The Effect of Information and Institutions on Price Negotiations: Evidence from Matched Survey and Auto Transaction Data*

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Abstract

Using matched survey and transaction data on 1,500 buyers, we investigate how different types of search and purchasing behavior affect transaction prices in auto retailing. Our results are consistent with the predictions of information economics and bargaining theory. Buyers pay less if they obtain an offer from a competing dealer (0.6% of purchase price), if they are informed about the specific car they eventually purchase (0.8%), and if they are patient (0.6%). The combined savings of these effects equal 1/3 of the average dealer margin. We find that the Internet lowers prices because it informs consumers (0.9%), and because the referral process of online buying services helps consumers (0.7%). We also find that buyers who perceive themselves as vulnerable in negotiation are more likely to benefit from the Internet. Such buyers pay 1.5% less when they use the Internet to inform themselves, while buyers who enjoy the bargaining process do not obtain a lower price when they are informed. These results suggest that tactical decisions consumers make to improve their price negotiation outcomes have surplus redistributing effects. The results speak both to the significance of the Internet in making information more easily available, and also to the potential of Internet institutions to affect the distribution of surplus even in established offline industries like auto retailing.

1 Introduction

Negotiation is a common way to determine a price in a market economy. For example, the price of many business services and of large consumer purchases are often negotiated. Despite the importance of negotiations, there is little non-experimental empirical literature on bargaining. This is because of the difficulty associated with collecting data on bargaining outcomes and relating them to the bargaining behavior and characteristics of the negotiating parties.

This paper overcomes these difficulties by using transaction data on new car purchases supplemented with the responses to a survey that asks buyers detailed questions about their search and purchase behavior. Our aim is to use this data to understand what helps consumers negotiate better prices. Information economics and bargaining theory predict that several broad categories of factors determine the price a buyer will negotiate, including the buyer's reservation price, the buyer's understanding of the seller's position, and the buyer's bargaining ability. We will relate measures of these factors to negotiated prices for new cars.

The Internet has become one of the most important sources of information that can affect these factors. In particular, consumers can research product characteristics, make price comparisons, communicate with sellers, obtain recommendations from peers, and so on. In addition, the Internet has made possible new institutions, like online buying services, that change price negotiations. As a result, we are particularly interested in what aspects of Internet use matter most for price negotiations.

We will address these questions in the context of price negotiations for new vehicles. We use a novel dataset that combines transaction data on 1,500 car purchases in California with the responses to a survey that asks buyers about their search and purchase behavior, their Internet usage, their attitudes towards information search and bargaining, and their demographics.

We have two specific goals in this paper. The first goal of the paper is to investigate what kinds of information, characteristics, and tactics help consumers negotiate favorable prices. For example, are buyers helped by knowing the invoice price of a new car? Is it important for buyers to have a price offer from a competing dealer? The second goal of this paper is to determine whether the Internet affects prices because it helps buyers obtain information that lowers the prices these buyers can negotiate, or whether the Internet affects prices because it has made widely available new institutions, like online buying services, that change the way price negotiations are conducted.

Our results are consistent with the predictions of information economics and bargaining

theory. In our first set of results we find that buyers who visit more dealers and who obtain an offer from a competing dealer pay less (0.6% of the purchase price). Also, buyers who reported collecting information on the specific car they eventually purchased pay lower prices (0.8%). Alternative measures of being informed, such as the hours of research activity or knowledge of the invoice price have comparable effects. We also find that buyers who are willing to postpone their purchase, should negotiations with the dealer break down, pay lower prices (0.6%). We find these price effects remain significant when we control for a consumer's demographics and characteristics, such as disutility of bargaining, willingness to search, and car knowledge. Thus, the search behavior and strategies we study are not simply proxying for unobserved consumer characteristics.

We also find that the benefits of gathering information differ by consumer type. While buyers with a high disutility of bargaining pay 2% less when they have collected information on the specific car they eventually purchase, buyers who enjoy the bargaining process pay the same price whether or not they collect information.

