Incidental Prices and their Effect on Willingness to Pay

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ABSTRACT

Past research has explored how both internal and external references prices affect consumer perceptions and consequently the price consumers are willing to pay for a product or service. Historically, researchers have examined the effects of exposure to prices for the same product, the same brand, or at the very least products within the same category. This research explores the effect of *incidental prices* on the consumer's willingness to pay. We define incidental prices as those prices advertised, offered or paid for unrelated products – goods that are neither viewed by the seller or the buyer as an indicator of what may or should be paid for the item in question. Unlike reference prices, an incidental price is neither intended nor presumed to affect consumer decision-making. More specifically, we examine how prices for products the buyer encounters unintentionally can affect his or her willingness to pay for a product they intend to buy. Our findings have important implications for auction houses and online vendors as well as conventional retailers.

KEY WORDS: Incidental Prices, Pricing, Anchoring, Auctions, Reference Price, Decision Making, Context Effects, Numeric Information, Willingness-to-Pay, Consumer Behavior

"A good decision is based on knowledge and not on numbers."

Plato
Laches or Courage (380 B.C.)

Each day consumers encounter a myriad of prices for goods and services they have absolutely no interest in buying. These numbers are everywhere, from the gas station signs and billboards drivers pass on their daily commute, to the newspaper, television and Internet advertisements that flood their homes and workplaces. Price tags figure prominently on products already on people's shelves, as well as on merchandise displayed in the shops they visit. Given the ubiquity of prices, one might expect consumers to become oblivious to the omnipresent pairing of Arab numerals with dollar signs, except when attached to specific items they consider purchasing. Yet extraneous price information may have a more profound impact on shoppers than previously suspected. By serving as reference points or anchors, such "incidental" prices may inadvertently alter a consumer's willingness to pay for an item they intend to buy.

In this research, we define "incidental prices" to mean those prices advertised, offered, or paid for goods that are neither viewed by the seller or the buyer as an indicator of what should be paid for a different item. They are prices of unrelated products that the buyer has little or no interest in purchasing. As such, incidental prices are numbers that offer no meaningful information about market prices and are encountered most probably by chance; any exposure to and knowledge of these prices is *incidental* to the transaction at hand. This research explores how the price of one good, encountered incidentally, can serve as an anchor, thereby elevating a consumer's willingness to pay for another distinct good. In doing so, we demonstrate how a consumer's willingness to pay can vary systematically with the price of unrelated products for sale in the shopping environment.

Certainly, willingness to pay (WTP) will vary systematically with some prices in the marketplace, or more specifically, those of related products. Not only do prices of close substitutes affect demand for a good, but internal reference prices – customers' expectation of a price level that seems reasonable – are affected by past and present prices of closely related products. Much of the work in the reference price literature has been devoted to understanding how price information in the marketplace affects WTP, although this literature investigates prices of closely related or identical goods exclusively. In this research, we focus on the influence of prices for unrelated products, which should be immaterial when determining how much to pay for the focal product.

The psychology literature has demonstrated how unrelated numbers can influence consumer decisions. The broad phenomenon labeled "anchoring" describes how random starting points systematically influence decisions. More specifically, people often form estimates based on an initial anchor, which may be irrelevant to the decision at hand, and adjust from there to yield their final answer. In one of the first studies to demonstrate the effect, Tversky and Kahneman (1974) spun a wheel with numbers ranging from 0 to 100, and subsequently asked subjects whether the percentage of African countries in the United Nations was greater than or less than that number. They then asked participants to estimate the actual figure and found a significant relationship between the number spun on the wheel (the anchor) and people's estimates, even though it was obvious to everyone involved that the anchor was generated by chance. Just as irrelevant numbers affect judgments, it is entirely plausible that unrelated prices affect willingness to pay.

At this point, one would be at a loss in using extant literature to predict the impact of incidental prices on WTP. The reference price literature would predict that incidental prices would have no impact on WTP, because the products are entirely unrelated. The anchoring literature, given its exclusive focus on individual anchors, is unable to predict which of a myriad of incidental prices would be influential, or even if any would be influential, for the anchoring literature has focused on manipulation of a single anchor rather than sets of potential anchors. In addition, in the handful of studies that have demonstrated the effect of an anchor on WTP, without exception respondents have been instructed to focus their attention on a related anchor in a relevant context. For example, economists studying the "starting point bias," have shown that the maximum amount people say they would pay and still vote for a referendum depends on the dollar amount specified in a preceding yes/no question asking them whether they would favor the same referendum requiring them to pay a specific annual fee (Green et al. 1998).

This research documents how willingness-to-pay can vary systematically with the price of unrelated goods present in the real marketplace. There are several key aspects of a real marketplace that we integrate into our work. First, any anchoring effect in the marketplace will likely be a passive process. We show that consumers need not focus their attention on incidental prices for them to have an effect. Second, consumers are typically exposed to numerous prices in the shopping environment, any or all of which may have an effect. We show that an extreme price value serves as an anchor when it is encountered immediately preceding the willingness to pay decision. Third, real purchase environments often contain relevant information on a "right" answer, such as prices at competitors or prices of similar goods. We document how buyers with access to extremely detailed and pertinent information can also be influenced by incidental prices. And fourth, there is a cost to making mistakes. In each of our three studies, the dependent variable is the amount of their own money respondents commit to spending.

We use a combination of laboratory and empirical studies in our research, for the two different approaches offer their own advantages. A controlled experiment allows us to narrow the scope of our work, isolating the effect and defining pertinent boundaries in order to understand key aspects of anchors in the real world. The empirical data allows one to assess whether or not the effect is measurable above the noise of conflicting and complicating factors. Combined, we offer ample evidence that the effect of incidental prices exists, and we show that the strength of the effect depends on factors frequently within the control of the firm. Our work also puts consumers on notice to be aware of the possible detrimental influences of extraneous information while deliberating willingness to pay.

The rest of this paper is organized as follows (See Figure 1). First, we review the reference price literature as well as the relevant psychological literature exploring the underlying mechanism for anchor effects. We then demonstrate the incidental price effect, and test a number of possible mediating and moderating variables within a series of three studies: a natural experiment, a well-controlled laboratory experiment and an analysis of third-party auction data. More specifically, in Study 1, we demonstrate how peoples' willingness to pay for one good can be affected systematically by the price advertised for an entirely unrelated product. The results suggest consumers are not cognizant of the effect of incidental prices, and that even well established market prices alone are not enough to eliminate the effect. In Study 2, we replicate the results of Study 1 in the laboratory while simultaneously varying three key factors: (1) whether the incidental price is for a similar or different good (applicability); (2) how *actively* respondents process the anchor (attention), and (3) its place within a sequence of numbers (order). In Study 3, we document the influence of incidental prices empirically in an auction setting utilizing a real-world data set provided by one of the nation's premiere classic automobile auction houses. Even among extremely knowledgeable car buyers the results are robust and contradict traditional economic theory involving auctions. Finally, we discuss some of the limitations of this work before proposing further potential marketing applications, as well as opportunities for future research.

