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Race effects on eBay

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We investigate the impact of seller race in a field experiment involving baseball card auctions on eBay. Photographs showed the cards held by either a dark-skinned/African-American hand or a light-skinned/Caucasian hand. Cards held by African-American sellers sold for approximately 20% ($0.90) less than cards held by Caucasian sellers. Our evidence of race differentials is important because the online environment is well controlled (with the absence of confounding tester effects) and because the results show that race effects can persist in a thick real-world market such as eBay.

1. Introduction

■ The large economics literature on eBay and other Internet auctions has given significant emphasis to field experiments (e.g., Jin and Kato, 2006; Reiley, 2006; Resnick, Zeckhauser, Swanson, and Lockwood, 2006), and field experiments have likewise been prominent in contemporary studies of race discrimination (e.g., Bertrand and Mullainathan, 2004; List, 2004). The present study arises at the intersection of these two literatures. We conduct a field experiment on the effects of seller race on eBay, a leading Internet auction site. In our experiment, either a dark-skinned/African-American hand or a light-skinned/Caucasian hand holds a baseball card up for auction (see Figures 1–4). Our experiment is well suited to studying and isolating race effects because online bidders have no access to the types of seller information—such as demeanor and socioeconomic background—that are usually observable in field experiments examining the effects of race on economic behavior. Our study design also benefits greatly from the large existing literature on Internet auctions (e.g., Melnik and Alm, 2002; Bajari and Hortacsu, 2003; Bolton,

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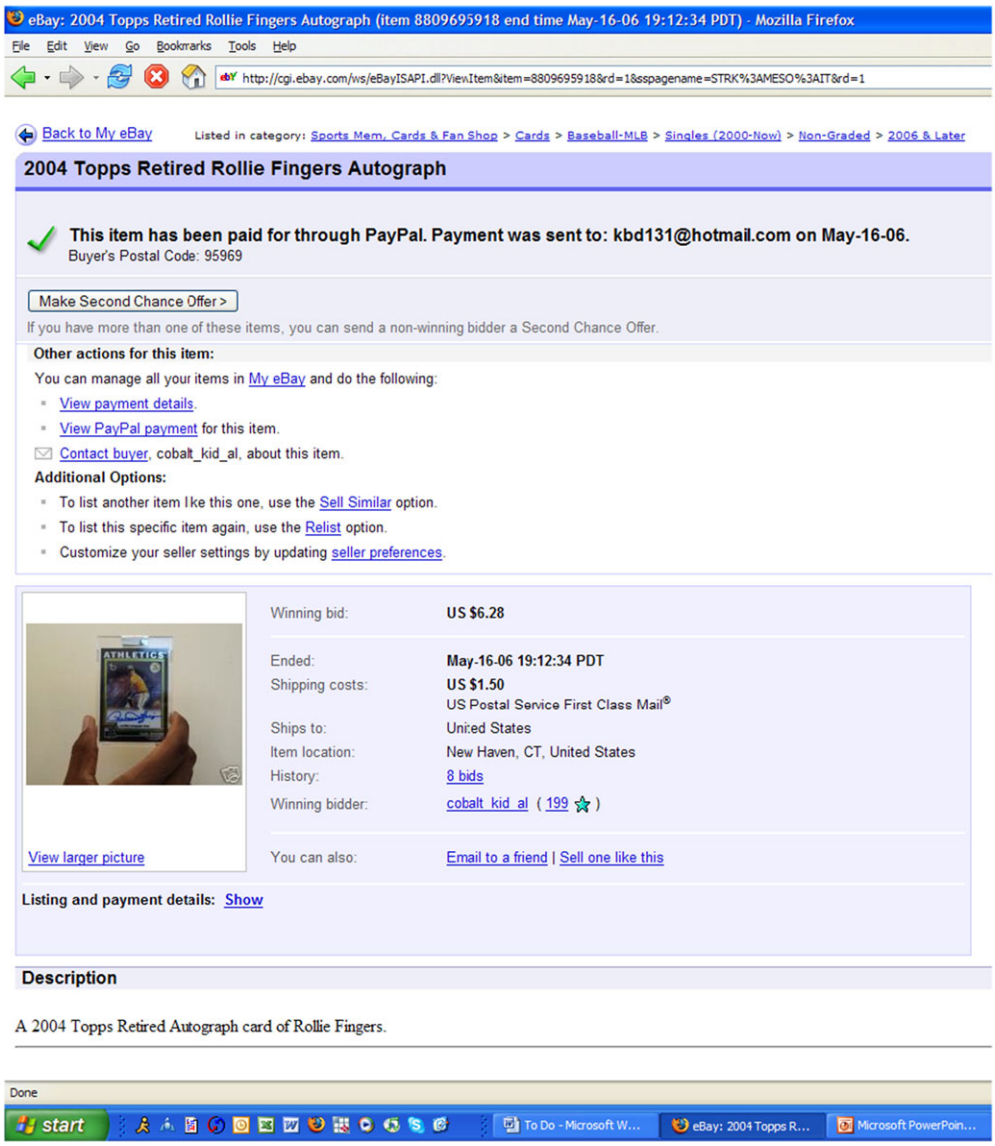
FIGURE 1

A screenshot showing a card held by a dark-skinned/African-American hand.

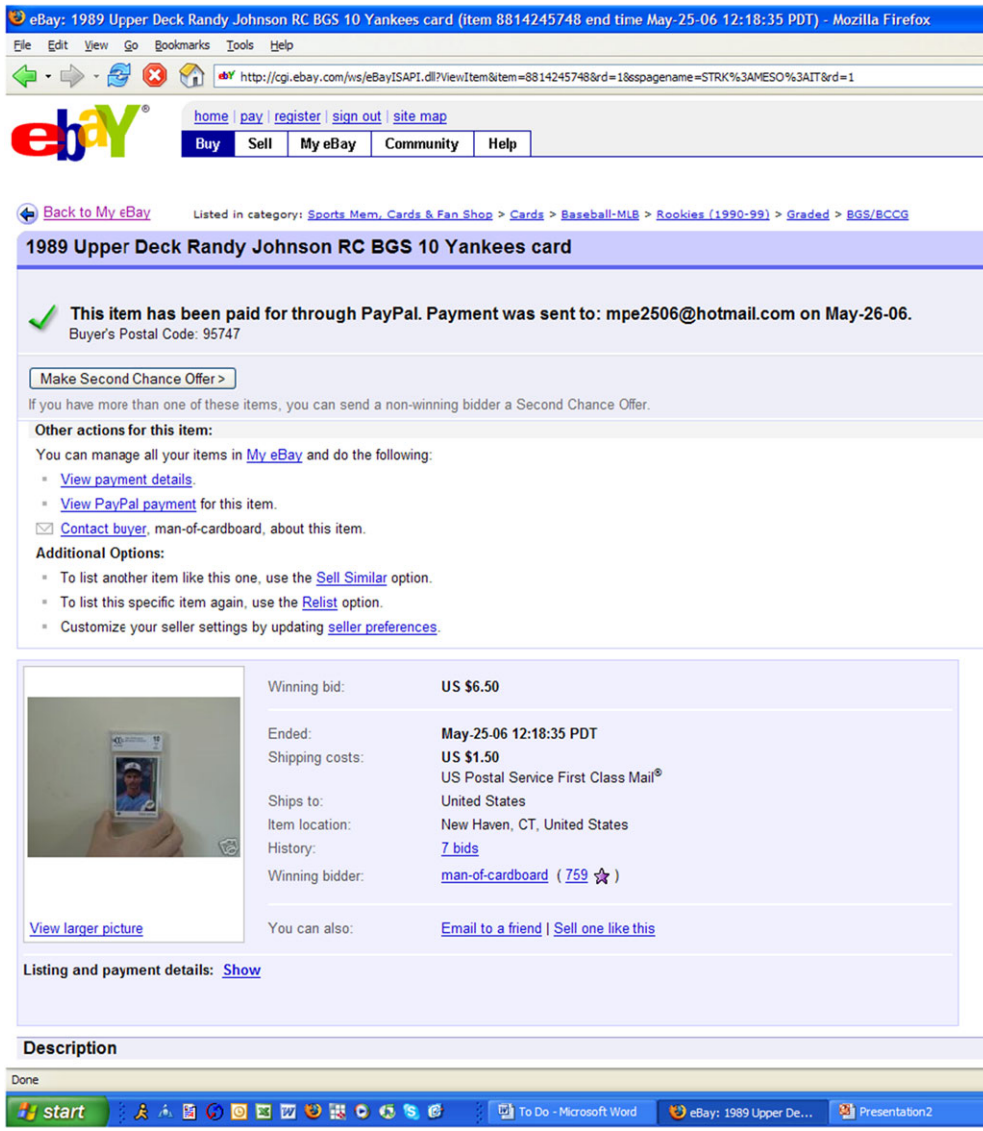


Katok, and Ockenfels, 2004; Jin and Kato, 2006; Reiley, 2006; Lucking-Reiley, Bryan, Prasad, and Reeves, 2007; Cabral and Hortacsu, 2010).

In the typical setting (e.g., Ayres and Siegelman, 1995), it is hard to rule out entirely the possibility that behavior or demeanor that might be correlated with race is the true cause of any observed differential treatment of members of different races. Even in a tester study in which racialized names rather than live individuals are used—as in the renowned resume study of Bertrand and Mullainathan (2004)—it has proven to be difficult to disentangle race from other factors. Although Bertrand and Mullainathan, as well as Nunley, Owens, and Howard (2011), use an individual's first name to signal race (e.g., "Emily" versus "Lakisha"), a potential confounding factor, as Bertrand and Mullainathan discuss at some length, is that "common"

FIGURE 2

A screenshot showing a card held by a light-skinned/Caucasian hand.