Our second set of results is on the role of the Internet. We find that the Internet lowers prices for two distinct reasons. First, it helps consumers collect information about prices. Second, the referral process of online buying services, a novel institution made possible by the Internet, helps consumers obtain lower prices. Our results show combined Internet and referral price effects of -1.6% to -2.5%; these estimates are close to the estimates of -2.2% in Zettelmeyer, Scott Morton, and Silva-Risso (2002), using a different data source, a different estimation method, and a different time period. Interestingly, we find that referrals from a manufacturer's web site to one of its affiliated dealers does not help consumers obtain a lower price. Superficially, referrals from independent online buying services and manufacturers are similar in that they put a customer in contact with a particular dealer. We conjecture that online buying services are more effective at lowering prices because their ability to direct customers among competing dealerships enables them to exert pressure on dealers to offer customers good prices. Manufacturers, who must maintain relationships with all their dealers, are less able to do so.

Finally, we find that using the Internet to obtain information helps only buyers who have a high disutility of bargaining. While buyers with a high disutility of bargaining pay 1.5% less when they use the Internet to inform themselves, buyers who like the bargaining process do not benefit from being informed. In contrast, the benefits of requesting a referral from an online buying service are equal for the two types of buyers (-0.7%)

Our paper is closely related to prior work analyzing how consumers search for car information. Ratchford and Srinivasan (1993) use survey data on search and choice behavior from a local automobile market to estimate returns to search time. They find evidence that consumers discontinue their searches in a manner that is consistent with balancing the returns from search with the cost of search. Ratchford, Talukdar, and Lee (2003) analyze how the Internet has changed consumer search behavior for automobiles. They use data on information sources used by consumers in 1989 (before the Internet) and 1999 (after the Internet) to estimate a model of total search. They find that the Internet leads to reduced total search and that Internet users would have searched more than offline users had the Internet not existed.

This paper is also related to Scott Morton, Zettelmeyer, and Silva-Risso (2001) and Zettelmeyer, Scott Morton, and Silva-Risso (2002). These papers are based on a large dataset of transaction prices for new cars which is then combined with information on Internet usage from a large online buying service (Autobytel.com). The first paper provides an overview of Internet car retailing and shows that consumers who use Autobytel.com pay lower prices than consumers who do not. The second paper controls for selection and shows that using Autobytel.com reduces the price a consumer pays by approximately 2.2%. Neither paper addresses the research questions in the present paper. This is because the data used in these papers only contains a single search- or Internet-related explanatory variable, which is whether a consumer used the online buying service Autobytel.com. This service both informs consumers and allows them to submit an online referral. Without other explanatory variables measuring, for example, the extent to which consumers were informed from other sources, these papers cannot determine the effects of different search and purchasing activities. For the same reason these paper cannot disentangle whether consumers save from using the Internet because they become better informed, or because new institutions, like online buying services, change the way price negotiations are conducted.

This paper also contributes to a small body of empirical literature analyzing the effect of Internet search on firms' pricing behavior. Brynjolfsson and Smith (2000), Ellison and Ellison (2001), and Iyer and Pazgal (2003) analyze pricing in the context of comparison shopping agents. Brown and Goolsbee (2002) show that the Internet may have helped to lower prices for term life insurance. In contrast with these previous studies, our focus is on the effect of different types of search and purchase behavior on negotiated prices.

We proceed as follows. Section 2 describes the survey and transaction data. Section 3 presents basic results from the survey. Section 4 investigates how different types of search

behavior affect transaction prices. Section 5 analyzes the different ways in which the Internet lowers prices. Section 6 concludes the paper.

2 Data

Our data come from two sources. The first source is a survey instrument which we mailed to 5250 consumers who purchased one of eight popular new car models in California during April and May 2002. We match the individual survey data to transaction data from a major supplier of marketing research information (henceforth MRI).

2.1 Survey data

Survey instrument: The survey asked questions about (1) the number of dealers a buyer visited, (2) the buyer's negotiation strategy, (3) the offline and online sources of information the buyer used, (4) the information the buyer learned at each of these information sources, (5) the referrals the buyer requested, (6) demographics, and (7) personal attitudes towards bargaining and information search. A copy of the survey can be found in the appendix.