Literature Review

There are two literature streams that are especially relevant to our study, the reference price literature and the anchoring literature.

Reference Prices

Consumers typically rely on some standard or reference point when evaluating the purchase price of a sought-after product (Monroe 1990). Just as Rosch (1975) defined cognitive reference points as any stimuli to which other stimuli are related, reference prices have been described most broadly as any price to which other prices are related (Jacobson & Obermiller 1990). Conceptual definitions for reference prices in the marketing literature are plentiful, although researchers can be divided most broadly by how they have chosen to operationalize the concept. Most assume consumers hold some internal reference point that serves as a neutral standard of comparison (Lichtenstein, Burton and Karson 1991). Such *internal* reference prices are constructed from experience, primarily from prices recalled from previous shopping trips. Accordingly, the notion of reference price has alternately been described as the last price paid for the item (Gabor 1977), the modal price (Ölander 1969), as well as an average of prices for similar goods (Monroe 1973). Similarly, empirical models of reference price often include a weighted average of past prices (Lattin & Bucklin, 1989; Kalyanaraman & Little, 1994; Mazumdar & Papatla, 1995). When someone's reference price relies on previously encountered prices it is referred to as *memory based* (Briesch et al. 1997).

Other researchers have argued that consumers' memory for prices is short-lived (Hardie, Johnson & Fader 1993, Rajendran & Tellis 1994) and consequently, a reference price is formed at the point of purchase based on the current prices of certain brands, or is comprised of some mixture of past and present prices. A reference price formed using prices available in the shopping environment, such as the mean price of competing brands or the range of prices seen while shopping, has been classified as *stimulus based*. Consumers are believed to rely on stimulus based price standards when they are unable or are not motivated enough to recall historical prices. Firms frequently use *external* reference prices, such as plausible or even exaggerated advertised prices, in an attempt to shift consumers' perceptions of the market's best available price upward (Lichtenstein and Bearden 1989, Urbany, Bearden and Weilbaker 1988). By-and-large, both internal and external, as well as memory-based and stimulus-based reference prices discussed in the literature thus far, are thought to emanate from price comparisons for closely related or identical goods.

Anchoring and Adjustment

Anchoring effects are remarkably robust, occurring even when anchor values are clearly uninformative, as in the aforementioned classic Tversky and Kahneman study (1974). The effects also appear not to depend on the judge's motivation or expertise (Joyce & Biddle 1981, Northcroft & Neale 1987), nor are they hindered by a forewarning to consider and correct for the effects of a potential anchor (Wilson, Houston, Etling & Brekke 1996). In spite of having been studied extensively, the psychological mechanism underlying anchoring effects remains somewhat of an enigma (Jacowitz & Kahneman 1995, Strack & Mussweiler 1997, Wilson et al. 1996).

A widely adopted framework describing the mechanism proposes that people first perform a comparative judgment between the anchor and the target estimation, during which a temporary representation of the anchor is constructed in short-term memory. This representation is thought to influence subsequent estimates (Chapman & Johnson 1994, Strack and Mussweiler 1997). Because people are subject to a confirmation bias (Klayman and Ha 1987), they tend to focus on semantic information consistent with the anchor, resulting in estimations being assimilated towards the anchor. Mussweiler, Strack & Pfeiffer (2000) offer the following example: judges asked whether the average price of a German car is higher or lower than 40,000 Marks are assumed to test the possibility that the average price is actually 40,000 Marks. To do so, they selectively retrieve knowledge from memory that is consistent (Mercedes is a German car and can cost 40,000 Marks). When asked to generate an estimate for the average price of a German car, the accessibility of anchor-consistent information has been increased, leading judges to rely primarily on that information and estimations closer to 40,000 Marks than they would have otherwise.

Other researchers, however, have shown that anchors can be effective even when the comparison task and estimation task are intentionally designed to be semantically unrelated (Wilson et al. 1996). Demonstrating an anchoring effect in the absence of semantic coherence suggests a more superficial and purely numeric anchoring effect (Wong & Kwong 2000), where the anchor value itself is activated in short-term memory rather than information about the target. Mussweiler & Strack (2001) have attempted to reconcile their selective accessibility hypothesis with the numeric priming hypothesis by proposing an integrative model by which numeric effects operate only if semantic knowledge is inapplicable. A purely numeric anchoring effect, they argue, is one of several anchoring phenomena that operate at the stage of standard selection.

Adaval and Monroe (2002) have shown the effect numbers, even subliminally primed numbers, can have on the standards consumers select for comparative judgments. By exposing subjects to high (low) numbers, including those below the consumer's threshold of perception, the authors made products judged later seem less (more) expensive. These results suggest the possibility that numerical information can be perceived implicitly and translated into magnitude representation regardless of the associated attribute dimension (grams, dollars). If numbers encountered without consumers even being aware that they had seen them can affect future evaluative judgment, and given that consumers may look at a specific product on the shelf for 1/25 to 1/50 of a second (and hence its price), an investigation of other such subliminal effects is warranted (Adaval and Monroe 2002). To this end, we extend the work by Adaval and Monroe as well as that on anchoring and standard selection in several important ways.

First, while Adaval and Monroe explored the effect of subliminally primed numbers on subsequent categorical evaluations, we examine how numbers affect internal notions of value as manifested in consumers' willingness to pay. Second, while the numbers in Adaval and Monroe's experiments were below the threshold of perception, their respondents' attention nonetheless was focused on the visual priming task. In our studies, we document how a more *passive* encounter with incidental prices (i.e., the anchors are present in the environment, but are not part of the focal transaction itself) is as *effective* as an active encounter (i.e., one in which a comparison is required). Historically, most of the studies involving anchors have included an explicit comparative task, although anchoring effects have been documented in studies where the anchor is simply present in the environment (e.g., Wansink, Kent and Hoch 1998).