African-American names may be common not among African-Americans in general but among particular socioeconomic subgroups of African-Americans, and thus observed negative outcomes for "Lakisha" rather than "Emily" may reflect either the effect of race or the effect of low socioeconomic status (or the effect of race coupled with low socioeconomic status) (see Fryer and Levitt, 2004).[1] Our eBay study, by varying racial appearance in an Internet auction in

[1] Although Bertrand and Mullainathan present considerable evidence that individual names that are correlated with lower actual socioeconomic status do not generate lower interview callback rates, they also find that *on average* the African-American names in their sample are correlated with lower socioeconomic status than the White names, and this average may be reflected in employer perceptions and behavior. In other words, it is possible that employers react not on the basis of the *actual* socioeconomic information conveyed by a particular name but on the basis of a generalized *perception* about types of names.

FIGURE 3

Examples of card photos featuring a dark-skinned/African-American hand.

which there is simply no behavior, demeanor, or other features (apart from racial appearance) to distinguish one sale from another, seeks to isolate the role of race to the greatest degree possible.

Section 2 below sets the stage for our empirical analysis by outlining how, in theory, race-based evaluations of auction items offered by African-American versus Caucasian sellers could affect auction outcomes in common-value and private-value auctions. Section 3 describes the design of our field experiment. Although other studies of Internet auctions have not examined potential differential treatment by racial appearance,[2] the design of our study nonetheless benefitted greatly from the large existing literature on eBay and other Internet auctions, as described in detail

[2] The Nunley, Owens, and Howard study noted above, in parallel to the Bertrand and Mullainathan study, examined potential differential treatment by racialized *names* on the Internet, finding some evidence of an effect of traditionally African-American names in markets with few sellers participating, but not in markets with more sellers. The difference between race (in the sense of racial appearance) and racialized naming has already been noted.

FIGURE 4

Examples of card photos featuring a light-skinned/Caucasian hand.

in Section 3. Our study is not primarily focused on distinguishing between the effects of racial appearance stemming from racial bias and the effects of racial appearance stemming from true statistical differences between African-American and Caucasian eBay sellers (if such differences exist—a point on which we are aware of no evidence), but our data do allow us to offer several partial tests of statistical versus nonstatistical discrimination, as discussed in Section 4. Section 5 provides further discussion of the empirical results presented in Section 4, and Section 6 offers brief concluding remarks.

Our study is related not only to the literature on Internet auctions but also to a number of recent studies examining race effects in *nonauction* online environments (e.g., Pope and Sydnor, 2011; Ravina, 2012; Doleac and Stein, 2013). Doleac and Stein's study is closest to this one; they test for race effects in advertising iPod Nanos held by either African-American or Caucasian sellers on Craigslist in 300 different local geographical markets. Most of these markets are quite small (the median number of advertisements for iPod Nanos offered for sale in their local markets in a week prior to one of their advertisements was three), and transaction prices are

privately negotiated via emails after potential buyers respond to a Craigslist advertisement. By contrast, in our eBay study, hundreds of thousands of baseball cards are offered for sale at any one time, and transaction prices are set through the Internet auction mechanism with no personal interaction and worldwide participation. The Doleac and Stein study and our study thus provide complementary tests of the effects of racial appearance in thicker national markets with more transparent transaction pricing (eBay) versus thinner, local markets with privately negotiated pricing (Craigslist). Although the auction and nonauction environments differ in various ways, both Doleac and Stein's study and our own find that race differences arise in some circumstances.

2. Race in auctions

■ A threshold question in our study is how racial bias among some or all prospective buyers could affect auction outcomes. Because racialized perceptions are likely to differ across individuals who bid in eBay auctions, it is important to consider how such heterogeneity will affect the auction process. (By contrast, List (2004) studied the effects of seller race in in-person sports card sales that did not involve auctioning cards to multiple bidders.) As Becker (1957) emphasized, the operation of markets may mean that economic outcomes such as wages and prices are not affected by racial bias even if some market participants are racially biased.

In a common-value auction, buyers' valuations are in part a product of buyers' estimation of other buyers' valuations. How much one bidder values a good depends in part on how much others value it. In such auctions, a given buyer's bidding behavior generally will be affected by racial bias among other potential buyers even if the first buyer personally harbors no racial bias. Such bias among some bidders will depress bids, which in turn will pull down even bids by individuals who do not themselves harbor direct racial bias.

Consider now the case of a private-value auction. In such an auction, buyers' valuations are not a product of other buyers' valuations, and, thus, bidding one's own valuation in a second-price, secret-bid auction is a dominant strategy. However, eBay is not a secret-bid auction (though it is a second-price auction), and, as an empirical matter, many eBay bidders make incremental bids, increasing their offers in a flurry of late bidding ("sniping") on items that one would expect to be independently valued (Roth and Ockenfels, 2002; Ariely, Ockenfels, and Roth, 2005; Ockenfels and Roth, 2006; Hossain, 2008). Roth and Ockenfels (2002) describe how naive bidders may submit incremental bids that are lower than their valuation because they act as if they will have to pay the amount they bid if they win the auction. In deciding the amount of their bids, such naive bidders, even if not themselves racially biased, may account for the possibility that other bidders may be racially biased and thus may bid lower values for an item sold by an African-American seller. Low bids by such naive bidders could affect the ultimate auction price, even in the presence of sophisticated bidders, because a naive bidder may have a higher private value for the item or because sophisticated bidders withhold their bids until the last minute to avoid competing against rising incremental bids (Roth and Ockenfels, 2002; Ockenfels and Roth, 2006). Alternatively, some bidders may not know whether their valuations are above or below a certain level until they observe a posted price at that level (Rasmusen, 2006; Hossain, 2008); again, racial bias among a different set of bidders will affect bids by these "uninformed," even if unbiased, bidders and, again, may thus affect auction outcomes. In short, in both common-value and private-value contexts, it is plausible that racial bias among some bidders will affect ultimate auction outcomes on eBay.

3. Study design

■ The study reported in this article involves auctioning baseball cards on eBay with cards held by either a dark-skinned/African-American or a light-skinned/Caucasian hand (see Figures 1–4). We conducted 394 eBay auctions of cards we had purchased on eBay several weeks earlier. The cards were purchased over 17 days and were of cards with an existing high bid of between $3 and

$8, so the cards in our auctions were of modest value—not cards for which fraudulent copies were likely to be a significant problem.[3] The level of value of the cards is relevant because an important issue with eBay and other online markets is the opportunity for fraudulent misrepresentations about objects (Bajari and Hortacsu, 2004); producing a "fake" of a baseball card worth near or more than $100 may be worthwhile, but producing a fraudulent copy of a $3 card is unlikely to be, so our use of modest-value cards ensured that the risk of fraudulent copies would be minimal.

For each of our auctions, we used the item title and description from the auction in which we purchased the card, but we did not transfer the formatting.[4] We charged $1.50 for shipping, did not offer shipping insurance, and specified that we would only ship to the United States. Each auction lasted a week. (Lucking-Reiley, Bryan, Prasad, and Reeves (2007) report that in a sample of one-cent coin auctions on eBay, the one-week auction was by far the most common choice.) Because Jin and Kato (2006) report that low starting prices and the absence of a secret reserve price are common in eBay baseball card auctions (albeit in a sample of cards of much higher value than those in our auctions), we used a starting price of $0.99 and no reserve price for all of our auctions.[5] When a card was sold, we left identical feedback ("great buyer, thanks") the day after the payment was made, and all cards were mailed the day after the card was paid for (except for Sundays and holidays). Because of the possibility of interactive effects between seller race and the race of players pictured on our cards, we coded the race or ethnicity of players as African-American, Hispanic, Caucasian/Asian, or, if two or more players were shown on a card and did not fall into the same race or ethnicity category, "multiple mixed."[6]

On any given day on eBay—a leading Internet auction site (Brown and Morgan, 2009)—hundreds of thousands of baseball card auctions are underway, so the 394 cards we auctioned represented a minute fraction of the overall market. The photographs used in our sales were unusual (although not unique) in showing the card held by a hand versus simply on its own. To avoid having our experiment be obtrusive, we intentionally did not have the same card being offered by sellers of both races. As in Resnick, Zeekhauser, Swanson, and Lockwood's (2006) field study on eBay, we received "no communications suggesting that any bidders noticed" any element of our experiment.

Our core test was whether cards held by an African-American hand produced different auction outcomes than cards held by a Caucasian hand. Before placing a bid, potential bidders naturally focus on the photographs of the cards and hence are likely to be exposed to the skin-color treatment. Researchers have tested for the impact of "framing effects" in a variety of contexts (e.g., Levin, Schneider, and Gaeth, 1998). Here, we study the impact of a literal frame, the hand surrounding the edges of the card.

Table 1 provides summary information for each of the four eBay accounts we used for selling cards. Our auctions were conducted in two rounds. The first round of auctions used two user IDs with no eBay history; the second round of auctions used two user IDs that had previously been used for a few transactions to generate positive eBay feedback. Positive feedback on eBay is earned when a transaction partner leaves a positive remark about the transaction.[7] Before the second round of auctions, we "seasoned" two of the user IDs by selling cards from these accounts so that these sellers would have equivalent, positive reputations. For the second round of our

[3] Jin and Kato (2006) find significant misrepresentation for the highly valued baseball cards (mean selling price of $165.50) in their study.