Sample: We chose our sample by car type and then mailed the survey to every consumer of the selected car types for whom we had transaction data in April and May 2002. The first objective in selecting car types was to include a variety of car categories (e.g. midsize sedan, luxury sedan, pickup, SUV, etc.). This is because we knew from previous work that Internet search could affect different car categories differently. The second objective in selecting car types was to keep the number of different cars small in order to be able to control for car fixed effects without losing too many degrees of freedom. We defined a "car" as the interaction of make, model, body type, transmission, displacement, doors, cylinders, and trim level (for example, one "car" is a 2002 Honda Accord sedan with automatic transmission, a 2.2 liter engine, 4 doors, 4 cylinders, and the EX trim). We added the purchases of the most common "cars" for a variety of car categories until we reached our desired sample size. This yielded the most popular variants of the following cars: Honda Accord, Chrysler PT Cruiser, Nissan Altima, Chevrolet Silverado, Toyota Corolla, Jeep Grand Cherokee, Honda Odyssey, and Chevrolet Tahoe.

Procedure: Each potential respondents received three mailings. The first mailing contained a letter announcing the arrival of the survey, introducing ourselves as the researchers and explaining the purpose of the project. The second mailing was sent out 5 days later and contained a cover letter, the survey, a pre-stamped return envelope, and a $1 bill. The third

mailing was sent out 5 days after the second mailing and consisted of a postcard thanking buyers for their participation and reminding them to return the survey. Of the 5250 we sent, 2470 were returned completed or partially completed, for a response rate of 47%.

Response issues: Some survey participants filled out the survey in an internally inconsistent manner. For example, some buyers checked off that they did not use the Internet to search for a car but then continued to indicate which websites they had visited. In another example buyers said that they researched two types of car but later reported that they spent zero hours on research. We left most inconsistent answers unedited, except when there was a second way to confirm an answer was erroneous. For example, if a person indicated he had researched zero cars *and* also spent zero hours doing research online *and* zero offline, then we did not allow him to be "informed about the car eventually purchased." In cases in which the answer to a question was missing but could be easily inferred from a followup question we filled in the answer. For example, if a buyer did not answer whether she had used the Internet but proceeded to detail the types of sites she had visited we filled in that she had used the Internet.

Since we have census-based demographic information in the transaction data, we can compare respondents and non-respondents. We find that buyers who did not respond to the survey live in census blocks with a lower percentage of college graduates, a higher percentage of high school drop-outs, a higher percentage of Hispanics and blacks, a lower household income, and lower house values (see Table 2 in the appendix). There is no difference between the two groups in the percentage of buyers who are identified as female on the basis of their first name. We are not concerned about the demographic differences between respondents and non-respondents because our results rely on between-consumer differences in search and purchase behavior and there remains much variation in such behavior among our respondents. In addition, our previous research suggested that it is the poorest, least educated buyers who pay most for a car. Hence, the difference between Internet and non-Internet prices, and the difference in prices paid by consumers who are informed and those who are not, is likely to be smaller within respondents than within the general population. Consequently, our results are likely to underestimate the true benefits of searching and using the Internet.

2.2 Transaction data

MRI collects transaction data from a sample of dealers in the major metropolitan areas in the US. These data include some customer information, the make, model and trim level of the car, financing information, trade-in information, dealer-added extras, and the profitability of the

car and the customer to the dealership.

The price observed in the dataset is the price that the customer pays for the vehicle including factory installed accessories and options and the dealer-installed accessories contracted for at the time of sale that contribute to the resale value of the car.[1] The *Price* variable we use as the dependent variable is this price, minus the *ManufacturerRebate*, if any, given directly to the consumer, and minus what is known as the *TradeInOverAllowance*. *TradeInOverAllowance* is the difference between the trade-in price paid by the dealer to the consumer and the estimated wholesale value of the trade-in vehicle (as booked by the dealer). We adjust for this amount to account for the possibility, for example, that dealers may offer consumers a low price for the new car because they are profiting from the trade-in.