Third, the magnitude of anchor effects has been shown to depend on how applicable the knowledge rendered accessible during the comparison task is to the estimation task. For example, comparing the *height* of the Brandenburg Gate to a given anchor yields weaker effects on subsequent estimates of the *width* of the gate than estimates of its *height* (Strack & Mussweiler 1997). Just as height is not relevant to judgments of width, the price of a sweatshirt from a competing vendor is not applicable when deciding how much to pay for a music CD. Expectedly, we find a weaker, yet significant anchor effect for unrelated goods. Note, however, that incidental price and willingness to pay are both denominated in the same unit of measurement (dollars), as are height and width (meters). Yet, just as Adaval and Monroe (2002) found the numeric prime has an effect whether denominated in dollars or grams, we change the associated attribute dimension from dollars to the bidder's ID number and find the effect is still present (See Study 2).

Finally, as mentioned earlier, while a large body of research has shown that estimates of unknown quantities can be influenced by exposure to normatively irrelevant information, we are the first to examine the differing effects of individual values within a sequence of potential anchors. Research on the effects of anchors has typically examined how a single value, upon which those affected have focused their attention, can influence subsequent judgments. Our results suggest that the final, or most recent number in a series that consumers come upon, is the most influential of the sequence.

In Study 1, we set out to demonstrate the effect of incidental prices in a real world shopping setting. Our principal hypothesis is that a relatively high price advertised for an unrelated good encountered in the same shopping environment (contextual cue) can elevate the maximum price an individual would be willing to pay for the product they desire (focal product).

STUDY 1

In Study 1, we document the impact of incidental prices, demonstrating their relevance to retailers who entertain negotiated prices. In this natural experiment, we use a commodity (music CD) as the focal good, because it is a product possessing a relatively well-known market price, with little price dispersion, and almost no uncertainty about quality.[1] For the incidental price, we rely on signage for an unrelated product (sweatshirt) sold by a neighboring, confederate vendor. We deliberately altered the product class for the incidental and focal goods such that they are not functionally complementary, or in other words, typically used or consumed together (Gaeth et al. 1990). Exposure to the anchor is what we have labeled as passive; shoppers were never instructed or encouraged to view or consider the price of the sweatshirt. The central question was whether or not the price of the sweatshirt would affect willingness to pay for the CD.

Participants

Participants were 60 visitors to a popular West Coast beach. All were shoppers attempting to purchase a CD from the experimenter, who posed as one of numerous vendors along a popular stretch of boardwalk. Each participant was debriefed after his or her encounter with the experimenter.

Design

A sign posted at a makeshift stand on the beachfront indicated that a popular CD was being offered for sale due to an unexpected surplus acquired by the vendor (i.e., the experimenter). In this way, only parties interested in that one specific CD were solicited. Simultaneously, a confederate operated an adjacent sales stand advertising sweatshirts for sale. The only sweatshirt on display was positioned on top of a box that appeared to contain additional stock. The garment was plain (no university insignia or other markings were present) and its price was prominently posted as either \$80 or \$10. A pilot study conducted among the same target population found the two products were deemed unrelated ($\mu = 6.43$ on a 7-point scale where 7 signified “entirely unrelated”). To insure the anchor was indeed incidental, any shopper showing interest in the sweatshirt (by approaching the sweatshirt stand or addressing the confederate before or after shopping for the CD) was excluded from the study.

We utilized the Becker, DeGroot and Marschak (1964) incentive-compatible procedure for assessing willingness to pay in order to reduce overbidding and elicit more reliable valuations at the point of purchase (Wertenbroch and Skiera 2002). The experimenter explained to those who approached the CD sales stand that the product would be sold in a somewhat unorthodox fashion by which they, the customers could “name their own price.” Potential buyers would make a single offer (i.e., their highest bid), after which a number would be drawn from a jar on display. If the bid exceeded the number drawn, the customer was obligated to buy the CD at the price they specified. It was explained that there would be no further negotiation, but that their singular offer would either be accepted or rejected. The jar contained a uniformly distributed set of numbers in 25-cent increments, although this was not revealed to shoppers. Each bid was recorded, a number was drawn, and the deal was either transacted or not in accordance with the previously agreed to terms. The primary goal is to assess the main effect for incidental price, in order to see if those who were exposed to the high sweatshirt price ($80) were willing to pay more than those who were exposed to the low price ($10).

During their debriefing, participants were asked whether they believed the asking price of the sweatshirt affected their willingness to pay for (or their offer for) the CD, both before and after being told the purpose of the study. In this exploratory question, we investigated whether consumers would acknowledge the role irrelevant information plays in their decision-making. We expected that most buyers would deny that an irrelevant price had any effect on their decision, even after being told the design of the experiment.

Results

The presence of an incidental price elevated the average bid among shoppers from $7.29 (median = $7.50) when the sweatshirt was priced low ($10) up to $9.00 (median = $10.00) when the sweatshirt was priced high ($80). The difference ($1.71) was statistically significant ($t_{56} = -2.03$, $p < 0.05$).

Insert Table 1 about here

The debriefing questions revealed that not a single subject believed that the price of the sweatshirt affected their bid prior to learning the purpose of the sale, and only four (7%) indicated that this incidental price might have affected their willingness to pay after the purpose and design of the study was explained. While these consumers neither recognized nor acknowledged that the incidental price affected their decision, it clearly did. Recall that the sweatshirt was for sale from a different vendor at a separate, independent stall, and hence its price was not related to, reflective of, or informative in any way towards how much customers should be willing to pay for the music CD.

Discussion

In this study, we have shown how the price of an unrelated good can affect people's willingness to pay for a relative commodity (music CD). The incidental price was the advertised price of a product in which the shopper had no interest (sweatshirt), but which bore a price that was either much higher than the market price of the focal good ($80), or somewhat lower ($10). While we find the incidental price had a profound affect on people's willingness to pay, we also find that people are either unable or unwilling to acknowledge the effect of such irrelevant information – they simply do not believe it affected them personally.

STUDY 2

In Study 1 we demonstrated the effect of an incidental price and documented consumers' inability or reluctance to acknowledge its impact on their judgments. In Study 2, we replicate the phenomenon in a more controlled environment while investigating the potentially mediating and moderating effects of a number of variables, including the degree to which consumers focus their attention on the incidental price, the applicability or relevance of that price when determining their willingness to pay, and the order in which consumers are exposed to an extreme value (anchor) within a sequence of incidental prices.

Participants

Participants were 567 students enrolled at a major West Coast university. The study was computerized, and respondents participated in groups of 40 people or less. Seven of the participants did not complete the study, so our analysis utilizes the remaining 560 observations.