[4] We made no claim about card quality unless such a claim was specific and was contained in the item description (e.g., "Grady Sizemore 2000 Bowman DB RC, mint"). Jin and Kato (2006) find that quality claims in eBay sales are uncorrelated with professional grading of the quality of the item being sold. As noted above, the cards in their study were highly valued cards, not the more mundane cards we sold; because professional grading of cards costs $6 to $20 per card (Jin and Kato, 2006), such grading is not relevant to the sector of the market we examine.

[5] The eBay reserve price is a secret price below which the seller will not sell the item. For a full account of the auction process on eBay, see Bajari and Hortacsu (2004).

[6] There are extremely few Asian players in our card sample.

[7] Bajari and Hortacsu (2004) provide further detail about eBay's feedback system.

TABLE 1 Summary of eBay Accounts Used for Card Sales

Round	Seller Feedback History	Skin Color of Hand Holding Card	eBay User ID	Item Location	Name Listed on eBay (Not Visible until Auction Complete)
1	No	African-American	kbd131	New Haven	J. Brown
1	No	Caucasian	awr4517	Seattle	C. McDowell
2	Yes	African-American	sbj664	Seattle	M. Bruton
2	Yes	Caucasian	mpe2506	New Haven	I. Ayres

auctions, both the African-American and the Caucasian seasoned user IDs had feedback scores of 11 throughout the auction period with the exception of two days on which one of the feedback scores trivially rose to 12.[8] Although our seasoned sellers' positive feedback scores were low relative to the scores of more experienced eBay users with many more transactions under their belts, there is some evidence that the level of positive feedback—as distinguished from the presence of meaningful negative feedback—is not significant to eBay users. In particular, Lucking-Reiley, Bryan, Prasad, and Reeves (2007) find that though sellers' feedback scores have no statistically significant effect on sale prices of coins in eBay one-cent coin auctions, negative feedback does have a statistically significant effect.[9] Likewise, both Bolton, Katok, and Ockenfels (2004) and Cabral and Hortacsu (2010) find that online buyers put significantly more weight on negative than positive feedback. Resnick, Zeckhauser, Swanson, and Lockwood (2006), however, find, in a field study in which a seller with a four-digit eBay feedback score also sold matched items under user IDs with single- or double-digit feedback scores, some evidence of a positive effect of the four-digit score; Melnik and Alm (2002) also find positive, though small, effects of sellers' feedback scores. Houser and Wooders (2006), Cabral and Hortacsu (2010), and Lei (2011) find larger positive effects of increases in a given seller's level of positive feedback. Overall, the use of seasoning in our study is likely to have reduced, but not entirely eliminated, buyer concerns about reputation. Of course, our African-American and Caucasian sellers were equal on this dimension.

Our four user IDs were generated as follows. First, we recorded the first letters of the 50 most common male names used for 30-year-old males. From this set of letters—a b c d e g j k m n p r s t—we randomly selected four sets of three initials. We also randomly selected short number strings of three or four digits to append to the initials in order to create the user IDs.[10]

Until an auction is concluded on eBay, prospective bidders see only the eBay user ID, not the underlying name of the account holder. However, they do have access to the location of the item under auction; these locations are linked to the account holders in Table 1. The account holder names associated with our four user IDs were those of one of the present authors (Ayres—New

[8] The full set of feedback comments up through the end of the auction round for each of our second round user IDs appears in Appendix B.

[9] Although Resnick, Zeckhauser, Swanson, and Lockwood (2006) note that seller reputation may be correlated with unobservable, price-affecting traits such as website design or superior depiction of items, making it difficult to generate a precise measure of the price effect of reputation per se, it seems likely that these unobservables would, if anything, lead to an *underestimation* of the positive price effect of high feedback scores on eBay, as more experienced sellers seem most likely to have, on average, better website design and item depiction. However, as Cabral and Hortacsu (2010) note, the unobservable seller heterogeneity also increases the level of noise in estimating the effect of seller reputation.

On the potential disincentive for buyers to leave negative feedback because of fear of retaliation (through negative feedback on them by sellers), see Li (2010) and Bolton, Greiner, and Ockenfels (2013). Perhaps in response to this concern, eBay has eliminated the ability of sellers to leave negative feedback about buyers, although such a step also makes it easier for sellers' competitors to pose as buyers and then post inaccurate negative feedback (compare Mayzlin, Dover, and Chevalier, 2014).

[10] We did not view the choice between three and four digits as meaningful. Our random selection resulted in the two user IDs associated with the African-American hand having three digits and the two user IDs associated with the Caucasian hand having four digits.

TABLE 2 Mean Sale and Purchase Prices By Seller Race for Completed Sales

	African-American Hand ($N = 170$)	Caucasian Hand ($N = 164$)	Difference
Sale price	$5.73	$6.53	−$0.80
Price at which card originally purchased	$9.92	$9.49	$0.43

Haven), Ayres's spouse (New Haven), a friend of one of our research assistants (Seattle), and the spouse of the research assistant (Seattle). As shown in the table, one African-American and one Caucasian seller were from New Haven, and the remaining two sellers were from Seattle.[11] Each user ID had a corresponding hotmail account (kbd131@hotmail.com, awr4517@hotmail.com, etc.), which in turn had an associated PayPal account for receiving payment on cards sold.

Cards were allocated to sellers as follows. First, the cards to be sold were put in alphabetical order by player last name. Then the cards were allocated to the four sellers on a rotating basis—"Aaron" to seller Brown, "Adams" to seller McDowell, "Balker" to seller Bruton, "Charles" to seller Ayres, and then back to Brown. On each day on which we put up cards for sale, we put up approximately 100 cards, alternating sets of 10 cards held by one type of seller (African-American or Caucasian) and 10 cards held by the other type of seller.

To preserve the key feature of our study's isolation of the effect of race from other features of the transaction, we did not respond to any emails from eBay users who contacted us about our cards during the pendency of an auction. In about 5% of our auctions, the auction winner emailed after the conclusion of the auction with a question about the use of PayPal or an inquiry about whether a shipping discount was available for multiple cards being sold to the same buyer; we responded to those emails with brief, identical statements reiterating that we would only accept payment through PayPal and that the shipping rate was $1.50 per card. In the overwhelming majority of transactions, we had no email contact at all with the auction winner.

4. Empirical results

■ Consistent with Jin and Kato's (2006) data on eBay baseball card auctions, most of the cards we put up for sale (370 of 394 cards, or 94%) attracted one or more bids at or above our starting price.[12] Such a high success rate is unsurprising in light of our low starting price. Among the 24 cards that did not attract any bids, 11 (13) were held by the African-American (Caucasian) hand. An additional 36 cards, although successfully auctioned, were never paid for by the winning bidder—a not-uncommon occurrence on eBay.[13] These cards, too, were almost evenly divided by seller race (16 held by the African-American hand and 20 by the Caucasian hand).

One benefit of our relatively high sale rate is that we have limited censoring of our sale price variable. Because of the essentially equal division in sale probability by seller race, our central outcomes of interest are the sale prices and bid amounts for cards held by African-American versus Caucasian hands. We also examine the gap between sale price and original purchase price, and the total number of bids, for cards in each category.

□ **Sale prices and bid amounts.** Tables 2–6 and Figures 5a–5c focus on our central outcomes of interest—the prices at which our cards sold and the bids placed on the cards. Table 2 shows mean sale prices as well as mean purchase prices (from our original purchase of the cards, described

[11] Although the account holders and locations were real, the hands used for the card sales were not those of the account holders.

[12] In the multi-month "market watch" of eBay card auctions conducted by Jin and Kato, 81% of cards put up for auction sold. In Lucking-Reiley, Bryan, Prasad, and Reeves's (2007) "market watch" data on one-cent coins minted between 1859 and 1909 (mean sale price of $173.20), 62% of the coins sold.

[13] In a survey of approximately 400 eBay users, 26% had experience with selling an item in an auction but never receiving payment (Edwards and Theunissen, 2007).

TABLE 3 OLS Regressions of Sale Price, Bid Amount, and Sale Profit on Seller Race and Other Explanatory Variables

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	Log of Card Sale Price ($N = 334$)	Log of Card Sale Price ($N = 334$)	Card Sale Price ($N = 334$)	Bid Amount ($N = 1563$)	Sale Profit (Card Sale Price−Original Purchase Price) ($N = 334$)	Card Sale Price ($N = 334$)	Log of Card Sale Price ($N = 370$)
African-American seller	−0.182**	−0.204**	−0.901**	−0.370**	−1.161**		−0.161**
	(0.084)	(0.080)	(0.427)	(0.183)	(0.481)		(0.075)
African-American player		0.022	−0.425	−0.743***	−0.501	−0.438	0.045
		(0.093)	(0.484)	(0.201)	(0.559)	(0.484)	(0.090)
Hispanic player		0.154	0.515	0.071	0.442	0.518	0.135
		(0.115)	(0.705)	(0.287)	(0.798)	(0.704)	(0.111)
Multiple players of different races		−0.195	−0.530	−0.156	−0.545	−0.504	−0.232
		(0.263)	(0.992)	(0.446)	(1.180)	(1.016)	(0.255)
Original price at which card was purchased		0.074***	0.392***	0.235***		0.392***	0.079***
		(0.013)	(0.070)	(0.030)		(0.071)	(0.012)
Auction began on first of four auction start dates		−0.119	−0.862	−0.478*	−0.911		−0.156
		(0.116)	(0.599)	(0.252)	(0.706)		(0.110)
Auction began on second of four auction start dates		−0.172	−0.852	−0.475*	−1.495**		−0.214*
		(0.122)	(0.658)	(0.275)	(0.719)		(0.115)
Auction began on third of four auction start dates		0.085	0.398	0.112	0.484		0.107
		(0.111)	(0.609)	(0.256)	(0.683)		(0.105)
African-American seller* Unseasoned						−0.517	
						(0.588)	
African-American seller* Seasoned						0.181	
						(0.616)	
Caucasian seller* Seasoned						1.434**	
						(0.577)	
Constant	1.649***	0.972***	3.135***	3.353***	−2.466***	2.078***	0.887***
	(0.058)	(0.160)	(0.795)	(0.336)	(0.572)	(0.793)	(0.151)

