms anecdotal evidence that potential buyers regularly cease communicating in the midst of discussing a potential sale.

<sup>8</sup>In fact, we *attempt* at least three postings, not all of which were successful (as discussed below).

towns in rural areas to the centers and suburbs of large cities. More information on the specific markets is included in Appendix A. Within a single market, sellers choose a category in which to list their advertisement; we posted in the “electronics for sale” category (as do the vast majority of other advertisers offering iPods for sale).

We collected data on the number of iPod Nano advertisements in each market at the time of our listing, and denote as “large” markets those with at least 20 advertisements posted between one and seven days prior.<sup>9</sup> At the time we posted our advertisements, the average market had 15.7 other advertisements for iPod Nanos that had been listed in the previous week, and 18% of our ads were posted in large markets. Markets with more advertisements posted presumably get more traffic from potential buyers. Thus, advertisements in thicker markets may get more responses on average. On the other hand, in markets with more sellers our advertisements face greater competition for prospective buyers’ attention and dollars.

Table 1 shows summary statistics for several market characteristics. In addition, Table 13 (in Appendix A) shows average values for these characteristics broken down by advertisement type.

### 2.3 Advertisement contents

The contents of our advertisements varied along three dimensions: photograph (including skin color), advertisement text, and asking price.

#### Photograph

Each advertisement included a photograph of a new, unopened iPod held in a black hand, a white hand, or a white hand with a wrist tattoo. All the photographs were of a man’s hand so, strictly speaking, our experimental design will only allow us to assess the discrimination faced by black *men*. Three styles of photographs were used for the black and white hands; the need to display the tattoo prevented us from matching all three hand positions perfectly in the last series of photos. Nevertheless, the pictures (reproduced in Figure 1) are very similar in all ways other than the apparent race or social group of the seller.

Photographs are very common in online classified advertisements, and are included in approximately 60% of the other iPod Nano advertisements we observe. Typically these are either

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<sup>9</sup>This count is based on a search for other advertisements in the same market that include the phrase “iPod Nano” (regardless of capitalization) in their title. (This count therefore includes both new and used items, and some non-iPod items, such as accessories.) Note that we have data on the *stock* of advertisements listed on the site when we post, but not on any *flow* of advertisements posted. Sellers can remove their listings, so the number of listings of vintage less than one week gives only a lower bound on the number of sellers to which a potential buyer may have been exposed during that week.



## 2 Procedure

**Table 1:** Market characteristics—Summary statistics

	Mean	Std. Dev.	25%	50%	75%
Mkt. ads week	15.7	33.2	1	3	11
20+ weekly ads	0.18				
Northeast	0.13				
Midwest	0.24				
South	0.36				
West	0.27				
% pop. White	77.0	16.1	67.1	81.5	90.1
% pop. Black	12.8	14.6	2.4	7.2	16.9
% pop. Hispanic	13.5	16.6	3.2	6.9	16.7
% pop. Asian	3.3	4.1	1.3	2.0	3.6
Poverty rate	15.7	6.3	11.7	14.7	19.1
Med. HH income (\$K)	46.3	10.9	39.4	44.5	51.1
Black isolation index	0.21	0.17	0.06	0.19	0.34
Property crime rate	358	125	276	338	412
Observations	1200				

*Note:* All observations equally weighted. Local racial composition, poverty rate, and household income are from the 2007 American Community Survey. Black isolation index is degree to which “the average black resident lives in a census tract in which the black share of the population exceeds the overall metropolitan average” in 2000 (from Glaeser and Vigdor, 2001). 2008 property crimes are per ten thousand people (from United States Department of Justice and Federal Bureau of Investigations, 2009). Isolation index and crime data are not available for all markets.

stock/marketing images or personal photographs of the item for sale; our photos are similar in style to the personal photos many others use.

### **Advertisement text**

Our advertisements (and the ensuing e-mail correspondence discussed in Section 2.5) randomized over six different texts: three types, each with a “high quality” and a “low quality” variant. We used multiple text types to create within-market variety that minimizes the apparent suspiciousness associated with repeatedly posting ads in the same market. (We were concerned here both with the websites’ users and with spam filters present on the sites themselves.) All six texts are included in Appendix B.

The three high-quality texts use proper capitalization, punctuation and grammar, and were generally well-written. Our low-quality advertisements had the same content, but with less sophisticated wording and incorrect spelling, grammar, and capitalization. Our aim was to provide a signal of the seller’s socioeconomic status, proxied by his education level and writing ability.

### **Asking price**

Each advertisement also included an asking price (both in a searchable price field and in the text of the listing) of either \$90, \$110, or \$130.<sup>10</sup> The iPod we advertised were popular and widely available through electronics retailers, mass market stores, online vendors, and Apple Stores. It had a list price of \$149.99 (plus local sales tax) and was available for sale prices of approximately \$135 throughout our experimental period, so all three asking prices were below the amount buyers would have paid in a store. This asking price represented the “first offer” in the sale negotiation, and we expect to see buyers’ responses depend on it. In addition to producing an anchoring effect (as in Tversky and Kahneman, 1974), the specific asking price also sent prospective buyers a signal about market conditions, the seller, and the quality of the product.

## **2.4 Timing**

Our experimental period covered March 16, 2009 through March 15, 2010, excluding the periods around major holidays (and various other times at which we suffered technical difficulties). Advertisements were posted in the morning and evening (at approximately 9:30 A.M. and 9:30 P.M.,

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<sup>10</sup>We limited asking prices to \$90 and \$110 beginning in December, 2009 due to \$130 advertisements’ very low response rates.

Pacific Time), with no more than four online at any given time. A tabulation of advertisement timing by advertisement type is provided in Table 15 in Appendix A.

We removed our advertisements approximately twelve hours after they were posted; no new potential buyers would view or respond to an ad after that point, though ongoing e-mail exchanges could and did continue well beyond the twelve-hour mark. During a pilot of the experiment in which we posted advertisements for longer durations, we found that the vast majority of responses were received within twelve hours, and it was common practice to complete transactions within a day or two after posting. Thus, our twelve-hour window gives us sufficient time to receive responses from most likely buyers.

We added the non-race social signal dimension of this experiment after we had already begun posting ads with black and white photos. Thus, a larger share of the later ads include tattoos. The results reported below are robust to the inclusion of a quadratic time trend to control for this correlation between ad type and timing, as well as several alternate strategies for controlling for advertisement timing such as including in regression specifications the order in which ads were posted within each market.

The weeks around two particular gift-giving holidays, Christmas and Valentine's Day, saw a large increase in responses to our ads and the offers received. Our analyses therefore include controls for these two periods.<sup>11</sup>

### 2.5 Negotiation with respondents

Beginning approximately two hours after each advertisement is posted, we sent a response via e-mail to each respondent saying that we had received many e-mails and asking for her best offer (or to confirm that an offer made in an initial e-mail was indeed her best). The text of all interactions was scripted and is included in Appendix C, together with additional details about our negotiation procedure.

In the course of our correspondence with potential buyers, we received a large number of “scam” offers (both as initial responses to our advertisements, and following our first e-mails). These scams generally comprised offers to pay high prices to have the item shipped overseas; several samples are included in Appendix D.<sup>12</sup> We coded all requests for shipping or non-cash

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<sup>11</sup>We define the Christmas period as the Monday after Thanksgiving (November 30) through December 21. We did not post advertisements from December 22 through January 5. The Valentine's Day period runs from two weeks before the holiday to one week after (January 31–February 21). We include the days after the holiday because some buyers reported looking for gifts to reciprocate gifts they had unexpectedly received.

<sup>12</sup>The associated fraud appears to operate in at least two ways. First, the “buyer's” payment—whether by online payment service, check, or money order—is counterfeit, allowing her to acquire the item at no cost. The second technique is more insidious. The seller receives an e-mail purporting to be from her bank or an online payment

### 3 Results: Average effects

payments (and other similar responses) as scams, and ceased correspondence with these respondents.<sup>13</sup>

Approximately 48 hours after removing each advertisement, we offered to sell the iPod, by postal mail, to the respondents who made and confirmed the highest offer and (when available) the second-highest offer. We apologized for being out of town, and told the respondent we were willing to mail her the iPod in exchange for payment via PayPal, an electronic payment system widely used for online person-to-person transactions. The time delay was intended to make our shipment proposal less suspicious; buyers might think we were local but had to leave town after posting the ad. We sent the iPods to those who agree to this, and replied to all other confirmed bidders that the iPod was no longer available.

The reasons we chose to offer shipment rather than in-person delivery were principally logistical, but we also sought to avoid introducing unobservable (and uncontrollable) variation. Given the local nature of our advertisements and the sites we posted them on, most high-bidders are understandably wary of a long-distance transactions; those who agreed to trade this way are unlikely to compose a representative sample of potential buyers. Nonetheless, we completed as many transactions as possible in the spirit of honestly following through on our advertised offer to sell.

## 3 Results: Average effects

We consider six different outcome measures: whether our advertisements were prematurely removed by website users, the number of responses received, qualitative characteristics of the responses' contents, the dollar amounts offered, high bidders' reactions to our stated inability to deliver the iPod in person, and the probability that an ad resulted in a successful sale. Average values for these measures by advertisement type are reported in Table 2.

The following subsections present findings on the effects of race on these outcomes, controlling for a variety of advertisement, timing, and market characteristics. Given that seller race was experimentally varied independent of these other characteristics, the race effects are consistently estimated by the difference or ratio of means reported in Table 2; including additional controls merely allows us to increase the estimates' precision.