Design

The study utilized a 2 (Applicability: "same" good or "different" good) x 2 (Attention: active, passive) x 3 (Order: HLL, LHL, LLH) full factorial design with an additional control condition. The cover story told students that they were about to participate in a couple of auctions, where the product for sale in the first auction would be dinner for two at a well-known local restaurant. Pre-tests indicated that students were familiar with and positively disposed to the restaurant (a national chain). The purpose of the second auction was to give the participants an additional reason not to overbid in the first auction, to help ensure that participants bid rationally, since the first auction was our focal auction for the experiment.

Respondents were told that they were participating in a real auction, and that each of them could submit one bid. It was explained that at the end of the day, the person running the experiment would compare all of the bids to determine whose bid was the highest. It was also explained that the highest bid would win, but only pay the amount of the second highest bid. The method and purpose of using the Vickrey auction format (Vickrey 1961; Hoffman et al. 1993), was described in detail. Participants were subsequently told that the next few screens would show the outcomes of a few previous auctions. Each of these following (three) screens led with the words “Example of a Recent Auction,” and a product description.

We varied “Applicability” by changing whether the sample auctions included the same product participants would later bid on (dinner for two at a local chain) or a different item (a pair of tickets for an NBA basketball game). By using a different product, we incapacitated the semantic influences by using comparative and estimation tasks that pertain to unrelated objects (Wong & Kwong 2000). A priori, we expected the anchor to have a greater effect when the auction results displayed were for the same item (according to the selective accessibility hypothesis), though we expected an anchoring effect nonetheless when the products were different (according to the numeric priming hypothesis). We predicted effects in both conditions compared to the control, but a larger effect when the products were the same, according to Mussweiler & Strack's (2001) integrative model, which posits an increased effect of selective accessibility over the basic numeric effect when semantic knowledge is applicable.

In the real world, consumers are persistently exposed to prices in their daily routines. In an attempt to replicate this in the lab, we exposed respondents to a sequence of three numbers that were either low or high, where 23 was low and 987 was high. In three separate conditions, the order of these numbers was varied, such that the high number either preceded the more moderate number (HLL), was in the midst of them (LHL) or was the last number they saw (LLH). In this way, we could test whether an extreme price seen before or after other prices has a differing effect. We expected that the more recent the exposure to the extreme value, the more profound the effect it would have.

At the same time, we manipulated whether their encounter with the anchor was active, or passive. In the "active" conditions, participants were asked, "If you were to bid on this auction, would you bid MORE or LESS than $X" where X was either $23 or $987. Participants were required to type in "M" for more or "L" for less on the keyboard in order to advance to the next screen. In the passive condition, participants did not receive the comparative question. Those in the control condition did not view any previous auction results and hence were not exposed to any possible anchors. They formed the baseline for all of our comparisons.

After instructions and anchors (test conditions) or just instructions (control), respondents then participated in the real auction, where they entered their bid for dinner for two (including appetizer, entrée, dessert and a soft drink). They subsequently had the opportunity to review and confirm their bid. At the end of the survey, they were asked to enter a code comprised of 10 characters or less which would be used to identify the winner. Participants decided how much time they would spend on each screen in the study and advanced at their own pace.

Results

We analyzed the data first by running a regression on dummy variables specifying the test conditions. Results for this regression are shown in Table 2. The average bid for the dinner in the control group was $39.88. A discussion of bids under test conditions follows.

Insert Table 2 about here

First and foremost, the order of the number sequence impacted the amount of the bid. On average, respondents who encountered the extreme anchor most recently before the real auction, the LLH condition, bid $7.86 more than control group members (p<0.05). Bids for the LHL condition were $4.58 higher on average than control group bids, although this difference was not statistically significant. It would appear that, whether the anchoring effect is the result of numeric or semantic causes, the effect is short-lived when other numbers are encountered subsequently. While Adaval and Monroe (2002) highlight the fact that their subliminal primes persisted for 48 hours, our effect diminished almost immediately. One potential explanation for the divergent results is that the standard formed in memory is replaced only when another number in the same context supplants it. It appears Adaval and Monroe exposed their participants to only one number, albeit subliminally, in the context of their study.

When the products shown in the sample auction were the same (the applicable condition), the average bid increased an incremental \$3.65 (p<0.05). This result is consistent with previous work in the anchoring literature demonstrating that the magnitude of an anchor's effect increases with the similarity between subjects shown in the comparison task and the estimation task, and it supports the integrative model of anchoring effects proposed by Mussweiler & Strack (2001). Note also that ordering of the sequence of numbers had a significant effect on bids regardless of whether or not the potential anchors were applicable.[2]

There was no effect based on whether the respondents actively attended to the anchors, or viewed them passively. This result is consistent with the notion that people spontaneously perform a comparative evaluation and was not entirely unexpected. We believe it is reasonable to expect the absence of a deliberative comparison would not hinder the effect, particularly given that human judgment is often considered comparative in nature, even if a comparison is not explicitly asked for (Kahneman and Miller 1986).

Discussion

In Study 2, we tested the effect of an extreme anchor (987) on consumers' willingness to pay for an unrelated product. We find no difference in the effect whether consumers are steered towards actively processing the number, or are simply exposed to the number for the duration of their choosing. We also find that, while numbers associated with the same product magnify the effect (ala the traditional reference price literature), numbers associated with entirely unrelated products also have a significant effect. Finally, we find that order moderates the effect in that an extreme anchor is strongest when it is viewed most recently.

In Study 3, taking what we have learned through Studies 1 and 2, we test the influence of incidental prices empirically in a real world auction setting. Therefore, an important distinction among auctions that is relevant to this research should be clarified. The distinction is whether the items sold assume independent private values (Vickrey 1961) or common values (Rothkopf 1969, Wilson 1969). In an independent private value (IPV) setting, bidders know the value of the item to themselves with certainty, and this value may differ widely across bidders. They gain no information about their personal valuation by observing the bids of others. Classic automobiles most frequently fall into this category, as two different aficionados may value a burgundy 1967 Plymouth Barracuda convertible differently. Conversely, with common value models, the “true value” of the item is the same for all bidders after the auction, because its value is determined through resale or exploitation such as cutting of timber or drilling for oil.

Study 3 examines how the sale price for one item sold at auction (i.e., the incidental price) can affect the highest bid secured for the next successive item brought up for sale. In other words, if Item A sells immediately before Item B at a relatively high price, bidders elevate their reservation prices (IPVs) for Item B. This occurs even if the two items are not closely related, bidders on Item B have no interest in Item A, the potential buyers are sophisticated shoppers, and the price of Item A provides no market information useful when valuing item B. We test all four of these propositions as best we can given the nature of the data provided.