Notes: The dependent variable in each column is as stated in the column heading. Huber-White robust standard errors are in parentheses. The bid sample used in column (D) is missing data for a few auctions (bid data was successfully scraped from eBay for most but not all auctions). $N = 370$ in column (G) because of the inclusion of auctions in which the winning bidder failed to submit payment after the auction concluded.
*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

above) by race for all completed sales. Because standard auction theory (Riley and Samuelson, 1981), as well as the empirical evidence (Reiley, 2006), suggest that lower minimum bid levels are associated with lower auction prices; because we used a low starting price (minimum bid) of $0.99 for all of our sales; and, most importantly, because in purchasing the cards initially we did not exert significant effort to minimize our buying prices, it is not surprising that our sale prices yielded negative profits on average. (The fact that our card photographs, featuring cards held by hands, were relatively unusual in the online card market could possibly have reduced the prices we received as well.) Our interest, however, is in the *difference* the pictured seller's race makes. As Table 2 shows, the cards sold by the African-American hand sold for less *and* were purchased for more (suggesting that they should have sold for higher prices than the cards held by the Caucasian hand). Recall that sellers were randomly assigned cards from among those we had previously purchased; we did not attempt to "match" cards on their purchase prices. Although our alphabetization procedure turned out to produce an imperfectly random allocation of cards across the African-American and Caucasian sellers with respect to card purchase price (not only in the sample of completed sales shown in Table 2 but also in the slightly larger sample of all cards we put up for sale—see Table A1), our randomization was fully successful with respect to the race of the player depicted on the card, as shown in Table A1.

FIGURE 5

Three card price measures through time.

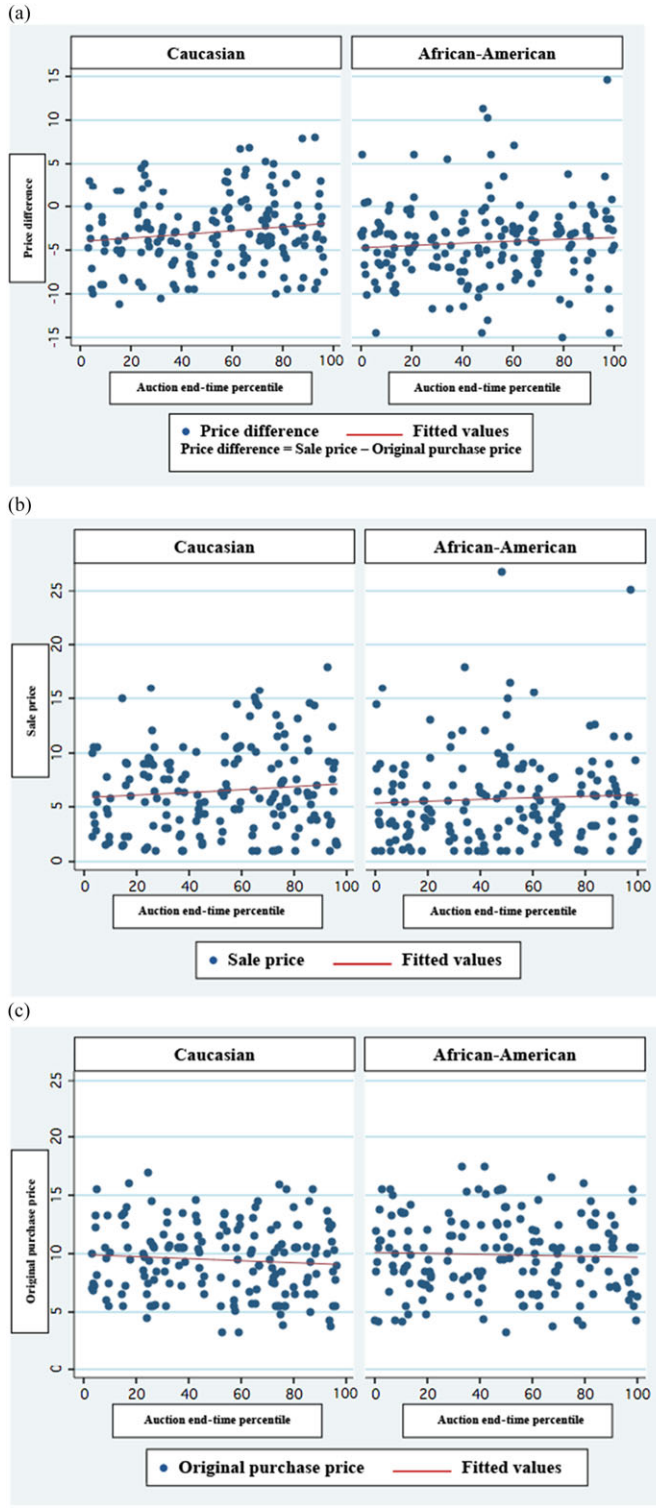


TABLE 4 OLS Regressions of Sale Price and Bid Amount on Seller Race, Bidder Feedback, and Other Explanatory Variables

	(A)	(B)	(C)	(D)
	Card Sale Price ($N = 332$)	Bid Amount ($N = 1563$)	Card Sale Price ($N = 332$)	Bid Amount ($N = 1563$)
African-American seller	−1.415***	−0.582***	−1.553***	−0.710***
	(0.453)	(0.186)	(0.510)	(0.204)
Winning bidder feedback ≥ 1000	−1.884***			
	(0.673)			
African-American seller*	2.632**			
Winning bidder feedback ≥ 1000	(1.282)			
Bidder feedback ≥ 1000		−0.869***		
		(0.308)		
African-American seller*		1.284**		
Bidder feedback ≥ 1000		(0.583)		
Winning bidder feedback ≥ 500			−0.943	
			(0.606)	
African-American seller*			1.625*	
Winning bidder feedback ≥ 500			(0.971)	
Bidder feedback ≥ 500				−0.323
				(0.250)
African-American seller*				1.009**
Bidder feedback ≥ 500				(0.416)
African-American player	−0.370	−0.748***	−0.469	−0.747***
	(0.489)	(0.200)	(0.489)	(0.200)
Hispanic player	0.554	0.058	0.522	0.092
	(0.693)	(0.289)	(0.700)	(0.288)
Multiple players of different races	−0.720	−0.242	−0.648	−0.223
	(0.949)	(0.445)	(0.926)	(0.443)

Notes: The dependent variable in each column is as stated in the column heading. Huber-White robust standard errors are in parentheses. $N = 332$ in columns (A) and (C) because bidder feedback information was unavailable for two winning bidders; $N = 1563$ in columns (B) and (D) because, though the bid sample is missing data for a few auctions (bid data was successfully scraped from eBay for most but not all auctions), bidder feedback information was available for all bids reflected in the bid sample. All regressions in the table include a constant term as well as controls for the original purchase price of the card and the auction start date.
*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Figure 5a plots the difference between the sale price and our original purchase price for each of our transactions arranged by auction time, showing graphically that this difference tends to be more negative with the African-American hand than with the Caucasian hand (particularly in later sales, though the commixture of seasoning in the later sales and seller location by race does not permit us to isolate a clean time effect). Of course, the gap between the purchase price and the sale price for any individual card could reflect such card-specific features as changes in the player's performance over the few weeks between our card purchases and our sales, but, again, our interest is in the *average* pattern by the race of the seller. Figures 5b and 5c disaggregate the information in Figure 5a, showing both that sale prices were higher for the Caucasian hand, particularly in later sales, and that purchase prices were lower.[14]

[14] Figure 5a further reveals that our data contain three substantial outliers—cases in which cards sold by the African-American hand sold for more than $10 above the card's purchase price. The presence of these outliers depresses the average difference between the success of sales by the Caucasian versus the African-American hand; the gap between these averages would be even larger without the three extremely positive transactions by the African-American hand (out of 334 total completed sales).

TABLE 5 OLS Regressions of Sale Price on Seller Race, Census Information, and Other Explanatory Variables

	(A)	(B)	(C)	(D)
	Card Sale Price ($N = 316$)	Card Sale Price ($N = 316$)	Card Sale Price ($N = 316$)	Card Sale Price ($N = 316$)
African-American seller	−2.002***	−1.672***	−1.610***	−1.577***
	(0.519)	(0.569)	(0.531)	(0.547)
Winning bidder feedback ≥ 1000	−1.910***	−1.971***	−1.991***	−1.929***
	(0.725)	(0.753)	(0.731)	(0.733)
African-American seller*	2.678**	2.685**	2.627**	2.517*
Winning bidder feedback ≥ 1000	(1.336)	(1.348)	(1.323)	(1.338)
Top quartile African-American zip code	−0.299			
	(0.774)			
African-American seller*	2.489**			
Top quartile African-American zip code	(1.167)			
Top half African-American zip code		0.448		
		(0.610)		
African-American seller*		0.726		
Top half African-American zip code		(0.905)		
Top quartile college-educated zip code			−0.834	
			(0.754)	
African-American seller*			0.943	
Top quartile college-educated zip code			(1.038)	
Top quartile income zip code				−0.283
				(0.657)
African-American seller*				0.929
Top quartile income zip code				(0.987)
African-American player	−0.614	−0.495	−0.512	−0.482
	(0.511)	(0.499)	(0.502)	(0.508)
Hispanic player	0.585	0.499	0.707	0.637
	(0.716)	(0.722)	(0.724)	(0.720)
Multiple players of different races	−1.054	−1.198	−0.834	−0.775
	(0.999)	(1.006)	(0.989)	(0.985)