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service, confirming that a payment has been received. The web links in this e-mail lead to sites controlled by the scammer, who hopes that the seller will enter her bank account or online payments password.

<sup>13</sup>After several months of reading and responding to potential buyers' e-mails, it became increasingly obvious which e-mails were attempted scams. Since not all of these e-mails result in follow-ups that would confirm our suspicions, we coded such responses as "probable scams" to distinguish them from genuine offers. We code responses as probable scams if the text of the e-mail or e-mail address is identical to those from a confirmed scam

### 3 Results: Average effects

**Table 2:** Key outcome averages by advertisement type

	White	Black	Tattoo	Total
Prematurely removed	0.028	0.056	0.041	0.041
<i>Number of responses</i>				
Number of non-scams	2.49	2.11	2.11	2.25
Number of offers	1.71	1.39	1.47	1.53
<i>Response characteristics</i> (given $\geq 1$ non-scam response)				
Incl. name	0.388	0.307	0.318	0.341
Polite	0.408	0.373	0.351	0.381
Incl. personal story	0.038	0.048	0.048	0.044
<i>Offer amount</i> (given $\geq 1$ offer)				
Mean offer	86.02	83.89	83.53	84.63
Best offer	94.05	90.25	90.41	91.79
<i>Reaction to delivery proposal</i> (given delivery proposed)				
Scam/payment concern	0.076	0.113	0.078	0.089
No response	0.375	0.421	0.401	0.397
Other	0.193	0.127	0.204	0.175
Prefer to wait	0.299	0.315	0.267	0.295
Willing to ship	0.056	0.025	0.051	0.045
iPod shipped	0.038	0.016	0.030	0.028

Mean values are reported.

*Note:* Observations are weighted by state population/number of ads posted in each state. All rows except “pre-maturely removed” exclude prematurely removed advertisements.

### 3 Results: Average effects

**Table 3:** Key outcome regressions

	(1) Prem. rem. Probit	(2) Nonscams Neg. Bin.	(3) Offers Neg. Bin.	(4) Mean offer OLS	(5) Best offer OLS	(6) Shipped Probit
Black	0.0270* (0.0149)	0.875** (0.0525)	0.830** (0.0631)	-1.872 <sup>+</sup> (1.250)	-3.558** (1.404)	-0.0141* (0.00766)
Tattoo	0.0136 (0.0141)	0.827*** (0.0525)	0.841** (0.0603)	-2.676** (1.328)	-4.149*** (1.554)	-0.00513 (0.00705)
High quality	-0.0158 <sup>+</sup> (0.0103)	0.975 (0.0526)	1.005 (0.0603)	0.325 (1.152)	0.760 (1.229)	-0.00559 (0.00680)
Price \$110	0.00607 (0.0116)	0.422*** (0.0264)	0.388*** (0.0278)	11.38*** (1.211)	6.269*** (1.323)	-0.0101 <sup>+</sup> (0.00615)
Price \$130	-0.0242** (0.0109)	0.223*** (0.0180)	0.182*** (0.0190)	20.32*** (2.104)	12.83*** (2.145)	-0.0278*** (0.00735)
Christmas	0.0209 (0.0307)	1.951*** (0.180)	2.119*** (0.242)	5.531*** (1.733)	11.80*** (2.106)	0.0248 (0.0262)
Valentine's Day	-0.00724 (0.0195)	1.290*** (0.110)	1.329*** (0.120)	2.230 (2.516)	1.895 (2.439)	0.00608 (0.0143)
Night	-0.00836 (0.00972)	0.696*** (0.0427)	0.665*** (0.0422)	-1.118 (1.130)	-2.938** (1.273)	0.000771 (0.00641)
20+ weekly ads	-0.00482 (0.0187)	2.021*** (0.174)	2.133*** (0.199)	0.863 (1.255)	6.156*** (1.874)	-0.00619 (0.00892)
Med. HH inc. (log)	-0.0615 (0.0447)	2.608*** (0.805)	3.209*** (1.089)	12.67** (5.326)	10.87 <sup>+</sup> (6.717)	0.0719** (0.0352)
Poverty rate	-0.00198 (0.00155)	1.026** (0.0122)	1.039*** (0.0138)	0.267 (0.221)	0.251 (0.243)	0.00253* (0.00133)
% pop. White	0.000108 (0.000455)	0.996* (0.00235)	0.997 (0.00255)	-0.00465 (0.0442)	-0.0574 (0.0469)	-0.000122 (0.000294)
Northeast	-0.0111 (0.0144)	0.978 (0.0971)	1.090 (0.115)	-4.116** (1.953)	-2.468 (2.301)	-0.00516 (0.0128)
Midwest	-0.0107 (0.0136)	0.980 (0.0817)	0.974 (0.0911)	-1.000 (1.475)	0.0924 (1.739)	0.00558 (0.0116)
South	-0.0154 (0.0152)	0.879 (0.0820)	0.924 (0.0975)	-2.015 (1.506)	-2.486 (1.801)	0.00619 (0.0103)
Observations	1200	1147	1147	663	663	1147
White mean	0.0278	2.493	1.707	86.02	94.05	0.0378

Marginal effects from probit estimation are reported in (1) and (6); (2)–(3) report incidence rate ratios from negative binomial estimation; (4)–(5) report OLS coefficients. Standard errors clustered by market are reported in parentheses.

<sup>+</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by state population/number of ads posted in each state. (2)–(6) exclude prematurely removed advertisements, and (4)–(5) limited to advertisements receiving at least one offer.

### 3.1 Premature advertisement removal

The sites on which we posted provide tools for users to mark advertisements as inappropriate or unwelcome. If enough users protest a particular ad in this way, it is removed from the website. 4.1% of our advertisements were removed in this manner. In addition to legitimate use of this feature, other sellers may disingenuously mark competing ads as inappropriate in order to reduce competition.<sup>14</sup>

Column 1 of Table 3 provides estimated marginal effects associated with probit estimation assessing which advertisements are most likely to be prematurely removed. The regression controls for a variety of advertisement, market, and timing characteristics that explain a substantial amount of the variation in our dependent measures. Appendix E reports results for a specification without controls and another that replaces the market controls with market fixed effects.

On average, black sellers' ads are prematurely removed 2.7% more of the time than white sellers'; the likelihood is thus almost twice as high that a black sellers' ad will be removed.

Clearly if an advertisement is removed, it limits the seller's opportunity to receive responses and bids from potential buyers. Although this is an economically relevant outcome for a seller, she can also repost her advertisement. In the name of conservatism, we therefore exclude prematurely removed advertisements from our subsequent analyses; Appendix E replicates several of the paper's results including these ads.

### 3.2 Number of responses

Approximately 82% of our advertisements received some response, and on average they received 2.7 responses. We identify a number of our responses as disingenuous "scams," and partition the remainder based on whether or not they result in a specific dollar offer. Table 4 provides summary statistics on the number of responses received broken down by response type.

Given that the number of responses (of each type) received are count variables, we estimate

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e-mail we received earlier. Our results are robust to this alternative coding procedure.

<sup>14</sup>In addition, the websites implement filters (based on unknown algorithms that appear to change frequently) to identify unwelcome advertisements. On several occasions, all of the ads we posted on a given morning or evening were immediately removed from the site. This universal, simultaneous premature removal suggested that our ads were caught in the websites' filters. Similarly, some ads did not show up in search results despite appearing to have posted successfully; this is also due to the websites' screening for unwelcome ads. All of these advertisements are entirely excluded from our analyses. Stratifying the advertisements we posted simultaneously by advertisement quality and market size greatly reduced this automatic removal.

**Table 4:** Number of responses—Summary statistics

	Mean	Std. Dev.	25%	50%	75%	95%	Max.	Frac. > 0
Responses	2.70	2.78	1	2	4	8	17	0.82
Scams	0.45	0.79	0	0	1	2	10	0.33
Non-scams	2.25	2.75	0	1	3	8	17	0.71
Offers	1.53	2.07	0	1	2	6	15	0.60
Observations	1147							

*Note:* Observations are weighted by state population/number of ads posted in each state. Excludes prematurely removed advertisements.

the impact of race and other covariates using models of the form

$$\text{responses}_i \sim \text{Poisson}(v_i \exp(\mathbf{x}_i \beta)) \quad (1a)$$

$$v_i \sim \text{Gamma}(1/\alpha, \alpha), \quad (1b)$$

where  $i$  indexes advertisements and  $\mathbf{x}_i$  is the  $i^{\text{th}}$  row of the data matrix  $\mathbf{X}$ , containing the covariates for advertisement  $i$ . This yields a Negative Binomial distribution for the outcome of interest (conditional on covariates)<sup>15</sup> Note that this Negative Binomial distribution has  $\mathbb{E}[\text{responses}_i] = \exp(\mathbf{x}_i \beta)$ ; thus the reported exponentiated coefficient estimates (corresponding to  $\exp(\beta_j)$  in Equation 1) should be interpreted as incidence rate ratios. A covariate has a positive effect on the outcome measure precisely when its corresponding exponentiated coefficient is greater than one; to determine the combined effect of several covariates, multiply the exponentiated coefficients together.

Responding to an advertisement requires no commitment and limited time, so it is cheap, but it is not free. There is no incentive for anyone to respond to an ad in which he is completely uninterested. Also, the number of responses received is unaffected by our subsequent e-mail correspondence, which may send additional signals about the seller and the local market. In particular, our first scripted e-mail response suggests that there is a lot of interest in our iPod (i.e., that the market is competitive) and that the seller is fairly savvy and organized in his approach to selling the item. Thus, the number of responses may best reflect local buyers' prior assumptions about black and white sellers, as well as the demand to purchase from them. To the extent that our correspondence provided additional information that contradicts these assumptions, some buyers might have ceased communication because they were no longer interested in purchasing

<sup>15</sup>In these Negative Binomial models,  $\alpha \geq 0$  parameterizes over/underdispersion relative to the Poisson distribution, since  $\text{responses}_i \rightarrow \text{Poisson}(\exp(\mathbf{x}_i \beta))$  as  $\alpha \rightarrow 0$ .



from us, not because they were not serious to begin with.