We control for car fixed effects according to the definition of a "car" above. While our car fixed effects will control for many of the factors that contribute to the price of a car, it will not control for the factory- and dealer-installed options which vary within trim level. The price we observe covers such options but we do not observe what options the car actually has. In order to control for price differences caused by options, we include as an explanatory variable the percent deviation of the dealer's cost of purchasing the vehicle from the average vehicle cost of that car in the dataset. This percent deviation, called *VehicleCost* will be positive when the car has an unobserved option (for example a CD player) and is therefore relatively expensive compared to other examples of the same car as specified above. Our measure of price also takes into account any variation in holdback and transportation charges.

To control for time variation in prices, we define a dummy *EndOfMonth* that equals 1 if the car was sold within the last 5 days of the month. A dummy variable *WeekEnd* specifies whether the car was purchased on a Saturday or Sunday to control for a similar, weekly effect. In addition, we include a dummy for the second month in our sample period to control for other seasonal effects.

We control for the competitiveness of each dealer's market. For each dealership we count the number of dealerships with the same nameplate that fall in a zip code that is within a 10 mile radius of the zip code of the focal dealership. We take into account cases where one owner owns several franchises in close proximity so that our measure counts only the number of separately-controlled entities.

We also supplement the demographic information from the survey with census data that

[1] Dealer-installed accessories that contribute to the resale value include items such as upgraded tires or a sound system, but would exclude options such as undercoating or waxing.

MRI matches with the buyer's address from the transaction record. The data is on the level of a "block group," which makes up about one fourth of the area and population of a census tract. On average, block groups have about 1100 people in them. Finally, we control for whether the car was sold in Northern or Southern California.

Combining the two datasets results in about 1,500 observations. This is smaller than the number of returned surveys because of missing information in the transaction dataset and some only partially completed surveys.

3 Survey findings

We first present basic findings from our survey. We report on search intensity, sources of information, negotiation behavior, and demographic differences. The next section combines the survey information for each consumer with information on the outcome of that consumer's car purchase.

Search intensity: Seventy-two percent of respondents reported that they used the Internet in some way to help them shop for a new vehicle. The median buyer who used the Internet spent 4 hours online. Buyers who used the Internet also spent more time collecting offline information than buyers who didn't use the Internet. The median buyer who used the Internet reported having spent 1 hour collecting information from *offline* sources as opposed to 0 hours reported by buyers who did not use the Internet. Buyers who used the Internet and those who did not both report spending a median of 4 hours at dealerships.

Internet users also report having collected information on more car types than buyers who did not use the Internet. The median buyer who used the Internet collected information for 2-3 cars whereas the median offline buyer only collected information for 1 car. Most strikingly, only 52% of buyers who did *not* use the Internet said that they had collected information (from any source) specifically on the vehicle they ended up buying. This contrasts with 95% for buyers who used the Internet. Across both groups the average is 82%. Overall we expect that our estimates of how long buyers search and how informed they are will be higher than is true for the general population because our respondents are wealthier and better educated. However, since we are interested in the difference between buyers who use the Internet and those who do not, this difference should not affect our subsequent findings of the effect of search on price. Indeed, the types of consumers whom our previous research has found to benefit most from

using the Internet (less wealthy, less educated, and racial and ethnic minorities) are under represented among our respondents. The price effect we find here is therefore likely to be less than what we would find in the general population.

As another measure of search intensity, we calculate the number of items (henceforth "pieces of information") buyers checked in questions 16 and 18 of the survey. These questions ask buyers to identify which types of information they gathered at the offline and online sources of information (discussed below). For buyers who used the Internet, the mean number of pieces of information collected online and offline was 9.1 and 7.8, respectively. Buyers who did not use the Internet collected only 7.5 pieces of information offline. The combination of results on the number of hours searched, the numbers of cars searched, and the pieces of information collected suggests that the Internet is not just a substitute for offline information sources for the set of buyers who happen to have online access. Instead, the Internet seems to be attracting the "searchers" among consumers.

Information sources: Among all buyers, 42% used Consumer Reports, 37% used other guide publications (e.g. Edmunds), 18% relied on auto enthusiast magazines (e.g. Car & Driver), 28% looked at the manufacturer's brochure, 12% received information from a financial institution such as a credit union, 47% obtained information from a dealer, and 50% received information from a friend, co-worker, or mechanic.[2] Most of these sources are used in similar proportions between buyers who used the Internet and those who did not. However, buyers who use the Internet are much more likely to have used Consumer Reports (49% vs. 25%) or other guide publications (48% vs. 8%) than offline buyers.