Notes: The dependent variable in each column is the card sale price. Huber-White robust standard errors are in parentheses. $N = 316$ because of the unavailability of Census data and bidder feedback information for some winning bidders. All regressions in the table include a constant term as well as controls for the original purchase price of the card and the auction start date.
*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Table 3 shows the results of ordinary least squares (OLS) regressions of card sale prices and bid amounts on seller race and other variables.[15] The African-American seller dummy variable in all regressions reported below is equal to 1 for cards held by the African-American hand. Columns (A) and (B) of Table 3 show that in regressions of the log of card sale price on seller race (column (A)) and on seller race, the race of the player depicted on the card, the card's original purchase price, and dummy variables for auction start dates (column (B)), the seller race dummy variable has a negative and significant estimated coefficient. As expected, purchase price, included in column (B), has a positive estimated coefficient. Columns (C) through (E) show that the seller race dummy variable likewise has a negative and significant estimated coefficient when card sale price rather than its log is used as the dependent variable (column (C)), when the level of the bid

[15] Because Jin and Kato (2006) find no evidence of selection effects in price regressions in a sample in which 81% of offered cards sold, and because an even higher fraction of our cards sold, we are not particularly concerned about selection effects in our regressions. We cannot use Jin and Kato's propensity score method, in which they include a propensity score in their sale price regressions, because we have virtually no power to predict whether a card will be sold using any nonendogenous source of variation. Jin and Kato's "market watch" data, by contrast, varies on dimensions such as seller feedback score, quality of card photo, and quality claims made—factors that can be used as explanatory variables in a regression in which whether a card was sold is the dependent variable.

TABLE 6 OLS Regressions of Sale Price, Bid Amount, and Sale Profit on Seller Race, Seller-Player Race Interactions, and Other Explanatory Variables

	(A)	(B)	(C)	(D)
	Card Sale Price ($N = 332$)	Bid Amount ($N = 1563$)	Card Sale Price ($N = 332$)	Sale Profit (Card Price−Original Purchase Price) ($N = 332$)
African-American seller	−0.788	−0.113	−0.785	−0.988
	(0.559)	(0.234)	(0.555)	(0.628)
Winning bidder feedback ≥ 1000	−1.898***		−1.981***	−2.756***
	(0.686)		(0.675)	(0.746)
African-American seller*	2.619**		2.632**	3.219**
	(1.289)		(1.266)	(1.272)
Winning bidder feedback ≥ 1000				
Bidder feedback ≥ 1000		−0.864***		
		(0.312)		
African-American seller*		1.356**		
Bidder feedback ≥ 1000		(0.586)		
African-American player	0.138	−0.379		
	(0.664)	(0.276)		
Hispanic player	1.662	1.030**		
	(1.088)	(0.420)		
Multiple players of different races	1.466	0.726		
	(0.958)	(0.520)		
African-American seller*	−1.014	−0.749*		
African-American player	(0.986)	(0.402)		
African-American seller*	−2.183	−2.013***		
Hispanic player	(1.379)	(0.561)		
African-American seller*	−3.824**	−2.206**		
Multiple players	(1.561)	(0.871)		
Minority player			0.751	0.909
			(0.600)	(0.654)
African-American seller*			−1.677*	−2.078**
Minority player			(0.859)	(0.951)

Notes: The dependent variable in each column is as stated in the column heading. Huber-White robust standard errors are in parentheses. $N = 332$ in columns (A), (C), and (D) because bidder feedback information was unavailable for two winning bidders; $N = 1563$ in column (B) because, although the bid sample is missing data for a few auctions (bid data was successfully scraped from eBay for most but not all auctions), bidder feedback information was available for all bids reflected in the bid sample. Regressions in columns (A), (B), and (C) include a constant term as well as controls for the original purchase price of the card and the auction start date. The regression in column (D) includes a constant term as well as controls for the auction start date.
*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

placed is used as the dependent variable in the full sample of all bids placed (column (D)), and when the difference between card sale price and the card's original purchase price is used as the dependent variable in the original sample (column (E)).

With respect to the race of players on our cards, the coefficients on the player race dummy variables are statistically indistinguishable from zero except in column (D), suggesting that—controlling for the purchase price of the card (which, of course, might itself have a racial component that we cannot detect given our lack of independent measures of card quality)—player race is not significantly correlated with sale price.[16] Below we look at the *interaction* of player race with seller race in card sale price regressions and reach a somewhat different conclusion.

[16] Nardinelli and Simon (1990), in a seminal study, find that cards showing minority players sell for less, controlling for player statistics. Although our regressions do not control for player statistics or other measures of player quality, we do control for the price at which the card was purchased. (At the time this article was prepared, we were unable to obtain Beckett values or other ratings for the vast majority of the relatively low-value cards we sold—cards that generally were

The bid amount regression in column (D), by contrast, reveals an effect of player race in the full sample of bids placed; the estimated coefficient on the dummy variable for an African-American player on the auctioned card is negative and highly statistically significant. Evidently, some bidders place lower bids for cards depicting African-American players, all else equal, even though the card sale price results suggest that the difference washes out by the close of the auction.

With respect to magnitude, the card sale price regression in column (C) of Table 3 suggests that the African-American hand is associated with a –$0.90 price effect—similar to the roughly 20% price effect of seller race in List's (2004) study of in-person baseball card sales at sports card shows. (In List's study, White sellers received an average offer of $42.05, compared to $33−$35 for minority sellers, on the higher value cards at issue in that study.)

Column (F) in Table 3 experiments with replacing the seller race dummy variable with dummy variables that interact seller race and seller experience; as discussed above, one pair of our sellers had positive feedback scores reflecting prior eBay selling experience. In column (F) of Table 3, the omitted dummy variable is the variable for the unseasoned Caucasian seller. Statistical discrimination would tend to suggest that the effect of seller race would be less pronounced in auctions conducted by seasoned sellers, about whom bidders have additional information, than in auctions conducted by unseasoned sellers. The estimates in column (F), however, suggest the opposite pattern. For unseasoned sellers the estimated race effect is −0.517 and is not significantly different from zero; for seasoned sellers the estimated race effect is −1.253 (0.181−1.434) and is significantly different from zero (standard error 0.610). The same larger seller race effect in our later auctions, conducted by seasoned sellers, is also apparent in Figure 5a. We are reluctant, however, to adopt any strong interpretation of the results on seasoning because the city locations for the unseasoned African-American and Caucasian sellers are flipped for the seasoned African-American and Caucasian sellers (see Table 1). Our experimental structure simply does not provide an unconfounded measure of the relative importance of seller race effects in auctions with unseasoned versus seasoned sellers.

The final column in Table 3 repeats the benchmark specification from column (B) of Table 3 using the sample of successful auctions (in which one or more bids above the starting price were received), even if the winning bidder did not end up sending payment. The results are similar to those from the sample of sales actually consummated.[17]

Table 4 incorporates controls for the experience level of bidders on our cards, motivated by the fact that Hossain (2008) suggests that bidder experience may have a significant effect on auction outcomes. Of course, bidder experience is a posttreatment variable, and there is no guarantee of its exogeneity, so our results with this variable included cannot be interpreted in the same light as the results in Table 3.

As is conventional in the empirical literature on Internet auctions (e.g., Roth and Ockenfels, 2002; Bajari and Hortacsu, 2003), we measure bidder experience level by the bidder's feedback score; as discussed above, an individual's feedback score will tend to rise with experience because most feedback given is positive. Column (A) of Table 4 reports results from a regression of card sale price on the same variables as in the primary specification in Table 3 plus a dummy variable equal to 1 for auctions in which the winning bidder's feedback score was over 1000 and a variable for the interaction of this experience dummy variable with seller race. As expected, the dummy variable on experience has a negative estimated coefficient in this sale price regression. More intriguing, the interaction of the experience and seller race dummy variables is positive, implying a higher price for the African-American seller when the winning bidder was highly

not included in the annual Beckett almanacs.) For recent work suggesting no significant influence of player race on the value of football cards after controlling for various factors, see Primm, Piquero, Regoli, and Piquero (2010).

[17] We experimented with controls for whether a card was autographed, included a jersey swatch, was displayed with all four corners clearly showing, and was certified, as noted further at the end of this subsection.

experienced. Column (B) shows an identical pattern of results in a larger sample of all bids placed rather than just winning bids from each completed auction. (In the larger sample in column (B), the experience dummy is equal to 1 if the submitting bidder's feedback score was 1000 or higher. In the case of the winning bid for each auction, this dummy variable is identical to the experience dummy variable used in column (A).) Columns (C) and (D) show directionally similar results for the bidder experience variables when the experience dummy is equal to 1 for bidder feedback scores of at least 500. In all of these regressions, the estimated coefficient on the seller race dummy variable continues to be highly negative. The results in Table 4 provide some evidence that African-American sellers are particularly disadvantaged with nonexpert bidders; expert bidders appear to pay less heed to seller race. It is important not to overstate the strength of this conclusion, however; we cannot be sure that an underlying variable, such as an unobservable feature of the pattern of earlier bids in the auction, is not correlated with both the dependent variable (sale price or bid amount) and the bidder experience dummy, as bidders with versus without high levels of eBay experience may respond differently to different bid patterns earlier in the auction.