Column 2 of Table 3 reports the results of a maximum likelihood estimation of Equation 1 for the number of non-scam responses received. While our average advertisement received 2.3 non-scam responses, black sellers receive 13% fewer responses than white sellers. Tattooed sellers appear to suffer even more discrimination than blacks along this margin, receiving 17% fewer responses than white sellers.

Several other covariates seem to have the expected effects: high asking prices depress response, and advertisements posted at night or in markets with few other ads fare poorly. Perhaps surprisingly, advertisement quality appears to have no effect on the number of responses received.

The number of dollar-valued offers<sup>16</sup> received may be a more reliable measure of serious interest, especially if we think that some buyers were searching for a good deal by indiscriminately responding to many sellers' ads. We record the dollar amount of an offer whether it comes in the initial inquiry or in response to our reply. Approximately two thirds of non-scam responses resulted in an offer, and the average advertisement received 1.5 offers.

We report Negative Binomial regression results for the number of offers in column 3 of Table 3. Black sellers receive 17% fewer offers than white sellers, while tattooed sellers receive 16% fewer.

### 3.3 Response characteristics

The manner in which buyers respond to advertisements may indicate their underlying level of respect or trust. We analyze the text of the first e-mail each buyer sends, identifying whether

1. The buyer included or signed her name (34% of responses);
2. The words "please," "thank you," or variations such as "pls," "thx," or "thanks" appeared anywhere in the e-mail text (38%); and/or
3. The buyer included a personal story, presumably to appeal to the seller's sentiments and get a lower price (4%).

Note these characteristics are neither mutually exclusive nor collectively exhaustive; examples of responses exhibiting each are included in Appendix D.

Table 5 reports probit regression results for these three attributes of buyers' responses. Obviously, this analysis is restricted to advertisements which received at least one non-scam response, which may introduce some selection effect. Overall, buyers are more likely to act respectfully when communicating with white sellers. Approximately 7% fewer buyers sign their names when

<sup>16</sup>Throughout the paper, we refer as "offers" only to cash offers. Approximately 4% of non-scam respondents offered to trade various goods and services—from live snakes to auto detailing—for our iPod. Several examples are included in Appendix D.

### 3 Results: Average effects

responding to black rather than white sellers; thus the average response received by a black seller is 17% less likely to include the buyer's name. This is similar to the effect observed for tattooed sellers.

Buyers are slightly less likely to use polite language when responding to black or tattooed sellers' advertisements, although these results do not rise to the level of statistical significance.

**Table 5:** Probit regression of response characteristics

	(1) Name	(2) Polite	(3) Personal
Black	-0.0652** (0.0290)	-0.0135 (0.0299)	0.0134 (0.0124)
Tattoo	-0.0740** (0.0311)	-0.0364 (0.0321)	0.00614 (0.0139)
Standard ctls.	✓	✓	✓
Observations	2488	2488	2488
White mean	0.388	0.408	0.038

Probit marginal effects are reported. Standard errors clustered by advertisement are reported in parentheses.

+  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by reciprocal of number of responses per advertisement. Excludes responses to prematurely removed advertisements. "Standard controls" are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine's day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).

#### 3.4 Offer amount

The ultimate reason that the number of responses is economically important to a seller is that it increases the probability of receiving a good offer and of completing a sale. We thus look at both the mean and maximal offers made in response to each advertisement, limiting our analysis to the 60% of advertisements that received at least one dollar-valued offer. To the extent that a seller is able to successfully complete a sale with the highest bidder at that bidder's offered price, the "best offer" received is the outcome of primary economic importance to the seller.

Conditional on receiving an offer, the mean offer received averaged \$86.02. We present Ordinary Least Squares results assessing the effect of advertisement type and other covariates on the average offer value in column 4 of Table 3. Compared with white sellers, black sellers receive offers \$1.87 lower, and tattooed sellers \$2.68 lower.

Although higher asking prices lead to higher offers (conditional on receiving at least one offer), this is clearly offset by the reduced number of offers received. As we found for the number of responses received, advertisement quality appears to have no effect on offer value. Finally, we note that average offers are approximately \$1–4 higher in the West (the excluded category) than in the rest of the country, with the lowest average offers in the Northeast.

Column 5 of Table 3 reports Ordinary Least Squares regression results for the best offer received. Conditional on receiving at least one offer, the average maximal offer was \$94.05. Given our earlier findings that black sellers receive fewer and lower offers, it is unsurprising that their best offers are \$3.56 lower than whites'. Tattooed sellers also suffer, with best offers \$4.15 lower than white sellers. These differences are statistically significant.<sup>17</sup>

### 3.5 Reactions to delivery proposal

After we took an advertisement down, we contacted the highest bidder to say that we would mail the iPod to her if she would pay us using PayPal. Because the websites include warnings about the risks of non-local transactions, we did not expect many buyers to accept this offer. However, the manner in which they declined can tell us something about their inclination to trust the seller. Buyers' initial responses to our delivery proposal fall into one of five mutually exclusive categories, listed here in order of most to least positive:

5. Suggesting an openness to receiving the iPod by mail (6% of proposed deliveries);
4. Offering to wait and meet when we get back into town (30%);
3. Declining for some other reason (19%);
2. No response (37%), which we interpret as a signal of some distrust; or
1. Explicitly accusing us of trying to scam them, or saying they don't want to use PayPal, which we interpret as a concern about being scammed (8%).

Examples of each type of reaction are included in Appendix D.

In Table 6, we report the results of ordered probit regressions of buyers' reactions to our delivery proposal on advertisement type. These regression specifications allow us to test whether each seller type received "more positive" reactions as measured by the ordinal ranking above. Although the coefficient estimates are difficult to interpret, the statistically significant negative coefficients on black support the hypothesis that black sellers receive worse reactions to their

<sup>17</sup>We were curious about the extent to which the lower best offers received by black and tattooed sellers are merely mechanically driven by the fact that they receive fewer offers: taking fewer draws from even identical offer distributions would produce lower maxima. Table 8 shows the regression separately for advertisements receiving one and more than one offer. The difference in best offers received by black and white sellers seems mainly to be driven by those advertisements that only receive a single offer.

### 3 Results: Average effects

delivery offers, suggesting an underlying distrust of black sellers. Note that this is the case even though the sample consists only of the (presumably less biased) potential buyers who chose to respond to those sellers' ads.

**Table 6:** Ordered probit regression of “positivity” of reaction to delivery proposal

	(1) React. to delivery proposal	(2) React. to delivery proposal
Black	-0.181* (0.104)	-0.184* (0.105)
Tattoo	-0.145 (0.108)	-0.145 (0.109)
Standard ctls.		✓
Observations	604	604

Ordered probit coefficients are reported. Standard errors clustered by advertisement are reported in parentheses.

+  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by reciprocal of number of delivery proposals per advertisement. Outcomes ranked from most to least positive are: willing to ship, prefer to wait, other, no response, and scam/payment concern. Excludes deliveries proposed to respondents to prematurely removed advertisements. “Standard controls” are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).

Table 23 in Appendix E reports probit estimates of the frequency of receiving each individual reaction type. For example, a buyer is 44% less likely to accept delivery by mail (an absolute difference of 2.5 percentage points) and 56% more likely to express concern about making a long-distance payment (an absolute difference of 4.2 percentage points) when responding to a black rather than white seller; both these differences are significant at the 15% level.

### 3.6 Shipment

After offering to ship the iPod to the highest bidder, our procedure becomes more ad hoc out of necessity (we must respond to questions, and work out the logistics of shipment and payment), but remains blind to the seller’s type. Column 6 of Table 3 reports the effect of seller type on the probability that advertisement results in a successful transaction. While the number of successes is small (since delivery by mail is not typical in this market), the race of the seller still has an effect: ads posted by black sellers ultimately result in sales almost 40% less often than ads posted by white sellers.

## 4 Understanding observed discrimination

In the previous section, we analyzed the differences in a number of outcomes faced by white, black, and tattooed sellers. We now investigate whether these differences vary systematically across markets, focusing on three key outcome measures: the number of offers received, the mean offer and the best offer. It is important to emphasize that unlike race, which we vary experimentally, the evidence in this section relies on variation across markets—competitive, regional, and demographic—that we do not control. While evidence that discrimination is particularly prevalent in particular types of markets can help shed light on its underlying mechanisms, we are mindful that a variety of mechanisms might be consistent with this evidence.

### 4.1 Degree of market competition

In theory (Becker, 1971), discrimination against black sellers should be less present in more competitive markets.<sup>18</sup> We use an indicator of market thickness—the presence of more than 20 ads per week<sup>19</sup>—to test whether this is the case in our data; that is, we test the hypothesis that the coefficient  $\beta_{20+\times\text{Black}}$  is greater than one in the Negative Binomial and greater than zero in the Ordinary Least Squares regressions.