STUDY 3

We hypothesize an anchor effect for incidental prices in English auctions, where large price differentials between successive items put up for sale systematically affect the maximum bid for the latter item. The essential feature of the English auction is that each bidder knows the level of the highest bid at any given point, as they observe their competitors' bids. The English auction, in which bidders successively raise an item's selling price until only one buyer remains, is probably the most recognized form of auction and is the model for online sellers such as Ebay and Yahoo auctions. It is also the form of auction most commonly used for selling goods like automobiles.

Our data come from one of the largest and best-known automobile auctioneers in the U.S., whose annual Classic Car Auction attracts some 125,000 car enthusiasts and 2,000-plus bidders from around the world. The company's year 2000 auction resulted in the sale of 538 consigned cars for a total sales figure exceeding $23 million.

Certain features of our particular auction make it particularly relevant for an anchoring study. Firstly, the automobiles are considered classic cars. Consider the average price paid in our data ($26,892) and the standard deviation ($25,213). With classic cars, no two cars are identical. Especially across model years and automobile makes, there will be wide dispersion of bids. Therefore, bids on past cars will offer relatively little information content for bidders on future cars, although we formally investigate in several ways whether buyers integrate relevant information.

Secondly, the bidders are not typical car buyers at a police auction looking to get a good deal on a daily driver. At the auction specifically selected for this study, the bidders are typically experts who are bidding on specialty items. With expertise there is a trend toward increased specificity and changes in the category structure. Developmental studies of natural categories (Anglin 1977) and laboratory studies (Murphy and Smith 1982) tell us increased product familiarity results mainly in an increased ability to categorize products at levels above and below the basic level, or make finer discriminations. And there is evidence that the basic level itself becomes more specific as expertise increases (Rosch et al. 1976). "Thus, an expert may spontaneously label a car as a 3-liter BMW, whereas a novice may simply describe it as a car" (Alba and Hutchinson 1987). Just as wine is not wine to the connoisseur, cars are not cars to those who attend this particular auction.

A third important feature is that detailed price guides offering precise information to bidders about each specific car are widely available, and several are sold on site. In addition, a number of annual publications list the market value for specific cars based on previous sales of similar autos. Hence, we expect that expert bidders, like the ones in our auction data, would know the market price or blue book price of a particular automobile.[3] Furthermore, automobiles sold at the auction studied here are inspected prior to being put up for sale, enabling bidders to further refine their bid relative to pricing guide values. So, even though there is high variance of car values across cars, our bidders are relative experts who have precise information readily available in order to enable them to make informed bids. In our auction, therefore, we have normative values for the car in addition to observing actual bids. Because our analysis is across cars of widely different values, we use the blue book data to standardize bids. The correlation of blue book prices with the actual bids is 0.79, making us comfortable using blue book values to standardize the bids for our analysis. We posit that anchors will shift actual bids relative to these normative price guide figures.

The company provided the authors sales records for 3,378 automobiles that had been auctioned off from 1995 through 2000. Of these, 33 records were missing final prices (either sales prices or highest bids), and we were unable to obtain reliable independent blue book values for 1,130 additional cars. The remaining 2,215 records contain 1,477 sales where the record for the previous car on the block selling was complete, giving us a large sample with which to work.

Each automobile's individual record contained the auction year (AUCTION), the lot number (i.e. the order in which the cars came up on the docket), the make (e.g. Ford), model (e.g. Thunderbird), and year of production (e.g. 1955). Each record also included the highest bid for the car (HIGH) and whether or not the highest bid resulted in the sale of the car (SOLD). For cars that sold, the high bid was greater than the seller's reservation price, if one existed (the seller may impose a reservation price, discarding all bids if they are below this amount).

For the six years in question, the auction always began on a Thursday and ended on a Sunday, and each record indicated the day of the week on which the car came up for auction. We defined a set of indicator variables to account for differences in the days (FRIDAY), (SATURDAY), and (SUNDAY). The data also show whether or not the car was sold during that day's prime time (PRIME), those hours in the middle of the day when the greatest number of bidders was likely to be present. In addition, we supplemented the data provided with independent blue book data on the value of the car (BLUE), taken from the Old Car Pricing Guide published in the year of the auction. It was extremely important to use a blue book value published in the year of the auction as the value of many classic automobiles fluctuate year to year, and informed bidders would rely on the most up-to-date blue book prices. As for the units of measurement, AUCTION is in years and HIGH is in dollars. The other variables are indicator variables, where PRIME is defined as “1” if the car was sold during prime time and “0” otherwise, and SOLD is “1” if the car was sold and “0” otherwise.

From the available data, we constructed additional variables of interest. Our dependent measure is the percentage difference between the high bid and the blue book price (PREMIUM), which was calculated as (HIGH-BLUE)/BLUE. Table 3 gives summary statistics on PREMIUM by auction year, where the mean for 1995 suggests that these automobiles sold on average at 88% above blue book.[4] Because some cars sold far above blue book values, the means are skewed much higher than the medians. We therefore report both the mean and median along with various measures of dispersion (standard deviation as well as 5% and 95% quantiles). The statistics in Table 3 also indicate that most of the cars sold for more than blue book value for all years. For instance, in 1995, half of the cars sold for at least 62% above their blue book value and 5% sold for more than 314% over blue book. This is likely to be due to high quality of cars brought to this particular auction (the auction fee serving as a selection constraint), but the competitive nature of the auction may serve to elevate prices as well. This does not pose a problem for our analysis, as we have no reason, a priori, to expect the difference between SOLD and BLUE to differ systematically for different cars. Finally, to measure the effect of an anchor we defined ANCHOR as the ratio of the HIGH bid for the previous car and the BLUE book value of the focal car.[5]

Insert Tables 3 & 4 about here

Results

The results of this model are given in Table 4. We present model estimates in Table 4 for which the standard errors have been estimated using White's correction (White, 1980) for heteroskedasticity. The estimate for AUCTION is 0.064, meaning that the average premium at this auction has increased by an additional 6.4% each year. Because PREMIUM was calculated using period blue book values, PREMIUM is already adjusted for inflation. However, the United States exhibited an extraordinary economic boom during the period of the data; potentially the roughly 6% annual increase is the effect of a positive income elasticity for luxury items. The Premium coefficient for Thursdays is lower than on other days. In addition, a Wald test of coefficient restrictions on the day indicator variables fails to reject that premiums on Friday, Saturday, and Sunday are all equal (p-value = 0.25). The premium shift for the weekend is most likely a mixture of supply and demand effects: sellers have the ability to choose among available days, and auction attendance is typically significantly higher on these days.