The most frequently visited site by buyers who reported using the Internet were manufacturer websites (70%). Internet consumers also frequently visited informational websites such as consumerreports.com or kbb.com (63%), followed by online buying services such as Autobytel.com or Carsdirect.com (56%) and individual dealer websites (31%). Only 6% of buyers who used the Internet collected information via chat rooms or bulletin boards.

Dealer negotiations: We also asked buyers about their negotiation with the dealer. Only 40% of buyers responded that they had a price offer from a competing dealer when they negotiated for the car they eventually purchased. Of the buyers who had a competing offer, 74% made use of the competing offer by explicitly mentioning it to their dealer. As before, we

[2]Note that these sources are not mutually exclusive, so the percentages do not add up to 100.

found differences between buyers who used the Internet and those who did not. The former were more likely to respond that they had explicitly told the dealer that they knew the invoice price (58% vs. 36%) or the "fair price" (market value) of the car (54% vs. 39%). Finally, 78% of buyers who had used the Internet responded that they had explicitly mentioned that fact to the dealer.

Demographics, search, and Internet usage: We find no difference in search behavior between males and females. There are no differences in the number of pieces of information collected on- or off-line. We also do not find a significant difference in Internet usage, in the number of dealers visited, or in the percentages of informed buyers. The one substantial gender difference is in the propensity of women and men to bring along another person to the dealership to negotiate price (69% of women vs. 48% of men).

Internet usage declines with age. Seventy-one percent of buyers under 20 used the Internet in contrast to 47% of buyers who reported to be 65 and over. Internet usage does not differ strongly across gender; 71% of males and 69% of females used the Internet. Education is good predictor of Internet usage. Only 37% of buyers who reported not to have a high school degree used the Internet. This is in contrast to 81% of buyers with a college degree or higher. Buyers for whom the highest level of education was a high school degree or some college reported using the Internet in 49% and 65% of the cases, respectively. A similar pattern emerges with respect to buyer income. Eighty-seven percent of buyers with income above $150,000 but only 47% of buyers with income between $20,000 and $29,999 reported using the Internet for car buying. Buyers in the lowest income category (below $20,000) have a higher propensity to use the Internet (52%) than those in the next lowest, presumably because that category contains students.

We find that minority respondents (African-American and Hispanic) visit as many dealerships on average as white respondents. However, a lower percentage of African-Americans and Hispanics report having collected information prior to purchasing than do whites (80% and 68%, respectively, vs. 86%). In line with this finding, African-American and Hispanic respondents are less likely to know the invoice price of a car than whites (34% and 32% vs. 49%). Hispanic respondents are significantly less likely to use the Internet to shop for their new car than whites (53% vs. 75%). African-Americans, however, have similar Internet usage as white buyers (71%). This likely contrasts with population-wide statistics due to our survey response bias; the African-Americans who responded to our survey have higher than average

socio-economic status.

4 Price estimations

We now investigate how different types of search behavior affect transaction prices. For this analysis we combine the survey responses from each consumer with information on the outcome of that consumer's car purchase.

Our dependent variable is *Price* as defined in the data section. In order to provide the appropriate baseline for the price of the car, we use a standard hedonic regression of log price. We work in logs because the price effect of many of the attributes of the car, such as being sold in Northern California or in May, are likely to be better modeled as a percentage of the car's value than a fixed dollar increment. We estimate the following specification:

$$\ln(Price_i) = X_i\alpha + D_i\beta + S_i\gamma + \epsilon_i$$

The X matrix is composed of transaction and car variables: car, month, and region fixed effects, car costs, and controls for whether the car was purchased at the end of month or the weekend. The matrix also contains an indicator for whether the buyer traded in a vehicle. The D matrix contains demographic characteristics of the buyer and her census block group (see Table 3 in the appendix for summary statistics). To this basic specification we add a matrix S which contains survey responses that indicate the search behavior and information of a buyer.