Table 7 suggests that black sellers indeed face less discrimination in more competitive markets. In markets with more than 20 weekly advertisements, black sellers receive approximately the same number of offers as whites ( $\hat{\beta}_{\text{Black}} \cdot \hat{\beta}_{20+\times\text{Black}} - 1 = -1\%$ ), while in less competitive markets black sellers receive 24% fewer offers ( $= 1 - \hat{\beta}_{\text{Black}}$ ). Similarly, in more competitive markets black sellers' best offers are about the same as whites' ( $\hat{\beta}_{\text{Black}} + \hat{\beta}_{20+\times\text{Black}} = -\$0.22$ ), rather than being \$4.64 lower ( $= \hat{\beta}_{\text{Black}}$ ).

Similarly, if discrimination is competed away, then black sellers should do relatively better when their advertisements are likely to receive more offers (whether due to the market, or non-race characteristics such as asking price). Table 8 shows regression results of offer value separately for advertisements that received one vs. multiple offers. When there is less competition for their product, the offers received by black sellers are more than \$6 lower than those received by whites; when there is more competition (indicated by at least two offers), the difference in offer values

<sup>18</sup>We are unable to observe the number of potential buyers in each market, but do know the number of other iPod Nano ads online at the same time as our ad. We use this measure of market thickness as a proxy for the number of potential buyers, but we do not know how highly the two are correlated. If the number of competing ads is a good proxy for the number of buyers, we should see less discrimination in thicker markets. If the number of competing ads is only an indicator of the number of sellers, discrimination could be *greater* in thicker markets, since buyers have more power.

<sup>19</sup>The results are similar for a variety of threshold values above 14 ads per week.

**Table 7:** Heterogeneous results by number of weekly market ads

	(1)		(2)		(3)	
	Number of offers		Mean offer		Best offer	
Black	0.765***	(0.0673)	-3.350**	(1.566)	-4.642***	(1.746)
Tattoo	0.817**	(0.0767)	-4.044**	(1.753)	-5.513***	(1.893)
20+ weekly ads	1.899***	(0.224)	-2.661 <sup>+</sup>	(1.836)	3.197	(2.732)
20+ × Black	1.298*	(0.203)	6.030**	(2.380)	4.422 <sup>+</sup>	(2.793)
20+ × Tattoo	1.108	(0.164)	4.932**	(2.430)	4.788	(3.353)
Standard ctls.	✓		✓		✓	
Observations	1147		663		663	
All black=0 p.	0.00961		0.0363		0.0298	

Incidence rate ratios from negative binomial estimation are reported in (1); OLS coefficients are reported in (2)–(3). Standard errors clustered by market are reported in parentheses.

<sup>+</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by state population/number of ads posted in each state. Excludes prematurely removed advertisements, and (2)–(3) limited to advertisements receiving at least one offer. “Standard controls” are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).

nearly disappears. The results are similar for tattooed sellers.

An alternate interpretation of these results is that black sellers face less discrimination in cities, where thicker online markets are more likely to be found. Residents of cities tend to be more racially diverse and younger (per the 2000 Census), and may be more accustomed to interacting with people of other races and ethnicities. Because these market characteristics (thickness and urbanity) are highly correlated, we are unable to distinguish whether market competition has “crowded out” discrimination, or whether buyers inclined against discrimination are merely more likely to live in thick competitive markets.

## 4.2 Regional cultural norms

The results reported in previous sections have included region fixed effects to control for geographic variation in factors such as the popularity of online classified advertising, as well as cultural norms and incomes. However, these local norms should be an important determinant of individuals’ racial biases, and culture differs greatly across regions. We thus expect that the effect of race on our economic outcomes of interest may be heterogeneous with respect to region. In Table 9 we report regression results that allow the differences between seller types to vary by region. (The West is the excluded region.)

We originally hypothesized that, due to its history of slavery and troubled race relations, the

#### 4 Understanding observed discrimination

**Table 8:** Offer value by number of offers

	(1) 1 offer		(2) Mean of 2+		(3) Best of 2+	
Black	-6.214**	(2.666)	0.648	(1.107)	-1.058	(1.332)
Tattoo	-5.739**	(2.773)	-0.721	(1.231)	-1.979	(1.619)
Standard ctls.	✓		✓		✓	
Observations	277		386		386	

OLS coefficients are reported. Standard errors clustered by market are reported in parentheses.

+  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations weighted by state population/number of ads posted in each state. Excludes prematurely removed advertisements. “Standard controls” are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).

**Table 9:** Heterogeneous results by region

	(1) Number of offers		(2) Mean offer		(3) Best offer	
Black	1.010	(0.145)	-2.388	(1.845)	-3.495*	(2.041)
Tattoo	0.953	(0.121)	-2.025	(2.444)	-1.822	(3.141)
Northeast	1.360**	(0.207)	-3.377	(3.017)	-1.108	(3.503)
Midwest	1.130	(0.161)	-1.303	(2.270)	0.710	(2.822)
South	0.993	(0.137)	-2.317	(2.003)	-1.836	(2.611)
Northeast × Black	0.672*	(0.149)	-0.803	(4.416)	-2.295	(4.704)
Northeast × Tattoo	0.691*	(0.151)	-2.023	(4.407)	-2.229	(4.984)
Midwest × Black	0.761	(0.172)	0.377	(3.150)	-0.154	(3.721)
Midwest × Tattoo	0.816	(0.174)	0.737	(3.351)	-2.050	(4.152)
South × Black	0.840	(0.159)	1.835	(2.826)	1.312	(3.225)
South × Tattoo	0.950	(0.171)	-1.078	(3.294)	-3.853	(4.049)
Standard ctls.	✓		✓		✓	
Observations	1147		663		663	
All black=0 p.	0.0524		0.526		0.116	

Incidence rate ratios from negative binomial estimation are reported in (1); OLS coefficients are reported in (2)–(3). Standard errors clustered by market are reported in parentheses.

+  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by state population/number of ads posted in each state. Excludes prematurely removed advertisements, and (2)–(3) limited to advertisements receiving at least one offer. “Standard controls” are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, and non-Hispanic white fraction of local population.

South would be the worst region for black sellers. However, black sellers were at the greatest disadvantage in the Northeast, where they received 32% fewer offers than whites. In contrast, these gaps were 23% in the Midwest and 15% in the South; black sellers received 1% more offers than white sellers in the West.

### 4.3 Other heterogeneous effects consistent with statistical discrimination

The presence of larger black-white outcome gaps in some settings than others could suggest the presence of statistical discrimination as distinct from animus. The former generally refers to discrimination where race is used as a proxy for other characteristics that buyers cannot observe directly, but wish to avoid (e.g., low socioeconomic status). Animus, or taste-based discrimination, is a negative reaction to race itself, independent of other characteristics.

We expect that buyers might statistically discriminate in this market to avoid one or more of the following: (1) buying fake or stolen goods,<sup>20</sup> (2) sellers they would need to meet in an inconvenient/dangerous neighborhood, and (3) sellers who would not complete the transaction because they are unreliable.

In general, statistical discrimination should decrease when more information about the seller's other (more relevant) characteristics becomes available. Animus would not be affected by additional information.

#### Advertisement text

Each of our advertisements was randomly assigned either a high- or low-quality text to provide a signal of the seller's socioeconomic status, proxied by his education level and writing ability. If low socioeconomic status is highly correlated with the characteristics that buyers are trying to avoid, discrimination should decrease in the presence of a high-quality ad. That is, if statistical discrimination against black sellers is operative, it should be smaller when advertisements are high quality; it might therefore manifest itself as coefficients on the interaction between black and high advertisement quality being greater than one in the Negative Binomial and greater than zero in the Ordinary Least Squares regressions reported in Table 10.

In terms of the number of offers received, black sellers do benefit slightly more than white sellers by posting high-quality ads, but the effect is fairly small, and statistically insignificant. However, given the limited importance we find for our quality measure even in our average effects

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<sup>20</sup>Indeed, the iPod Nano we sell is probably more likely to be fake or stolen than many other goods, so it is a particularly good test for this form of statistical discrimination.



#### 4 Understanding observed discrimination

**Table 10:** Heterogeneous results by advertisement quality

	(1)		(2)		(3)	
	Number of offers		Mean offer		Best offer	
Black	0.795**	(0.0798)	-1.293	(1.806)	-2.529	(2.155)
Tattoo	0.824*	(0.0916)	-2.414	(1.852)	-4.210*	(2.190)
High quality	0.968	(0.0935)	0.819	(1.677)	1.379	(1.951)
HQ × Black	1.087	(0.154)	-1.098	(2.744)	-1.971	(3.246)
HQ × Tattoo	1.039	(0.160)	-0.473	(2.650)	0.128	(3.004)
Standard ctls.	✓		✓		✓	
Observations	1147		663		663	
All black=0 p.	0.0356		0.318		0.0372	

Incidence rate ratios from negative binomial estimation are reported in (1); OLS coefficients are reported in (2)–(3). Standard errors clustered by market are reported in parentheses.

+  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by state population/number of ads posted in each state. Excludes prematurely removed advertisements, and (2)–(3) limited to advertisements receiving at least one offer. “Standard controls” are: asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).

analysis, it seems likely that our low- and high-quality advertisements are simply insufficiently different to affect response.<sup>21</sup>

### Racial isolation

Buyers might statistically discriminate against black sellers if they assume it would be inconvenient to travel to meet those sellers. (If the seller is the one traveling, buyers might assume he is less reliable because of the inconvenience.) This is more likely when local black and white populations are more geographically isolated from one another. Glaeser and Vigdor (2001) created an “isolation” index to measure segregation in metropolitan areas across the country; their data map to approximately 82% of our markets. The index increases from zero to one with greater isolation, and indicates the degree to which “the average black resident lives in a census tract in which the black share of the population exceeds the overall metropolitan average.” That is, it measures how geographically segregated the local black population is from the local white population.