Similarly, sellers have the option of paying an additional fee to sell their car during PRIME time on the weekend days. Sellers who anticipate higher margins are more likely to pay the additional fee, so it comes as no surprise that we find "prime time" cars have bids that are 25% higher than non-prime time bids. We also tested interactions of PRIME with individual days, not finding any interactions to be significant. Somewhat less intuitive is the finding that PREMIUM for cars that sold was 35% lower than for cars that did not sell (the high bid failed to meet the seller's reservation price). If we consider the high bid to be a random variable, the probability that a high bid exceeds a reservation price decreases as the reservation price increases (i.e., cars with low reservation prices outsell cars with high reservation prices, all else equal). We believe this logic to be the explanation for the negative sign on SOLD.

More pertinent to our study is that we do find substantial evidence of an anchoring effect across auctions, where the high bid for the previous automobile, on average, influences the premium on the current or focal car. If the highest bid on the previous car was three times the blue book value of the current car, the premium on the current car averages 3*14.8% = 44.4% above the unanchored premium. In other words, if the car that sold before your '67 Plymouth Barracuda was a classic Mercedes that sold for three times the blue book value of your car, you can expect a 44% (3 x 0.148 in Table 4) premium increase.

DISCUSSION

Alternative Explanations

Because the results are obtained in empirical data, outside the control of a laboratory where competing effects are eliminated by design, we investigated several alternative explanations for the observed anchoring effect. The first alternative explanation would be that similar cars were sold in sequence, so that recent bids are more informative than less recent bids. The second competing explanation is that buyers attend to margins on previous cars in order to get a *feel* for the current market, and the third possibility is that high bids on preceding cars induce a "big spender" type of social effect.

We first assess the degree to which similar cars were grouped together, for similar items are often grouped together at art and furniture auctions. If similar items are sold in sequence, the previous car's bid would offer more information than other prior bids and should appear significant in our model.[6] Sequences of similar cars could also lead to an additional cause for autocorrelation of bids. One could imagine that a bidder on an extremely costly car may have lost that item to a more aggressive bidder and consequently elevated their budget constraint for a subsequent similar car, which had a lower blue book value.

Sequences of similar cars do not appear to be the cause of our results, for two similar cars rarely followed each other in succession (See Table 5). In addition, we attended the 2001 auction and monitored 100 random lots, recording the number of bidders who bid on successive cars. Only about 4% of the automobiles that came up for auction in that sample had bidders who had bid on the previous automobile.

In order to increase our confidence even further that bundles of similar cars hitting the block was not the cause of our results, we also re-estimated our model on two reduced sets of data. First, we deleted all observations for which the current car and the previous car are of the same make (Ford, Porsche, etc.). We view this selection procedure as more than adequate, in that different models both of the same make may dramatically differ. For example, we have in our data a Ford Model T sold immediately following a

Ford Thunderbird. Even so, there is the possibility that two cars of different makes may be very similar, an issue we address below. Using this reduced set of cars, the regression results are very much like those in Table 4 (the anchor coefficient is 0.13, significant with a *p*-value of 0.0003), showing that sequences of similar cars are not causing the result reported above.

To address the possibility, albeit remote, that similar cars of different makes are sold in sequence, we deleted all cars whose pricing guide valuations are within $10,000 of one another. Again, we view our procedures as draconian, in that a $10,000 range is vast for similar cars. (The average price of cars in the data is around $27,000.) Our results again are very much like those of Table 4 (the anchor coefficient is 0.12, with *p*-value of 0.0023). We view these results as quite strong, eliminating this particular alternative cause of the observed effect.

Insert Table 5 about here

Another potential competing explanation is that buyers attend to margins on previous cars in order to get a feel for the current market, thereby determining what the current "mark-up" above blue book should be and adjusting their valuations or reservation prices accordingly. If so, the bids on the focal car would be affected by the PREMIUM of the preceding car(s), or better yet, the mean PREMIUM of preceding cars. To test this hypothesis, we constructed a variable MEANPREM, the average margin for cars preceding the focal car, not including preceding cars that were on the docket in previous days or time periods (PRIME/non-PRIME). We replaced ANCHOR with MEANPREM, finding that the margin measure is not significant (see Table 6). We also included MEANPREM along with ANCHOR, finding that ANCHOR remained significant while MEANPREM was not significant (See Table 7). These results show that bidders are affected by nominal preceding bids, not by preceding margins.

Insert Tables 6 & 7 about here

Alternatively, buyers may be influenced not by the margins but the actual prices of preceding cars such that inflated bids on previous cars may induce a "big spender" type of social effect. Imagine that after one buyer is willing to shell out hundreds of thousands for a single car, it may be socially unappealing to show reticence towards spending an additional $500 or $1,000 for a subsequent car. This social argument regards the bidding atmosphere, meaning that we would like some measure of not just a recent car, but of the bidding environment. To test for this big spender social effect, we constructed a variable called BIGSPEND. It is the average HIGH bid for cars preceding the focal car, not including preceding cars that were on the docket in previous days or time periods (PRIME/non-PRIME). It also is calculated excluding the HIGH bid for the car immediately preceding the focal car, since that value is already used in ANCHOR.

The results of the model with BIGSPEND are not shown here, but they are similar to those for MEANPREM. When BIGSPEND replaces ANCHOR in the model, it is not significant ($p>0.20$). If BIGSPEND is included with ANCHOR, ANCHOR is significant

($p<0.01$), but BIGSPEND is not ($p>0.95$). Therefore, the anchor effect appears to be something separate and different from a social big spending effect.

There is one other alternative explanation for the significant coefficient on ANCHOR. Because our dependent variable (PREMIUM) and our main predictor (ANCHOR) both have the same denominator (BLUE), it is plausible that the significant coefficient on ANCHOR is due to this common component. However, a model in which we eliminate this common component (dependent variable as $HIGH_t$-$BLUE_t$, main predictor as $HIGH_{t-1}$) has a significant coefficient on $HIGH_{t-1}$. So the correlation is not due to the common component, in that the significance holds when this common component is eliminated.