In an attempt to probe further into the nature of the race differences suggested by Tables 3 and 4, columns (A) and (B) of Table 5 incorporate controls for whether the winning bidder (who will tend to be a bidder with a relatively higher valuation for the card than other bidders) came from a zip code with versus without a threshold level of racial diversity. This variable, again, is a posttreatment variable, a fact to be kept in mind in interpreting our results. We are interested in testing whether auctions with greater race effects in sale price were disproportionately won by buyers from Whiter zip codes. Note that this test is noisy to the extent that the level of the sale price depends not only on the level of the bid submitted by the winning bidder but also on the level of the second-highest bid submitted (as eBay is a second-price auction). Put differently, the effect of seller race on the level of the winning bidder's bid is only imperfectly reflected in the price the winning bidder ends up paying for the card. Nonetheless, as described below, our results map to some degree onto the racial composition of the zip code of the winning bidder (at the same time that they show no relationship to other demographic features of the winning bidder's zip code).

To determine the racial composition of the winning bidder's zip code, we use available Census data for the zip codes of winning bidders for our cards, yielding a total of 316 observations, as zip code or Census data was missing for the winning bidder in 18 of our sales. (In an effort to avoid violating eBay's privacy rules governing "harvest[ing] or otherwise collect[ing] information about users, including email addresses, without their consent," we did not record winning bidders' zip codes in our database; we simply used the zip code from the eBay sale email with the bidder's mailing address to access the relevant Census data, such as percent of the zip code population that is African-American, and then entered only that data in our database.) In column (A) (column (B)) of Table 5, the regression includes a dummy variable for whether the winning bidder's zip code was in the top quartile (top half) of the Census districts in our sample in terms of percent African-American; zip codes that were more than about 10% (about 3%) African-American were in the top quartile (top half) in our sample. (As these statistics show, card buyers in our sample were much Whiter than the American population as a whole; similarly, almost all of the sports card buyers in List's (2004) study were White.) As columns (A) and (B) show, cards sold to Whiter zip code winning bidders by an African-American hand seemed to sell for less than cards sold to Blacker zip code winning bidders by an African-American hand, at least when "Blacker zip code" means more than about 10% African-American.[18] Columns (C) and (D) of Table 5 show that no statistically significant effect is observed when we differentiate among winning bidders' zip codes by *nonrace* traits such as education (column (C)) and family income (column (D)). The

[18] Table A2 shows that the same is true when the bidder experience controls, which are included in Table 5, are omitted.

estimated coefficient on the seller race dummy variable continues to be negative in all of these regressions.

Table 6 further explores the role of race in our auctions by examining interactions between seller race and the race of the player or players depicted on the card. The estimated coefficients on all three interaction terms in column (A) of Table 6 are negative, though only one of them (the estimated coefficient on African-American seller * Multiple players of different races) is significantly different from zero. Column (B) of Table 6, which uses the full population of bid amounts, shows negative and more precisely estimated coefficients on the three interaction terms. These results provide some suggestion that an African-American seller receives low bids not (primarily) for cards in general, but for cards depicting African-American or Hispanic players in particular. Columns (C) and (D) return to the smaller sample of card sale prices from column (A) and use an aggregate dummy for a "minority race" player on the card; the results again suggest that the negative relationship between an African-American seller and the card sale price (or, in column (D), the difference between the card sale price and the card's original purchase price) is heaviest when a minority player is depicted on the card. It is possible that viewing an African-American or Hispanic player on a card that is also held by an African-American hand somehow activates implicit racial attitudes that depress the sale price of the card.[19]

□ **Number of bids.** Table 7 examines the relationship between seller race and the number of bids received (as distinguished from the price level of those bids). In a Poisson regression of the number of bids on seller race, bidder feedback variables, the race of the player depicted on the card, the card's original purchase price, and dummy variables for auction start dates, the estimated coefficient on the seller race dummy variable is negative (with borderline statistical significance); column (A) of Table A4 shows a similar result using an OLS regression, which is somewhat less well suited than a Poisson regression to count data such as the number of bids but may hold some advantages for our bid data because the arrival of a given bid may influence other bids' arrival. The next four columns in Tables 7 and A4 suggest a negative relationship between the seller race dummy variable and the number of bids in auctions in which the winning bidder is from a relatively White zip code; in columns (B) and (C) in particular, with the inclusion of a dummy variable for whether the winning bidder's zip code was in the top quartile of the Census district in our sample in terms of percent African-American, the seller race dummy variable is very negatively correlated with the number of bids in auctions won by bidders not in that top quartile. (Put differently, the estimated coefficients on the interactions between the seller race dummy variable and the winning bidder coming from a relatively Blacker zip code are uniformly positive.) The final two columns of Tables 7 and A4 confirm that these zip code effects do not recur with zip codes characterized by demographic traits other than race (in particular, education and income).

5. Discussion

■ Why did cards held by the African-American hand net less, on average, than cards held by the Caucasian hand in our study? A conscious, animus-based desire to transact on less favorable terms with African-American baseball card sellers may not seem particularly likely. Racial bias, to the extent it exists today, is more often implicit bias of the sort exemplified by the results of

[19] Table A3 shows that results are similar to those in Table 6 when the bidder experience controls, which are included in Table 6, are omitted.

Experimenting with controls for whether a card was autographed, included a jersey swatch, was displayed with all four corners clearly showing, and was certified produced no significant change in the results in Tables 3–6, except that the estimated coefficient on the seller race dummy variable was smaller in absolute magnitude and no longer statistically significant at conventional levels in columns (A) and (C) of Table 3. Estimated coefficients on the autograph, swatch, corner, and certification variables were almost uniformly statistically indistinguishable from zero.

TABLE 7 Poisson Regressions of Number of Bids on Seller Race and Other Explanatory Variables

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	Number of Bids ($N = 332$)	Number of Bids ($N = 316$)	Number of Bids ($N = 318$)	Number of Bids ($N = 316$)	Number of Bids ($N = 318$)	Number of Bids ($N = 316$)	Number of Bids ($N = 316$)
African-American seller	−0.112*	−0.236***	−0.227***	−0.178**	−0.183**	−0.117	−0.122
	(0.066)	(0.071)	(0.064)	(0.079)	(0.075)	(0.079)	(0.078)
Winning bidder feedback ≥ 1000	−0.230**	−0.226**		−0.227**		−0.223**	−0.220**
	(0.094)	(0.093)		(0.103)		(0.098)	(0.099)
African-American seller*	−0.020	0.017		0.015		0.001	−0.012
Winning bidder feedback ≥ 1000	(0.144)	(0.147)		(0.153)		(0.148)	(0.149)
Top quartile African-American zip code		−0.282**	−0.277**				
		(0.112)	(0.114)				
African-American seller*		0.532***	0.531***				
Top quartile African-American zip code		(0.152)	(0.155)				
Top half African-American zip code				0.001	−0.011		
				(0.083)	(0.081)		
African-American seller*				0.152	0.176		
Top half African-American zip code				(0.120)	(0.119)		
Top quartile college-educated zip code						0.026	
						(0.115)	
African-American seller*						0.036	
Top quartile college-educated zip code						(0.148)	
Top quartile income zip code							0.042
							(0.098)
African-American seller*							0.097
Top quartile income zip code							(0.134)
African-American player	0.057	0.025	0.020	0.047	0.039	0.045	0.045
	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)
Hispanic player	0.053	0.041	0.047	0.039	0.047	0.040	0.045
	(0.086)	(0.093)	(0.094)	(0.091)	(0.092)	(0.097)	(0.095)
Multiple players of different races	−0.251	−0.254	−0.254	−0.305*	−0.305*	−0.266	−0.265
	(0.181)	(0.195)	(0.183)	(0.185)	(0.174)	(0.183)	(0.185)
Original price at which card was purchased	0.031***	0.034***	0.031***	0.031***	0.028***	0.031***	0.031***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Auction began on first of four auction start dates	−0.041	−0.024	0.029	−0.017	−0.019	−0.011	−0.016
	(0.084)	(0.085)	(0.085)	(0.086)	(0.086)	(0.086)	(0.087)
Auction began on second of four auction start dates	−0.112	−0.130	−0.108	−0.098	−0.076	−0.094	−0.095
	(0.084)	(0.086)	(0.084)	(0.086)	(0.084)	(0.088)	(0.087)
Auction began on third of four auction start dates	−0.021	−0.035	−0.020	−0.016	0.002	−0.017	−0.013
	(0.081)	(0.082)	(0.081)	(0.085)	(0.084)	(0.085)	(0.084)
Constant	1.419***	1.466***	1.452***	1.420***	1.410***	1.416***	1.409***
	(0.111)	(0.111)	(0.113)	(0.113)	(0.116)	(0.111)	(0.111)

Notes: The dependent variable in each column is the number of bids. Huber-White robust standard errors are in parentheses. $N = 332$ in column (A) because bidder feedback information was unavailable for two winning bidders; $N = 316$ in columns (B), (D), (F), and (G) because of the unavailability of Census data and bidder feedback information for some winning bidders; and $N = 318$ in columns (C) and (E) because of the unavailability of Census data for some winning bidders.

*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

the Implicit Association Test (IAT) (Greenwald, McGhee, and Schwartz, 1998; Nosek, Banaji, and Greenwald, 2002). In this test, which has been taken by millions of people on the Internet, individuals are presented with photos of White and African-American faces and with pleasant and unpleasant words; in one round of the test respondents are asked to associate White faces with pleasant words and African-American faces with unpleasant words, and in the other round

respondents are asked to associate White faces with unpleasant words and African-American faces with pleasant words. Nearly all White Americans exhibit significantly better performance on the first task than on the second. Such implicit racial bias may, but need not, correlate with differential treatment in markets; an important current question for empirical research is the degree to which it does.