We denote markets in the top quartile of racial isolation scores as exhibiting “high isolation,”

<sup>21</sup> Buyers might also have interpreted the low-quality text as signaling youth or “hipness” instead of low socioeconomic status. To the extent that different buyers had opposing reactions to ad quality, the effects might have canceled out.

#### 4 Understanding observed discrimination

and consider the differential effect of race in those markets. If statistical discrimination is operative in this market due to buyers assuming that buying from a black seller is likely to involve greater inconvenience, black sellers should have worse outcomes in high-isolation markets.<sup>22</sup> This would result in coefficients on the interactions between black and high isolation that are less than one in the Negative Binomial and less than zero in the OLS regressions.

**Table 11:** Heterogeneous results by black isolation index

	(1)		(2)		(3)	
	Number of offers		Mean offer		Best offer	
Black	0.783	(0.137)	-6.610***	(2.474)	-7.321***	(2.789)
Tattoo	0.827	(0.150)	-4.298	(3.513)	-4.372	(4.120)
High isolation	1.351**	(0.181)	0.836	(2.201)	3.617	(2.759)
High iso. × Black	0.544***	(0.112)	-3.504	(3.526)	-9.368**	(4.373)
High iso. × Tattoo	0.789	(0.142)	1.474	(4.050)	-4.428	(4.424)
Regions × Black/Tattoo	✓		✓		✓	
20+ × Black/Tattoo	✓		✓		✓	
Standard ctls.	✓		✓		✓	
Observations	924		577		577	
All black=0 p.	0.00813		0.0935		0.0636	

Incidence rate ratios from negative binomial estimation are reported in (1); OLS coefficients are reported in (2)–(3). Standard errors clustered by market are reported in parentheses.

+  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by state population/number of ads posted in each state. Excludes prematurely removed advertisements, and (2)–(3) limited to advertisements receiving at least one offer. “High isolation” markets are top 25% as measured by degree to which “the average black resident lives in a census tract in which the black share of the population exceeds the overall metropolitan average” in 2000 (from Glaeser and Vigdor, 2001). “Standard controls” are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).

Indeed, this is what we find. To account for the fact that racial isolation varies systematically with other important market characteristics, we exploit only variation in isolation between similarly thick markets in the same region. For example, among Western markets with fewer than twenty weekly ads (the excluded categories), black sellers receive 57% fewer offers than white sellers in high isolation markets, compared with 12% fewer in low isolation markets. The best offers black sellers receive are nearly \$17 lower than those white sellers receive in high isolation markets, compared with a \$7 gap in markets with less isolation. We do not expect the effect of

<sup>22</sup>Of course, the extent to which black residents are geographically isolated from white residents in a particular market may also be positively correlated with animus for a variety of reasons. (Either one could cause the other, or both might be attributable to some third factor.) To the extent that this is the case, ours is an imperfect test for statistical discrimination.

having a tattoo to vary as much with the degree of racial isolation, and indeed it does not.

### **Property crime rate**

Buyers might also statistically discriminate against black sellers if they think those sellers are more likely to sell stolen goods or that it is more dangerous to meet those sellers in person (because the sellers live in high-crime markets or are criminals themselves). Using data from the Uniform Crime Statistics (United States Department of Justice and Federal Bureau of Investigations, 2009), which map to 88% of our markets, we designate markets with 2008 property crime rates in the top quartile of our sample as “high-crime” areas. We then test the hypothesis that buyers are more likely to discriminate against black sellers in areas with high property crime rates than they are in areas with less crime, as might be expected if transacting with a black seller is perceived as posing a disproportionate risk of exposure to criminality.<sup>23</sup>

Indeed, we do find that black sellers have the worst outcomes in high-crime areas: They receive 21% fewer offers and \$12 lower best offers than white sellers, compared with 2% fewer offers and \$4 lower best offers in low-crime (thin, western) markets. The effect is directionally similar, albeit somewhat smaller, for tattooed sellers.

---

<sup>23</sup>As with our racial isolation test, this is an imperfect test of statistical discrimination since property crime rates are likely positively correlated with racial animus. We are testing a hypothesis consistent with a particular channel through which statistical discrimination might be expected to operate; we are *not* testing for the existence of this form of statistical discrimination. We might also be concerned about whether race is actually serving as a proxy for crime, or whether the latter is merely correlated with some other factor that respondents are (statistically) discriminating against. Appendix E shows that our results for racial isolation and property crime are robust to joint inclusion in one regression.

## 5 Conclusions

**Table 12:** Heterogeneous results by property crime rate

	(1)		(2)		(3)	
	Number of offers		Mean offer		Best offer	
Black	0.980	(0.168)	-4.748*	(2.436)	-4.198 <sup>+</sup>	(2.648)
Tattoo	0.970	(0.171)	-3.887	(3.274)	-3.547	(3.855)
High prop. crime rate	0.983	(0.140)	3.376*	(1.907)	4.060*	(2.324)
High crime × Black	0.803	(0.165)	-5.820**	(2.742)	-7.984**	(3.363)
High crime × Tattoo	0.913	(0.170)	-5.315 <sup>+</sup>	(3.274)	-5.414 <sup>+</sup>	(3.726)
Regions × Black/Tattoo	✓		✓		✓	
20+ × Black/Tattoo	✓		✓		✓	
Standard ctls.	✓		✓		✓	
Observations	1007		604		604	
All black=0 p.	0.0799		0.0242		0.0230	

Incidence rate ratios from negative binomial estimation are reported in (1); OLS coefficients are reported in (2)–(3). Standard errors clustered by market are reported in parentheses.

<sup>+</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by state population/number of ads posted in each state. Excludes prematurely removed advertisements, and (2)–(3) limited to advertisements receiving at least one offer. “High crime” markets are top 25% as measured by 2008 property crimes per capita (from United States Department of Justice and Federal Bureau of Investigations, 2009). “Standard controls” are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).

## 5 Conclusions

In this paper, we present strong evidence that black sellers suffer worse market outcomes than their white counterparts in the environment we consider. In particular, their advertisements receive 13% fewer responses, and 17% fewer offers. These effects are strongest in the Northeast, and are similar in magnitude to those associated with a seller’s display of a wrist tattoo. Conditional on receiving at least one offer, a black seller’s average offer is approximately \$1.87 lower than a white seller’s, with an even greater difference in the *highest* offers: the best offer received by a black seller is typically \$3.56 lower. These represent gaps of 2.2% and 3.8%, respectively, below white sellers’ offers.

Respondents to advertisements with black photographs also exhibit lower trust. Compared with correspondents with white sellers, they are 17% less likely to include their name in their initial e-mail to the seller. Furthermore, the high bidders on black sellers’ advertisements—presumably among the least biased of potential buyers—are 44% less likely to accept delivery by mail and are 56% more likely to express concern about making a long-distance payment.

We test (albeit with limited ability) various explanations for this observed discrimination. The

## *5 Conclusions*

disadvantage faced by black sellers is greatly reduced in more competitive markets; this provides evidence in favor of Becker's hypothesis that discrimination can be competed away. Our results do not vary significantly by advertisement quality, but discrimination is greater in markets in which black and white residents are geographically isolated from one another, and in markets with high property crime rates. This is consistent with statistical discrimination used to avoid a fraudulent, inconvenient, or dangerous sale (although it is also possible that animus against black sellers is higher in high-crime or high-isolation markets).

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## A Market, advertisement and timing characteristics

The classified network through which we posted included sites for 326 geographic markets as of March 2009. When posting an advertisement, a seller is asked to write in her specific location. For those markets where the site provides a list of submarkets (e.g., the New York metropolitan area), we posted separate advertisements in each submarket and entered the name of that submarket in the location field. For most remaining markets (e.g., Boise), we merely entered the name of the market. A few markets (e.g., South Dakota) cover such broad areas that it would be unrealistic for a single seller to conduct a sale everywhere within the market; in these cases, we entered the name of the highest-population city in the market.

Table 13 shows average values for a number of market characteristics broken down by advertisement types. An  $F$ -test of the joint hypothesis that all fourteen means are equal across the three advertisement types has a  $p$ -value in excess of 99% (which is unsurprising given that we aimed to post every type in each market).

**Table 13:** Market characteristic averages by advertisement type

	White	Black	Tattoo	Total
Mkt. ads week	14.86	15.32	17.25	15.68
20+ weekly ads	0.171	0.174	0.210	0.183
Northeast	0.125	0.134	0.119	0.127
Midwest	0.241	0.243	0.243	0.242
South	0.369	0.356	0.362	0.362
West	0.264	0.266	0.277	0.268
% pop. White	77.26	76.78	77.09	77.04
% pop. Black	12.93	12.88	12.52	12.80
% pop. Hispanic	13.02	13.74	13.91	13.53
% pop. Asian	3.160	3.301	3.305	3.250
Poverty rate	15.62	15.92	15.55	15.71
Med. HH inc. (\$K)	46.30	45.85	46.79	46.27
Black isolation index	0.211	0.218	0.215	0.215
Property crime rate	359.6	359.6	352.1	357.6
Observations	1200			

*Note:* All observations equally weighted. Local racial composition, poverty rate, and household income are from the 2007 American Community Survey. Black isolation index is degree to which “the average black resident lives in a census tract in which the black share of the population exceeds the overall metropolitan average” in 2000 (from Glaeser and Vigdor, 2001). 2008 property crimes are per ten thousand people (from United States Department of Justice and Federal Bureau of Investigations, 2009). Isolation index and crime data are not available for all markets.