To summarize, in Study 3 we find evidence in the actual marketplace that incidental prices affect willingness to pay. In the auction data, the highest bid on the prior car influenced bids on the subsequent focal car. An economically rational agent would be interested in information from past bids, but this agent would focus on margins rather than nominal bids. We find no evidence that bids are affected by past margins, only by past nominal values, a result which suggests that seemingly innocuous recently-viewed numbers (incidental prices) can affect buyers' willingness to pay.

CONCLUSION

This research has demonstrated how incidental prices – those prices advertised, offered, or paid for goods that are neither viewed by the seller or the buyer as an indicator of what may or should be paid for item in question, can affect people's willingness to pay. We demonstrate in Study 1, a natural experiment, how the price of a sweatshirt on display at an adjacent seller affected shoppers willingness to pay for a music CD, despite the product's status as a relative commodity. In Study 2, we found irrelevant anchors influenced bidders' willingness to pay in a controlled laboratory experiment, and documented mediators and moderators of the effect. When the numbers were associated with similar or identical products, the effect was larger, while the order in which bidders encountered the anchors served as a moderator, such that the final number had a disproportionate effect. In addition, we found that attempts to reduce the attention paid to potential anchors – refraining from prompting people to process the anchor – did not diminish the effect. In Study 3, real world auction data reveal that the price tag on a relatively expensive car can affect bidders' willingness to pay for a lower-priced car that subsequently hits the auction block, and that this effect increases as the price of the anchor automobile increases.

Although we have shown that incidental prices can act as anchors when the focal products have less (music CD) and more (classic cars) ambiguous market prices, it would be interesting to test the relationship between incidental prices and internal reference prices or valuations. We would expect an incidental price to affect willingness to pay for a can of Coke, with its extremely well known common value, much less than it might affect items where consumer valuations differ widely, or where they may have more difficulty assessing value, such as wines, art or gourmet meals. We have found effects for items at both extremes (music CDs and classic cars), but have not compared the magnitude of the effect across types of goods.

In addition, the type of numbers that people spontaneously anchor upon may differ. Recall our results differ from previous studies of anchoring (Adaval & Monroe

2002) in which the effect of anchor persists for days. We would expect respondents in their studies to have come across other numbers in that time period. In our experiments, the effect of a recently viewed, extreme number diminishes quickly if another number is presented in the same context. More work could be done to examine what exactly makes the effects of some numeric anchors persist and others diminish over time.

Future research may also examine the differing effects, if any, between low and high anchors on willingness to pay. Typically, researchers have investigated how high anchors serve to elevate judgments or factors in marketing, such as willingness to pay (Northcraft & Neale 1987) and purchase quantities (Wansink, Kent and Hoch 1998). Researchers investigating anchoring effects have documented the effect of negative anchors (e.g., Green et al.), yet the results have been mixed as to whether the effects are symmetric (Mussweiler & Strack 1999) or asymmetric (Jacowitz and Kahneman 1995). Many high-priced items (e.g., automobiles, vacation packages) may be negatively affected by low incidental prices and this effect may not be identical to the effect of high anchors. In the domain of pricing, any asymmetric effect of high and low anchors "may arise from an asymmetry of uncertainty…" as suggested by Jacowitz and Kahneman, in which there is a definite lower bound ($0) but no definite upper bound. Although not reported here, we investigated negative anchors using the classic automobile data. Because of large standard errors on negative anchors, we could neither rule out symmetry (negative anchors have equal and opposite effect of positive anchors) nor asymmetry (negative anchors have no effect at all). Our statistically insignificant results for negative anchors prevent us from drawing any substantial conclusions with regards to the relative effectiveness of high versus low incidental prices, although it would be interesting to explore whether any asymmetries exist in how incidental prices affect willingness to pay.

From a practical perspective, the present research on the determinants of an incidental price's effect on willingness to pay offers guidance to marketers who should be aware of the environmental factors that influence consumers' spending limits. The effect of incidental prices may be far reaching and have profound implications for sellers. First and foremost, as Study 3 illustrates, our results have clear and direct implications for all of the parties involved in an auction. The prescription for sellers is clear – attempt to get your belongings to follow costlier items onto the selling block – the more expensive the better. Auctioneers, whose profits are derived not from the sale of one item, but from maximizing total sales, might develop an algorithm that optimizes the order in which lots come up, in order to maximize price differentials based on expected selling price. At the very least, rather than follow a clear progression from inexpensive to expensive items, they may want to intermingle the two types of goods.[7] And bidders must be cognizant of the undue influence high bids or selling prices for preceding items may have on their willingness to pay in order to correct for it.

The marketing implications clearly extend beyond auctions, to online vendors and conventional retailers alike. Virtual resellers may want to consider our results when programming which pop-up ads appear when as surfers visit their site. While opening a browser with the intention of buying a book at Amazon.com, one author noted the pop-up ad touted flights at Orbitz.com "starting at $124," which is not expensive for airline travel, but quite costly for a book. Could exposure to that ad have made him less price sensitive, allowing him pay more than $60 for a pricing text without balking? Similarly, imagine the consumer who sees a Mercedes billboard making it clear that the C-class model can be purchased for less than $37,000 before entering his favorite fast food drive through. Does the $6.95 value meal suddenly seem more like a good deal? Given our results, we suspect this may often be the case.

ENDNOTES

1. The music CD sold for between $13.99 and $15.99 at numerous retail vendors in town at the time of the experiment. It was “on sale” for $14.99 with a list price of $17.98 at Amazon.com.
2. To see this, we tested if the LLH bids were the same as the control bids 1) using only applicable LLH bids, and 2) using only inapplicable LLH bids. The null was rejected in both cases at $p<0.05$.
3. In fact, when one of the authors attended the auction, several appraisal guides were widely available for sale including those from the National Automobile Dealers’ Association (N.A.D.A.) and the Old Cars Price Guide from Krause Publications.
4. Data for the year 2000 is incomplete due to the fact that the company was still processing data when the records were delivered to the authors.
5. We also have used a set of dummy variables to create a non-parametric specification of this model. Because the results from the non-parametric model did not substantively differ from those we present here, we have not included the non-parametric results in this paper.
6. We thank an anonymous reviewer for pointing out this alternative explanation.
7. If negative and positive anchors are symmetric, and if the anchor effect is linear, then the auctioneer’s profits will be the same regardless of the order. The data does show that the anchor effect is close to linear, but the data is inconclusive on the symmetry of negative and positive anchors.