As a matter of theory, such correlation seems especially likely when, as here, the market transaction in question occurs without a great deal of deliberation. In the quick moment in which a bidder decides how much to bid on a card, implicit attitudes may hold strong sway. As Hossain (2008) suggests (though not in the context of race specifically), for many Internet auction bidders this moment may fall within the domain of "system 1"—rapid, intuitive—judgment rather than "system 2"—reasoned, analytic—judgment. Emotions rather than rational, deliberative calculations may primarily determine bidding behavior (Ku, Malhotra, and Murnighan, 2005). Thus, the moment of bidding may be an "IAT moment" (Ayres, 2001), in which implicit attitudes significantly shape behavior.

Relatedly, many auction bidders may be uncertain about their valuation of even private-value auction goods (e.g., Fischhoff, 1991; Ahlee and Malmendier, 2005). In the discretionary judgments that follow from such bidder uncertainty, implicit racial bias may exert substantial force. As recently observed by a trio of social psychologists, "[I]n situations involving ambiguity..., European-Americans [are] less likely to help African-Americans than [to help] European-Americans" (Killen, McGlothlin, and Henning, 2008). In short, it is certainly plausible that the valuations of at least some bidders in eBay auctions are influenced by implicit racial bias (and we discussed in Section 2 above how such bias could be expected to shape auction outcomes even when some bidders may not themselves be biased).[20]

Although an "IAT moment" may explain our baseball card findings, it also remains possible that lower prices for cards held by the African-American hand in our study reflected not a distaste for or implicit bias against such individuals but a statistically accurate belief that there was greater risk in transacting with an African-American seller on eBay (although we are aware of no evidence of such greater risk). List (2004) concluded that lower baseball card sale prices in bilateral sales by minority as opposed to White sellers were the result of buyers' statistically accurate perception of different reservation prices among minority sellers; transaction risks were not at issue in his context because transactions were conducted in person. Such risks are potentially important in eBay sales, as bidders can neither physically inspect the good to be purchased nor observe the seller or its store in person (Dewan and Hsu, 2004; Resnick, Zeckhauser, Swanson, and Lockwood, 2006), and even our "seasoned" sellers were, as noted above, relatively "unseasoned" relative to highly experienced eBay sellers with four- or even five-digit feedback scores. (Our earlier discussion revealed the conflicting evidence on the role of high levels of overall eBay feedback versus simply the absence of negative feedback.) However, the findings reported in Table 6 provide some evidence of an *interaction* between seller race and the race of the players on the card, yet the race of the players on the card should have no influence on an *accurate* perception of underlying reliability of African-American versus Caucasian sellers. In addition, Table 4 shows that if bidder experience measures may properly be included in the card sale price regressions (despite being posttreatment variables), greater bidder experience reduces the race effect; bidders whose experience suggests more accurate perceptions of seller reliability show smaller race effects than inexperienced bidders. It remains possible, however, that the relevant bidder perception concerns the protections bidders have under PayPal, rather than the reliability of sellers; perhaps experienced bidders are rationally less concerned about seller reliability

[20] We had hoped to test for the presence of an IAT-behavior link in our study. To that end, we sent a single follow-up email (all that could reasonably be viewed as permissible under eBay's privacy rules) to individuals who purchased cards from us, offering them a $50 iTunes or amazon.com gift certificate to answer a short "survey," which included a race IAT. Unfortunately, only a handful of our buyers responded to this offer.

given their familiarity with PayPal's protections. In the end, our data may provide some relevant evidence about various statistical discrimination hypotheses but cannot offer definitive rejection of (or support for) such hypotheses.[21]

6. Conclusion

■ Baseball cards we auctioned on eBay sold for significantly less when held by an African-American hand than when held by a Caucasian hand. A simple auction market (eBay) appears to produce disproportionately negative outcomes for African-Americans even when there is no opportunity to observe demeanor, socioeconomic status, or other nonrace but potentially race-correlated features of potential transaction partners. Of course, in using eBay itself, sellers who might fear differential treatment on the basis of race may simply avoid using photos and other material signalling race, much as Scott Morton, Zettelmeyer, and Silva-Risso (2001) find that car price disparities for African-American versus Caucasian buyers are reduced when negotiations are initially conducted online (where a buyer's race is unobservable to the seller). Online, avoiding disclosure of race-related information should enable sellers to avoid differential outcomes.[22] Our results, however, provide a relatively clean demonstration of the role race may play in economic and other outcomes, including in contexts (e.g., Price and Wolfers, 2010) in which—unlike online—race cannot simply be hidden from view.

[21] If one believes that our results reflect accurate statistical discrimination (though, again, we are aware of no data suggesting higher transaction risks on eBay with some racial groups than with others), it may bear noting that such statistical discrimination represents a particularly unadulterated form of statistical discrimination by comparison to the nature of statistical discrimination in in-person or other more richly textured settings. In those other settings, race plus some other set of factual features of the situation—features that might have varied by race—produces disparate outcomes; we cannot be certain that race itself is having an effect (Heckman, 1998). Here, as we emphasized in the Introduction, there simply are few contextual features in play, and the bare fact of an African-American hand lowers prices received in eBay auctions.

[22] In a similar spirit, Goldin and Rouse (2000) find that when orchestra auditions take place behind a curtain, female musicians are significantly more likely to be selected.

Appendix A

This appendix presents additional empirical results.

TABLE A1 Pretreatment Analysis By Seller Race

Pretreatment Variable	Total ($N = 394$)	African-American Hand ($N = 197$)	Caucasian Hand ($N = 197$)	Absolute Value of Difference
Proportion of cards auctioned with no seasoning/feedback	0.5000	0.4975	0.5025	0.0050
Proportion of cards auctioned with seasoning/feedback	0.5000	0.5025	0.4975	0.0050
Mean price at which card originally purchased	\$9.53	\$9.82	\$9.23	\$0.59*
Proportion of cards auctioned showing Caucasian player	0.6091	0.6091	0.6091	0.0000
Proportion of cards auctioned showing African-American player	0.2233	0.2335	0.2132	0.0203
Proportion of cards auctioned showing Hispanic player	0.1320	0.1218	0.1421	0.0203
Proportion of cards auctioned showing multiple players of different races	0.0355	0.0355	0.0355	0.0000

*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

TABLE A2 OLS Regressions of Sale Price on Seller Race, Census Information, and Other Explanatory Variables—Omitting Bidder Feedback Variables

	(A)	(B)	(C)	(D)
	Card Sale Price ($N = 318$)	Card Sale Price ($N = 318$)	Card Sale Price ($N = 318$)	Card Sale Price ($N = 318$)
African-American seller	−1.456***	−1.169**	−1.045**	−1.039**
	(0.472)	(0.562)	(0.517)	(0.526)
Top quartile African-American zip code	−0.263			
	(0.798)			
African-American seller*	2.401**			
Top quartile African-American zip code	(1.166)			
Top half African-American zip code		0.369		
		(0.598)		
African-American seller*		0.735		
Top half African-American zip code		(0.887)		
Top quartile college-educated zip code			−0.599	
			(0.756)	
African-American seller*			0.710	
Top quartile college-educated zip code			(1.039)	
Top quartile income zip code				−0.072
				(0.661)
African-American seller*				0.774
Top quartile income zip code				(0.974)
African-American player	−0.667	−0.575	−0.580	−0.556
	(0.505)	(0.493)	(0.497)	(0.502)
Hispanic player	0.520	0.442	0.606	0.558
	(0.726)	(0.732)	(0.728)	(0.728)
Multiple players of different races	−0.877	−0.997	−0.662	−0.623
	(1.039)	(1.041)	(1.019)	(1.011)

Notes: The dependent variable in each column is the card sale price. Huber-White robust standard errors are in parentheses. $N = 318$ because of the unavailability of Census data for some winning bidders. All regressions in the table include a constant term as well as controls for the original purchase price of the card and the auction start date.
*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

TABLE A3 OLS Regressions of Sale Price, Bid Amount, and Sale Profit on Seller Race, Seller-Player Race Interactions, and Other Explanatory Variables—Omitting Bidder Feedback Variables

	(A)	(B)	(C)	(D)
	Card Sale Price ($N = 334$)	Bid Amount ($N = 1563$)	Card Sale Price ($N = 334$)	Sale Profit (Card Sale Price−Original Purchase Price) ($N = 334$)
African-American seller	−0.299	0.106	−0.298	−0.398
	(0.573)	(0.246)	(0.569)	(0.617)
African-American player	0.005	−0.374		
	(0.668)	(0.279)		
Hispanic player	1.634	1.020**		
	(1.118)	(0.424)		
Multiple players of different races	1.791*	0.820		
	(0.963)	(0.519)		
African-American seller*	−0.863	−0.748*		
African-American player	(0.975)	(0.402)		
African-American seller*	−2.205	−1.961***		
Hispanic player	(1.405)	(0.557)		
African-American seller*	−4.057**	−2.213**		
Multiple player	(1.609)	(0.873)		
Minority player			0.686	0.830
			(0.609)	(0.681)
African-American seller*			−1.603*	−2.017**
Minority player			(0.866)	(0.970)

Notes: The dependent variable in each column is as stated in the column heading. Huber-White robust standard errors are in parentheses. The bid sample used in column (B) is missing data for a few auctions (bid data was successfully scraped from eBay for most but not all auctions). Regressions in columns (A), (B), and (C) include a constant term as well as controls for the original purchase price of the card and the auction start date. The regression in column (D) includes a constant term as well as controls for the auction start date.
*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

TABLE A4 OLS Regressions of Number of Bids on Seller Race and Other Explanatory Variables