We described in Sections 2.3 and 2.4 several key dimensions along which our advertisement



contents and post timing vary. Tables 14–15 show our stratification of advertisement types across these attributes.

The tables in this appendix include data on prematurely removed advertisements.

**Table 14:** Advertisement characteristics

	<b>Ad type</b>							
	<b>White</b>		<b>Black</b>		<b>Tattoo</b>		<b>Total</b>	
	No.	%	No.	%	No.	%	No.	%
<b>Ad. quality</b>								
Low	215	49.0	217	50.2	163	49.5	595	49.6
High	224	51.0	215	49.8	166	50.5	605	50.4
<b>Total</b>	439	100.0	432	100.0	329	100.0	1200	100.0
<b>Asking price</b>								
90	164	37.4	161	37.3	115	35.0	440	36.7
110	169	38.5	153	35.4	148	45.0	470	39.2
130	106	24.1	118	27.3	66	20.1	290	24.2
<b>Total</b>	439	100.0	432	100.0	329	100.0	1200	100.0

**Table 15:** Advertisement timing

	<b>Ad type</b>							
	<b>White</b>		<b>Black</b>		<b>Tattoo</b>		<b>Total</b>	
	No.	%	No.	%	No.	%	No.	%
<b>Day of week</b>								
Weekday	335	76.3	325	75.2	249	75.7	909	75.8
Saturday	45	10.3	53	12.3	39	11.9	137	11.4
Sunday	59	13.4	54	12.5	41	12.5	154	12.8
<b>Total</b>	439	100.0	432	100.0	329	100.0	1200	100.0
<b>Post time</b>								
Day	249	56.7	247	57.2	180	54.7	676	56.3
Night	190	43.3	185	42.8	149	45.3	524	43.7
<b>Total</b>	439	100.0	432	100.0	329	100.0	1200	100.0
<b>Holiday</b>								
Christmas	16	3.6	16	3.7	18	5.5	50	4.2
Valentine's Day	28	6.4	24	5.6	29	8.8	81	6.8
Other	395	90.0	392	90.7	282	85.7	1069	89.1
<b>Total</b>	439	100.0	432	100.0	329	100.0	1200	100.0

## **B Advertisement text**

The text used in our advertisements is shown in Tables 16–18.<sup>24</sup> Our advertisements were posted in the “electronics for sale” category (as were the vast majority of other advertisers offering iPods for sale).

<sup>24</sup>Prior to Apple's introduction of the fifth generation iPod on September 9, 2009, advertisements offered fourth generation iPods (substituting “4th” for “5th,” throughout).

**Table 16:** Advertisement text: “A” text

	High-quality advertisement	Low-quality advertisement
<b>Ad title</b>	iPod Nano 8GB 5th Gen silver - *New in Box*	iPod Nano 8GB 5th Gen silver - *New in Box*
<b>Ad text</b>	<p>I recently received an iPod Nano as a gift, but I already have one. It is a BRAND NEW silver 8GB iPod Nano 5th generation (with video). Still in the box - never opened. Retail for \$149 but I'll sell it for \$[price] or the best offer I receive.</p> <p>* Holds up to 2000 songs            * Holds up to 8 hours video            * View photos/video in portrait or landscape            * Up to 24-hr. battery life</p> <p>I can meet wherever is convenient for you.</p>	<p>i recently recieved a ipod nano as a gift, and i already have one. its BRAND NEW silver 8GB iPod Nano 5th generation (with video)!! still in the box never opened. retail for \$149 but ill sell for \$[price] or best offer</p> <p>* Holds up to 2000 songs            * Holds up to 8 hours video            * View photos/video in portrait or landscape            * Up to 24-hr. battery life</p> <p>can meet wherever works for you</p>

**Table 17:** Advertisement text: “B” text

	<b>High-quality advertisement</b>	<b>Low-quality advertisement</b>
<b>Ad title</b>	BRAND NEW silver 8gb IPOD NANO!!!! Never opened!	BRAND NEW silver 8gb IPOD NANO!!!! Never opened!
<b>Ad text</b>	NEW IN BOX - Never been opened, still sealed. Exactly what you'd get if you bought from Apple.	NEW IN BOX!!! never even opened. exactly what youd get from apple.
	5th generation, Silver, with Video - 8GB (holds up to 2000 songs or 8 hours video) - Battery life up to 24 hours	5th generation, silver, with video - 8gb - holds up to 2000 songs/8 hours video - battery lasts up to 24 hours
	I won it, but I don't need it; I need the cash instead.	i won it but dont need it. need the cash instead!
	Help me out and make me an offer. The retail price \$149, but I will sell for \$[price] or the best offer I receive.	help me out!!! make me an offer. retail price \$149–will sell for \$[price] or the best offer i get.
	We can meet wherever is convenient for you.	meet wherever works for you

**Table 18:** Advertisement text: “C” text

	High-quality advertisement	Low-quality advertisement
<b>Ad title</b>	NEW 5th gen silver 8gb IPOD NANO – NEVER OPENED!	NEW 5th gen silver 8gb IPOD NANO – NEVER OPENED!
<b>Ad text</b>	<p>I have a brand new iPod Nano that I don't need (I already have one). Silver, 8GB, 5th generation (with video), never opened!</p> <p>Holds up to 8 hours of video or 2000 songs. 24-hour battery life. This is the latest version!</p> <p>It sells for \$149 plus tax in the store, but I'll let it go for \$[price] or the best offer I receive. So, make me an offer! I'll meet you wherever is convenient.</p> <p>We can meet wherever is convenient for you.</p>	<p>ive got a brand new ipod nano that i dont need (already have one). silver, 8GB, 5th generation (with video), never opened at all!!</p> <p>holds up to 8 hours of video or 2000 songs. 24-hour batttery life. this is the newesttt version!!</p> <p>it sells for \$149 plus tax in teh store, but i'll let it go for \$[price] or the best offer i get. so make me an offer!!! i'll meet you wherevers good for you.</p>

## **C E-mail correspondence with potential buyers**

Potential buyers initially contacted us via advertisement-specific anonymized e-mail addresses assigned by the websites. Our responses and all subsequent correspondence were conducted using the address rmitchell203@gmail.com. “Mitchell” is an extremely common last name among both black and white Americans, we do not anticipate the number “203” sending any particular signal to correspondents, and Gmail is a popular, freely available e-mail service.

All of our messages were sent in plain text (i.e., without any HTML coding) and maintained the subject of the potential buyer’s initial e-mail response, prepending “Re:.” Our software was configured so that potential buyers’ e-mail programs would display the e-mail address either alone or together with the name “R. Mitchell.”

**Table 19:** Correspondence text

	<b>High-quality advertisement</b>	<b>Low-quality advertisement</b>
<b>e-mail 1 (offer): “A” text</b>	Thank you for your interest in my iPod Nano. I’ve received a lot of responses, and would like to sell this quickly to the person who makes me the best offer. CASH ONLY, no trades. Is \$[offer] your best offer? Thanks.  [link to ad] [text of ad]	thank you for your interest in my ipod nano. i got a lot of responses, and would like to sell this quickly to the person who makes me the best offer. CASH ONLY, no trades. is \$[offer] your best offer? thanks.  [link to ad] [text of ad]
<b>e-mail 1 (no offer): “A” text</b>	Thank you for your interest in my iPod Nano. I’ve received a lot of responses, and would like to sell this quickly to the person who makes me the best offer. CASH ONLY, no trades. Please send me your best offer, and I’ll let you know if you get it. Thanks.  [link to ad] [text of ad]	thank you for your interest in my ipod nano. i got a lot of responses, and would like to sell this quickly to the person who makes me the best offer. CASH ONLY, no trades. please send me your best offer, and i’ll let you know if you get it. thanks.  [link to ad] [text of ad]

Continued

	<b>High-quality advertisement</b>	<b>Low-quality advertisement</b>
<b>e-mail 1 (offer): “B”/“C” text</b>	<p>Hi –</p> <p>Thanks for your email. I had a lot of responses and I’m sure you understand that I want to get the most that I can for this iPod. Am I correct that \$[offer] is your best offer? Cash only/no trades, please.</p> <p>Thanks.</p> <p>[link to ad] [text of ad]</p>	<p>hi</p> <p>thanks for your email. i got lots of responses and im sure you understand i wanna get the best price i can for the ipod. am i right \$[offer] is ur best offer? cash only no trades please!</p> <p>thanks</p> <p>[link to ad] [text of ad]</p>
<b>e-mail 1 (no offer): “B”/“C” text</b>	<p>Hi –</p> <p>Thanks for your email. I had a lot of responses and I’m sure you understand that I want to get the most that I can for this iPod. Send me your best offer, and I’ll email you if you get it. Cash only/no trades, please.</p> <p>Thanks.</p> <p>[link to ad] [text of ad]</p>	<p>hi</p> <p>thanks for your email. i got lots of responses and im sure you understand i wanna get the best price i can for the ipod. send me ur best offer and ill email you if you get it. cash only no trades please!</p> <p>thanks</p> <p>[link to ad] [text of ad]</p>
<b>e-mail 2 (high offer)</b>	<p>Hello. Congratulations, you made the best offer so the new iPod Nano is yours for \$[offer]. Unfortunately, I am out of town at the moment so can’t meet in person for a while. I’m happy to send it to you if you can pay me using Paypal. Sorry about that. Let me know if you want to do this.</p>	<p>hello. congratulations, you made the best offer so the new ipod nano is yours for \$[offer]. unfortunatley, im out of town at the moment so can’t meet in person for a while. i can sent it to you if you can pay me using paypal. sorry about that. let me know if you want to do this</p>

Continued

	High-quality advertisement	Low-quality advertisement
<b>e-mail 2 (low offer)</b>	The iPod Nano is no longer available. Thank you for your time, and good luck finding one elsewhere.	the ipod nano is gone. thanks for your time and good luck finding another one

## **D Sample responses from buyers**

### **D.1 Response types**

The e-mails below are representative of each type of response received from potential buyers. Some are initial responses to our advertisement, and some followed our first e-mail (“e-mail 1” above).