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Figure 1

A Framework Describing the Effect of Incidental Prices on Willingness to Pay

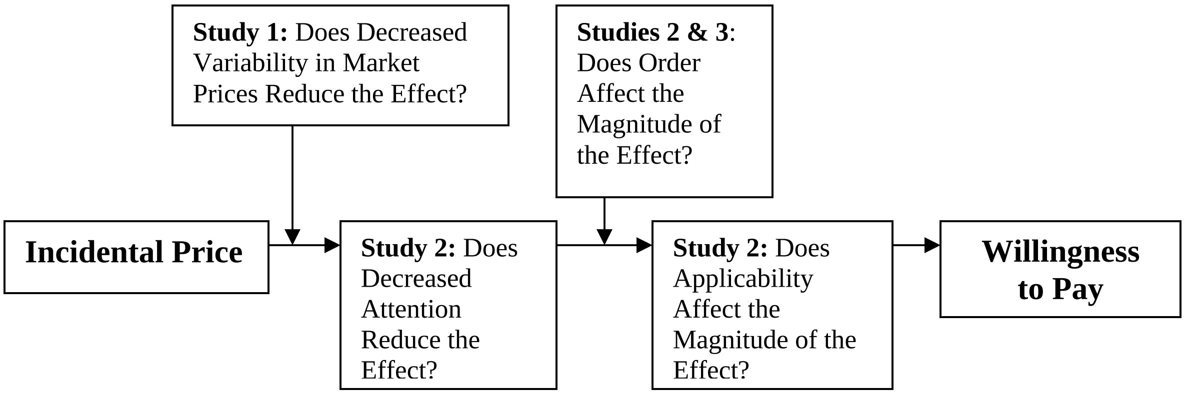

TABLE 1

	Bid for Music CD		
Sweatshirt Price	**n**	**Mean**	**Std. Error.**
$10	30	$7.29	$0.54
$80	30	$9.00	$0.64

TABLE 2

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	39.88	2.61	15.26	<0.0001
Applicable	3.65	1.67	2.18	0.0294
Active	-0.33	1.67	-0.20	0.8447
HLL	1.49	3.22	0.46	0.6435
LHL	4.58	3.23	1.42	0.1572
LLH	7.86	3.20	2.46	0.0144

TABLE 3

Study 1: Summary of Premium by Auction Year

		Premium				
				Quantiles		
AUCTION	N	Mean	s.d.	5%	Median	95%
1995	239	0.88	1.29	-0.38	0.62	3.14
1996	278	1.10	1.51	-0.31	0.68	3.63
1997	240	1.15	1.30	-0.29	0.92	3.58
1998	363	1.13	1.34	-0.20	0.79	3.66
1999	316	1.10	1.24	-0.32	0.88	3.48
2000	41	0.97	1.19	-0.46	0.59	2.94

TABLE 4

Dependent Variable: PREMIUM
Number of observations: 1477
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTERCEPT	0.567838	0.099295	5.718712	0.0000
AUCTION YEAR	0.064001	0.021067	3.038051	0.0024
FRIDAY	0.301492	0.080738	3.734208	0.0002
SATURDAY	0.405079	0.098204	4.124869	0.0000
SUNDAY	0.208373	0.103151	2.020077	0.0436
PRIME	0.253749	0.081009	3.132371	0.0018
SOLD	-0.349373	0.076167	-4.586916	0.0000
ANCHOR	0.148480	0.039326	3.775628	0.0002

R-squared	0.180333	Mean dependent var	1.075764
Adjusted R-squared	0.176427	S.D. dependent var	1.334992
S.E. of regression	1.211517	Akaike info criterion	3.227025
Sum squared resid	2156.159	Schwarz criterion	3.255720
Log likelihood	-2375.158	F-statistic	46.17024
Durbin-Watson stat	1.947774	Prob(F-statistic)	0.000000

TABLE 5

STUDY 1: SIMILARITIES BETWEEN CARS OFFERED IN SUCCESSION

Year	N	Identical Make	Make & Model	Make, Model & Year
1995	239	16 (6.7%)	4 (1.7%)	0 (0.0%)
1996	278	25 (9.0%)	6 (2.2%)	4 (1.4%)
1997	240	10 (4.2%)	4 (1.7%)	2 (0.8%)
1998	363	29 (8.0%)	10 (2.8%)	4 (1.1%)
1999	316	28 (8.9%)	5 (1.6%)	3 (0.9%)
2000	41	2 (4.8%)	1 (2.4%)	0 (0.0%)
	1447	110 (7.4%)	30 (2.0%)	13 (0.9%)

TABLE 6

Dependent Variable: PREMIUM
Number of Observations: 1477
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTERCEPT	0.859011	0.076426	11.23976	0.0000
AUCTION YEAR	0.062316	0.023692	2.630242	0.0086
FRIDAY	0.305678	0.085265	3.585018	0.0003
SATURDAY	0.510699	0.106063	4.815047	0.0000
SUNDAY	0.328607	0.115781	2.838165	0.0046
PRIME	0.382519	0.091451	4.182791	0.0000
SOLD	-0.314960	0.081792	-3.850742	0.0001
MEANPREM	-0.000118	0.000203	-0.578962	0.5627

R-squared	0.058459	Mean dependent var	1.075764
Adjusted R-squared	0.053972	S.D. dependent var	1.334992
S.E. of regression	1.298466	Akaike info criterion	3.365645
Sum squared resid	2476.753	Schwarz criterion	3.394340
Log likelihood	-2477.529	F-statistic	13.02973
Durbin-Watson stat	1.881771	Prob(F-statistic)	0.000000

TABLE 7

Dependent Variable: PREMIUM
Number of observations: 1477
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTERCEPT	0.567605	0.099344	5.713560	0.0000
AUCTION YEAR	0.065882	0.022301	2.954194	0.0032
FRIDAY	0.303304	0.080837	3.752028	0.0002
SATURDAY	0.409461	0.096648	4.236605	0.0000
SUNDAY	0.214485	0.107638	1.992657	0.0465
PRIME	0.253166	0.080589	3.141447	0.0017
SOLD	-0.349630	0.076035	-4.598252	0.0000
ANCHOR	0.148400	0.039347	3.771582	0.0002
MEANPREM	-3.64E-05	0.000184	-0.197753	0.8433

R-squared	0.180362	Mean dependent var	1.075764
Adjusted R-squared	0.175896	S.D. dependent var	1.334992
S.E. of regression	1.211908	Akaike info criterion	3.228344
Sum squared resid	2156.083	Schwarz criterion	3.260626
Log likelihood	-2375.132	F-statistic	40.37939
Durbin-Watson stat	1.947872	Prob(F-statistic)	0.000000