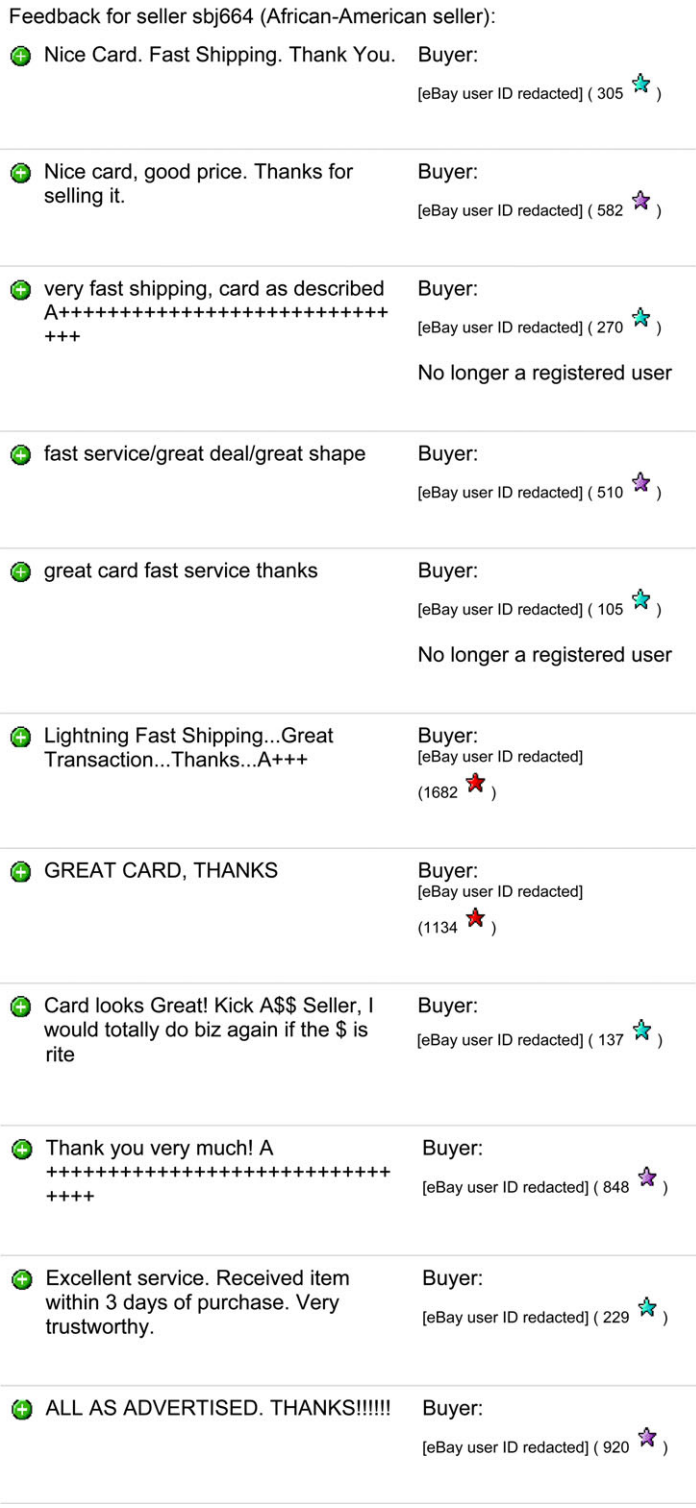
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	Number of Bids ($N = 332$)	Number of Bids ($N = 316$)	Number of Bids ($N = 318$)	Number of Bids ($N = 316$)	Number of Bids ($N = 318$)	Number of Bids ($N = 316$)	Number of Bids ($N = 316$)
African-American seller	−0.563*	−1.183***	−1.132***	−0.878**	−0.887**	−0.589	−0.609
	(0.340)	(0.370)	(0.324)	(0.396)	(0.367)	(0.403)	(0.400)
Winning bidder feedback ≥ 1000	−1.121**	−1.106**		−1.122**		−1.098**	−1.086**
	(0.452)	(0.455)		(0.504)		(0.482)	(0.483)
African-American seller*	0.185	0.181		0.176		0.106	0.040
Winning bidder feedback ≥ 1000	(0.643)	(0.666)		(0.698)		(0.675)	(0.678)
Top quartile African-American zip code		−1.374***	−1.353***				
		(0.511)	(0.518)				
African-American seller*		2.622***	2.631***				
Top quartile African-American zip code		(0.763)	(0.774)				
Top half African-American zip code				−0.006	−0.059		
				(0.446)	(0.434)		
African-American seller*				0.739	0.849		
Top half African-American zip code				(0.619)	(0.613)		
Top quartile college-educated zip code						0.132	
						(0.636)	
African-American seller*						0.175	
Top quartile college-educated zip code						(0.792)	
Top quartile income zip code							0.213
							(0.540)
African-American seller*							0.483
Top quartile income zip code							(0.713)
Original price at which card was purchased	0.154***	0.171***	0.154***	0.155***	0.138***	0.154***	0.154***
	(0.045)	(0.045)	(0.044)	(0.046)	(0.045)	(0.046)	(0.045)
Auction began on first of four auction start dates	−0.190	−0.128	−0.157	−0.070	−0.088	−0.048	−0.072
	(0.425)	(0.435)	(0.433)	(0.442)	(0.440)	(0.444)	(0.444)
Auction began on second of four auction start dates	−0.543	−0.630	−0.531	−0.478	−0.378	−0.455	−0.462
	(0.419)	(0.436)	(0.424)	(0.434)	(0.426)	(0.442)	(0.440)
Auction began on third of four auction start dates	−0.092	−0.171	−0.105	−0.061	0.012	−0.075	−0.051
	(0.422)	(0.427)	(0.423)	(0.439)	(0.435)	(0.442)	(0.437)
African-American player	0.270	0.105	0.094	0.217	0.192	0.215	0.223
	(0.350)	(0.356)	(0.355)	(0.357)	(0.355)	(0.355)	(0.353)
Hispanic player	0.272	0.202	0.232	0.202	0.235	0.200	0.229
	(0.451)	(0.489)	(0.494)	(0.479)	(0.485)	(0.510)	(0.498)
Multiple players of different races	−1.087	−1.111	−1.079	−1.361*	−1.333**	−1.159	−1.149
	(0.695)	(0.773)	(0.723)	(0.724)	(0.676)	(0.711)	(0.724)
Constant	4.081***	4.345***	4.253***	4.090***	4.029***	4.052***	4.010***
	(0.554)	(0.566)	(0.564)	(0.571)	(0.574)	(0.558)	(0.561)

Notes: The dependent variable in each column is the number of bids. Huber-White robust standard errors are in parentheses. $N = 332$ in column (A) because bidder feedback information was unavailable for two winning bidders; $N = 316$ in columns (B), (D), (F), and (G) because of the unavailability of Census data and bidder feedback information for some winning bidders; and $N = 318$ in columns (C) and (E) because of the unavailability of Census data for some winning bidders.

*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

Appendix B

This appendix presents the feedback received by sellers sbj664 and mpe2506 in connection with auctions conducted prior to the auctions studied in the present article.



Feedback for seller sbj664 (African-American seller):

Nice Card. Fast Shipping. Thank You.	Buyer: [eBay user ID redacted] (305)
Nice card, good price. Thanks for selling it.	Buyer: [eBay user ID redacted] (582)
very fast shipping, card as described A++++++++++++++++++++++++++++	Buyer: [eBay user ID redacted] (270) No longer a registered user
fast service/great deal/great shape	Buyer: [eBay user ID redacted] (510)
great card fast service thanks	Buyer: [eBay user ID redacted] (105) No longer a registered user
Lightning Fast Shipping...Great Transaction...Thanks...A+++	Buyer: [eBay user ID redacted] (1682)
GREAT CARD, THANKS	Buyer: [eBay user ID redacted] (1134)
Card looks Great! Kick A$$ Seller, I would totally do biz again if the $ is rite	Buyer: [eBay user ID redacted] (137)
Thank you very much! A ++++++++++++++++++++++++++++	Buyer: [eBay user ID redacted] (848)
Excellent service. Received item within 3 days of purchase. Very trustworthy.	Buyer: [eBay user ID redacted] (229)
ALL AS ADVERTISED. THANKS!!!!!!	Buyer: [eBay user ID redacted] (920)

Feedback for seller mpe2506 (Caucasian seller):

SUPER FAST SHIPPING!!! GREAT EBAYER!!! HIGHLY RECOMMENDED!!!	Buyer: [eBay user ID redacted] (1803 ★)
Very Honest w/ High Integrity A+ Recommended eBay 1st Rate Thank You	Buyer: [eBay user ID redacted] (1255 ★)
LIGHTNING FAST SHIPPING!!! AWESOME VINTAGE DECAL THANKS AAA+++	Buyer: [eBay user ID redacted] (672 ★)
Nice card. Smooth transaction.	Buyer: [eBay user ID redacted] (2336 ★)
great seller	Buyer: [eBay user ID redacted] (201 ★)
card received quickly and in good condition...thanks!!	Buyer: [eBay user ID redacted] (545 ★)
GREAT CARD, THANKS	Buyer: [eBay user ID redacted] (1134 ★)
great card-fast shipping-a pleasure-A++++-THANK YOU	Buyer: [eBay user ID redacted] (690 ★)
NIce card and packaging. Totally pleased! THANKS!	Buyer: [eBay user ID redacted] (3500 ★)
Thanks,looks great	Buyer: [eBay user ID redacted] (99 ★)
GREAT transaction! Would deal with again. Recommended.	Buyer: [eBay user ID redacted] (969 ★)
great Card & transaction - AAAAAAA++++++++++	Buyer: [eBay user ID redacted] (1920 ★) No longer a registered user

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