#### **Scams**

thanks for getting back to me ,i am a medical doctor soo i av to perform an operation outside the country in west africa and i dont have the time to pick the item up so i want you to help me ship the the item to this country i will be responsible for the shipping and handling fee so get back to e on how you wish to get your money....  
regards Dr [name]

Nice hearing back from you,i want you to know that i am so serious in buying your item, and i will not be able to come for the pickup.i intended to come to your door to come and give you the money and use the opportunity to check the condition of the item,but due to the fact that am very busy at work nowaday"s,i wouldn"t have the opportunity to do so.I will be glad if you can be so nice to help me ship it down to my daughter whom schools oversea,and i will cover the shipping cost for the item to be sent to her...So i am ready to pay you \$800 for the item cost including the shipping cost , and i will prefer paying you via paypal,because very fast and secure,so i want you to get back with your PayPal email address and your full name.so that the instant payment will be made..  
Or if you prefer a bank transfer or western union.  
Best regards,  
[name]..



### *D Sample responses from buyers*

You don't have to sell this.

I used to sell stuff on [website] just like you were doing to pay my bills. I was really getting ripped off by selling stuff so cheap. My buddy told me about this site and I made about \$4k from it last month. Its great and the has helped me and friends so much. I'm doing better than my current fulltime job and this is just extra money! To give it a try go to [URL]

If you need help getting started please let me know.

#### **Non-offers (non-trade)**

You still have the ipod?

[link to ad]

I am interested in buying your Ipod, therefore what is the best cash price you will take for this. I am local in [city] and could meet you tomorrow.

Thank you,

[name]

#### **Non-offers (trade)**

I was just wondering if you would be interested in trading for a full blooded boxer pup if so give me or my wife a call [phone number] [name] or [phone number] [name] thanks

[link to ad]

may I know if you will consider a silver edition game cube with wireless controller and 3 games as trade for your Ipod nano?

I will not be available until 3:00 pm.

would you be interested in a trade for a 6 ft red tail boa with custom enclosure and a laptop that works great just needs a hard drive it comes with a wifi card and a bb gun co2 semi auto hand gun let me know

#### **Offers**

Hi, \$75 is all i can afford right now. This will be given as a gift. I don't even get to keep it for myself.

Cash in hand and ready to pick up tomorrow if you accept my offer. Br,

[name]

take 60

Hey, just wondering if its still available. Had one of my friends get his nano jacked so if \$100 would work that would be very appreciated. Thanks

## **D.2 Response characteristics**

The e-mails below illustrate the three characteristics (inclusion of the buyer's name, politeness, and inclusion of a personal story to invoke sympathy) discussed in section 3.3.

### **Name**

If you still have the nano iPod for sale i would like to get it from you.

Thanks

[Name]

[link to ad]

Hi is this still available and if so would u take \$70 dollars..[Name] at [phone number].

If you will take \$75 cash let me know I am off today and my name is [Name]. Let me know Thanks, my cell is [phone number].

### **No Name**

\$75 for your iPod nano?

Would you go down to a hundred.. I'll pick it up today. I do work at 1 tho so asap would be best.

IS THIS STILL AVAILABLE FOR SALE?GET BACK TO ME ASAP.

### **Polite**

Hello,

Would you take \$50 for the ipod?

Thanks

HI , MY NAME IS [NAME] , I AM INTERESTED IN YOUR IPOD , CAN YOU GIVE ME YOUR PHONE NUMBER PLEASE?OR IN CASE THIS IS MY PHONE NUMBER [PHONE NUMBER] , THANKS.

Hi!! Do you still have your ipod? Would you be able to sell it for 100? Thanks for your time!!!

-[Name]

### **Not Polite**

i can offer you \$70 for your ipod ...let me know

Are you willing to trade for anything like gps for the car or a gas car. if so text/call [Name] at [phone number]

Im coming down from [city] tomorrow would you be able to meet in [city] sometime tomorrow night?

## **Personal**

Hi,

I'm interested in the Nano and can meet you in [neighborhood] today. I'd really like to spend \$75. I know it's not the \$110 you're asking for, but I'm a grad student and have to stay on budget! I need it because I promised my little cousin I'd get her Nano for her birthday but I'm short on the cash. In this case, the Nano will be good as new!

Please consider the offer—it's \$75 bucks in your pocket that you weren't expecting before you got the gift, and it would make my 14 year old cousin a very happy birthday girl! Call me at the number below and let's make it happen!

Thanks so much,

[Name] [phone number]

[link to ad]

DO YOU STILL HAVE THE IPOD?

IF SO I AM WILLING TO OFFER \$75 FOR IT. I WOULD OFFER MORE BUT IT IS ALL THAT I HAVE LEFT TO SPEND.JUST TRYING TO GET AN EXTRA VALETINES GIFT FOR MY DAUGHTER.I AM IN [CITY] AND I CAN MEET YOU ANY TIME.

LET ME KNOW

MAHALO

[NAME]

Hi, saw your ad on [website]. I know that you're asking 90.00 for the ipod, but I only have 50.00. It's fore my son's birthday in a few weeks and that's all I can afford...would you consider it? email me back and let me know.

[link to ad]

## **Not Personal**

hi 70 for ipod 8gb,call me please [name],,,,,,,,,,,,,,,,,,,,,,

[phone number]——

Hello. How about 70usd? thanks

hello,

i saw your post for the ipod and am very interested!

i am available all day tomorrow and can meet you where/whenever.. i live in [neighborhood].

please do not hesitate to call me.

thanks,

[name]

[phone number]

### **D.3 Reactions to delivery proposal**

The e-mails below illustrate the types of reactions received to our proposal to ship the iPod in exchange for PayPal payment. These reactions are discussed in section 3.5.

#### **Open to Shipment**

Great. Any idea when you will be back or can you send ro me and I will pay then? Where does payment need to be sent ?

Thanks

paypal would be fine, do you live near [city]? could pick it up. Your call.

I do have a paypal accout that I use when using ebay but Im not sure how to use this outside of ebay. That would be great if this is possible. I will wait to hear back from you. Thanks'

[Name]

#### **Prefer to Wait**

I'll wait till you are back in town and can get it that way.

Thanks for letting me know, thats great news! I will wait until you are back in town to meet up and give4 you cash. Send me a message when you get back, and when it is good for you to meet. All the best.

[Name]

let me know when u get to town and we'll hook up ok??

#### **Other or Too Late**

already bought another one, i needed it the same day i e-mailed you. sorry.

Sorry bought one already.

[Name]

No thanks

#### **Payment Concern**

Hsha [expletive] you spammer

Sorry, I DON'T DEAL WITH SCAMMERS!!!! Try someone else.

i don't use paypal buddy. face to face ok.

## E Additional results

### E.1 Regressions with alternate controls

We also consider the results reported in Table 3 with alternate controls for advertisement, market, and timing characteristics. Table 20 reports results for a specification without controls (other than advertisement type). Table 21 replaces the market controls with market fixed effects (where the effects on likelihood of premature removal and shipment are now estimated using OLS to avoid an incidental parameter problem).

**Table 20:** Key outcome regressions (without controls)

	(1) Prem. rem. Probit	(2) Nonscams Neg. Bin.	(3) Offers Neg. Bin.	(4) Mean offer OLS	(5) Best offer OLS	(6) Shipped Probit
Black	0.0297* (0.0165)	0.845* (0.0728)	0.811* (0.0885)	-2.122 <sup>+</sup> (1.417)	-3.802** (1.585)	-0.0210** (0.0107)
Tattoo	0.0157 (0.0159)	0.846* (0.0737)	0.859 <sup>+</sup> (0.0843)	-2.488 <sup>+</sup> (1.634)	-3.643** (1.712)	-0.00597 (0.0111)
Observations	1200	1147	1147	663	663	1147

Marginal effects from probit estimation are reported in (1) and (6); (2)–(3) report incidence rate ratios from negative binomial estimation; (4)–(5) report OLS coefficients. Standard errors clustered by market are reported in parentheses.

<sup>+</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Note: Observations are weighted by state population/number of ads posted in each state. (2)–(6) exclude prematurely removed advertisements, and (4)–(5) limited to advertisements receiving at least one offer.

### E.2 Robustness to including prematurely removed ads

We would be concerned if our findings were driven by a large extent by the higher likelihood of black sellers' advertisements being prematurely removed discussed in Section 3.1. However, our average effects results are affected only slightly by the exclusion of prematurely removed advertisements; this is illustrated in Table 22.

### E.3 Reactions to delivery proposal regressions

Table 23 reports probit estimates of the effect on the frequency of receiving each reaction associated with the non-white seller types. Although these separate results are not generally statistically significant, the fact that the “black” and “tattooed” coefficients are generally negative in the left-hand columns and positive in the right-hand ones offers further evidence that black

## E Additional results

**Table 21:** Key outcome regressions (with market fixed effects)

	(1) Prem. rem. OLS	(2) Nonscams Neg. Bin.	(3) Offers Neg. Bin.	(4) Mean offer OLS	(5) Best offer OLS	(6) Shipped OLS
Black	0.0198 <sup>+</sup> (0.0135)	0.923 (0.0518)	0.854 <sup>**</sup> (0.0580)	-0.500 (1.323)	-2.167 (1.558)	-0.0195 <sup>+</sup> (0.0119)
Tattoo	0.00995 (0.0146)	0.824 <sup>***</sup> (0.0498)	0.796 <sup>***</sup> (0.0574)	-1.571 (1.412)	-3.750 <sup>**</sup> (1.664)	-0.00972 (0.0129)
High quality	-0.0178 (0.0127)	0.969 (0.0501)	0.973 (0.0600)	0.162 (1.250)	0.994 (1.472)	-0.00851 (0.0112)
Price \$110	0.00492 (0.0149)	0.427 <sup>***</sup> (0.0254)	0.416 <sup>***</sup> (0.0293)	10.59 <sup>***</sup> (1.409)	5.118 <sup>***</sup> (1.659)	-0.0130 (0.0132)
Price \$130	-0.0136 (0.0171)	0.225 <sup>***</sup> (0.0197)	0.191 <sup>***</sup> (0.0209)	23.08 <sup>***</sup> (1.863)	14.60 <sup>***</sup> (2.195)	-0.0446 <sup>***</sup> (0.0151)
Christmas	0.0539 <sup>*</sup> (0.0319)	1.791 <sup>***</sup> (0.174)	1.878 <sup>***</sup> (0.214)	5.430 <sup>*</sup> (2.861)	9.836 <sup>***</sup> (3.371)	0.0422 <sup>+</sup> (0.0287)
Valentine's Day	0.00515 (0.0254)	1.222 <sup>**</sup> (0.108)	1.374 <sup>***</sup> (0.142)	0.0399 (2.165)	1.035 (2.551)	0.0147 (0.0224)
Night	-0.0246 <sup>*</sup> (0.0132)	0.689 <sup>***</sup> (0.0385)	0.664 <sup>***</sup> (0.0443)	0.347 (1.357)	-2.323 <sup>+</sup> (1.598)	-0.00480 (0.0117)
Observations	1195	1093	1024	578	578	1139
Market FE	319	297	274	192	192	315

OLS coefficients are reported, except columns (2)–(3) report incidence rate ratios from negative binomial estimation. Standard errors clustered by market are reported in parentheses.

<sup>+</sup>  $p < 0.15$ , <sup>\*</sup>  $p < 0.10$ , <sup>\*\*</sup>  $p < 0.05$ , <sup>\*\*\*</sup>  $p < 0.01$ .

*Note:* Samples are as follows: (1) includes all advertisements in markets with more than one advertisement posted; (2) includes advertisements not prematurely removed, in markets where more than one advertisement was not prematurely removed and some ad received at least one nonscam; (3) includes advertisements not prematurely removed, in markets where more than one advertisement was not prematurely removed and some ad received at least one offer; (4)–(5) include advertisements not prematurely removed and receiving at least one offer, in markets where more than one advertisement was not prematurely removed; (6) includes advertisements not prematurely removed, in markets where more than one advertisement was not prematurely removed.

*E Additional results*

**Table 22:** Key outcome regressions (including prematurely removed ads)

	(1) Nonscams Neg. Bin.	(2) Offers Neg. Bin.	(3) Mean offer OLS	(4) Best offer OLS	(5) Shipped Probit
Black	0.869** (0.0532)	0.822** (0.0643)	-1.835 <sup>+</sup> (1.225)	-3.506** (1.374)	-0.0127 <sup>+</sup> (0.00776)
Tattoo	0.826*** (0.0523)	0.836** (0.0589)	-2.541* (1.315)	-4.067*** (1.556)	-0.00381 (0.00731)
High quality	0.988 (0.0535)	1.022 (0.0614)	0.397 (1.151)	0.858 (1.227)	-0.00560 (0.00672)
Price \$110	0.422*** (0.0266)	0.388*** (0.0281)	11.96*** (1.197)	7.012*** (1.292)	-0.0119* (0.00613)
Price \$130	0.224*** (0.0180)	0.183*** (0.0190)	20.67*** (2.102)	13.35*** (2.123)	-0.0289*** (0.00717)
Christmas	1.873*** (0.181)	2.027*** (0.239)	5.534*** (1.664)	11.69*** (2.028)	0.0224 (0.0246)
Valentine's Day	1.312*** (0.110)	1.361*** (0.120)	1.983 (2.437)	1.675 (2.400)	0.00448 (0.0136)
Night	0.698*** (0.0432)	0.663*** (0.0426)	-1.557 (1.149)	-3.418*** (1.285)	0.00152 (0.00642)
20+ weekly ads	2.002*** (0.179)	2.103*** (0.203)	0.412 (1.295)	5.414*** (1.888)	-0.00754 (0.00837)
Med. HH inc. (log)	2.665*** (0.833)	3.249*** (1.121)	12.65** (5.388)	11.05 <sup>+</sup> (6.754)	0.0698** (0.0353)
Poverty rate	1.026** (0.0122)	1.038*** (0.0137)	0.256 (0.221)	0.232 (0.242)	0.00238* (0.00133)
% pop. White	0.995* (0.00244)	0.997 (0.00261)	-0.0109 (0.0437)	-0.0619 (0.0464)	-0.000154 (0.000282)
Northeast	0.952 (0.0926)	1.061 (0.109)	-3.687* (1.967)	-2.234 (2.285)	-0.00669 (0.0119)
Midwest	0.981 (0.0829)	0.977 (0.0929)	-0.836 (1.516)	0.341 (1.752)	0.00295 (0.0106)
South	0.887 (0.0828)	0.937 (0.0996)	-1.698 (1.525)	-2.098 (1.797)	0.00527 (0.00988)
Observations	1200	1200	681	681	1200

Incidence rate ratios from negative binomial estimation are reported in (1)–(2); (3)–(4) report OLS coefficients; (6) reports marginal effects from probit estimation. Standard errors clustered by market are reported in parentheses.  
<sup>+</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by state population/number of ads posted in each state. (3)–(4) limited to advertisements receiving at least one offer.

## E Additional results

and tattooed sellers are more likely to receive “bad” and less likely to receive “good” reactions. Dividing the estimated “black” coefficients by the white means reported in Table 2, for example, suggests that a buyer is 44% less likely to accept delivery by mail and 56% more likely to express concern about making a long-distance payment when responding to a black rather than white seller.

**Table 23:** Probit regression of reactions to delivery proposal

	(1) Ship	(2) Wait	(3) Other	(4) None	(5) Concern
Black	-0.0248 <sup>+</sup> (0.0159)	0.000723 (0.0452)	-0.0494 (0.0355)	0.0280 (0.0484)	0.0424 <sup>+</sup> (0.0272)
Tattoo	-0.000782 (0.0182)	-0.0590 (0.0461)	0.00678 (0.0391)	0.0376 (0.0513)	0.0165 (0.0279)
Standard ctls.	✓	✓	✓	✓	✓
Observations	572	604	604	604	604

Probit marginal effects are reported. Standard errors clustered by advertisement are reported in parentheses.

<sup>+</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by reciprocal of number of delivery proposals per advertisement. Excludes deliveries proposed to respondents to prematurely removed advertisements. Sample size is slightly reduced for the “willing to accept shipment” outcome since no buyers had this response to the 32 delivery proposals made during the Christmas period (and these observations were dropped). “Standard controls” are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).

### E.4 Racial isolation and property crime joint regression

The degree of racial isolation is somewhat positively correlated with the property crime rate, but the results presented in the main text are robust to inclusion of both measures in a single regression.



**Table 24:** Heterogeneous results by racial isolation and property crime rate

	(1)		(2)		(3)	
	Number of offers		Mean offer		Best offer	
Black	0.819	(0.153)	-6.191**	(2.696)	-6.241**	(2.984)
Tattoo	0.851	(0.167)	-3.003	(3.808)	-3.488	(4.418)
High isolation	1.380**	(0.192)	0.147	(2.388)	1.828	(2.919)
High iso. × Black	0.540***	(0.108)	-3.408	(3.692)	-8.739*	(4.526)
High iso. × Tattoo	0.765 <sup>+</sup>	(0.134)	1.908	(4.199)	-2.319	(4.649)
High prop. crime rate	0.974	(0.130)	3.102 <sup>+</sup>	(1.957)	3.636 <sup>+</sup>	(2.441)
High crime × Black	0.860	(0.166)	-4.827*	(2.805)	-7.184**	(3.385)
High crime × Tattoo	0.910	(0.169)	-5.324 <sup>+</sup>	(3.438)	-5.375	(3.961)
Regions × Black/Tattoo	✓		✓		✓	
20+ × Black/Tattoo	✓		✓		✓	
Standard ctls.	✓		✓		✓	
Observations	858		546		546	
All black=0 p.	0.0137		0.0449		0.0176	

Incidence rate ratios from negative binomial estimation are reported in (1); OLS coefficients are reported in (2)–(3). Standard errors clustered by market are reported in parentheses.

<sup>+</sup>  $p < 0.15$ , \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Observations are weighted by state population/number of ads posted in each state. Excludes prematurely removed advertisements, and (2)–(3) limited to advertisements receiving at least one offer. “High crime” markets are top 25% as measured by 2008 property crimes per capita (from United States Department of Justice and Federal Bureau of Investigations, 2009). “Standard controls” are: high advertisement quality, asking price (\$130 and \$110 dummies; \$90 excluded), holidays (Christmas and Valentine’s day dummies), night, 20+ iPod Nano ads in market over previous week, median household income, poverty rate, non-Hispanic white fraction of local population, and region (Northeast, Midwest, and South dummies; West excluded).