We use demographic information on gender, age, education, income, and race from the survey. We use information on house ownership, median house value, and type of occupation in the census block group in which the buyer resides. In our base specification we find that education, house value, and gender are the only statistically significant demographic variables (see column 1 of Table 4). Higher levels of education and higher house values are associated with lower transaction prices. Each higher educational level the buyer attains is associated with a 0.45% price decrease. The fact that other demographic variables are not significant is most likely the result of our small sample size; in our previous work with a larger sample of transaction data we found that age and income, for example, were also significant. In the smaller sample considered here, the coefficient on income is negative but statistically insignificant (-0.30, p-value 0.24). The coefficient on squared income (0.04, p-value 0.04), which is statistically significant, suggests that those with the highest incomes pay more, all else equal.

Women pay on average half a percentage point more for their cars than men. The Hispanic

coefficient indicates that Hispanics also pay on average 0.5% more, however, the coefficient is not statistically significant (p-value 0.18). The coefficient on African-Americans is also not statistically significant, which is perhaps not surprising since only 51 buyers in our final sample classified themselves as African-Americans. These point estimates on Hispanics and African-Americans are about half the size of the ones we estimated in other work with a large national sample (Scott Morton, Zettelmeyer, and Silva-Risso 2003). The reason might be that survey respondents have higher socio-economic status than average for their racial or ethnic group. The female coefficient is identical to our previous estimates.

4.1 Search behavior and prices

We analyze the effect of several basic search behaviors on price. We begin by looking at very general measures of whether a buyer is informed, and at whether the buyer has investigated alternatives to buying from this dealer. We believe that both should be important in price negotiation. Our first specification accounts for whether the buyer collected information at all for the vehicle that she ended up purchasing and whether the buyer obtained a price offer from a competing dealer (see column 2 in Table 4). We find that buyers who reported having collected information for the type of car they eventually purchased pay on average 1.0% less than other buyers. Buyers with a price offer from a competing dealer pay on average 0.65% less than those who did not obtain one.

We designed our survey to ask several related questions about what we anticipated would be key elements of the negotiation process. For example, in addition to asking whether a buyer had a competing offer, we asked how many other dealerships the buyer visited. In addition to asking whether a buyer collected information on the vehicle purchased, we asked how much time the buyer spent doing research online and offline.

If we substitute these alternative measures we find that the number of dealers visited by a buyer is a good alternative measure for having a competing offer. If we repeat the prior specification including the number of visited dealers, having obtained a competing offer becomes insignificant, but each increase in response scale category for the number of visited dealers decreases price by 0.48% (see column 3 in Table 4). The point estimate for having a competing offer is, loosely speaking, approximately equivalent to visiting at least one dealership in addition to the one where the car was purchased.

Using the alternative measure for having collected information, namely the amount of time spent doing research online or offline, we find that buyers who spend any positive time doing

research pay on average 0.88% less than buyers who report having spent no time researching. However, the number of hours spent (other than being positive) is not a significant predictor of price (see column 4 in Table 4).

Having found that collecting information matters in negotiating lower prices, we are interested in what kind of information matters most. In questions 16 and 18 we asked respondents what information they researched, including "which car to purchase," "which dealers to visit or buy from," "MSRP," "dealer cost (invoice/hold-back)," or the "fair price or market value." We find that buyers who report having used at least one source of information to find the invoice price pay on average 0.96% less than other buyers (see column 5 in Table 4). Knowledge of other pieces of information seems not to affect price. It is interesting that the piece of information that matters most is one that is useful primarily in negotiation. Intuitively, having researched which car to buy or which dealer to visit is much less useful in price negotiation than knowing the other party's bargaining position. The empirical results confirm this.[3] In a related result, we find that the number of types of cars for which a buyer collected information has no effect on price (not reported).[4]

We proceed with "being informed about the car a consumer eventually purchase" and "having obtained a price offer from a competing dealer" because these are the responses to the most simple questions and have the fewest missing observations; we refer to these variables henceforth as *Informed* and *CompetingOffer*.

We conclude this subsection by analyzing the price effect of a variable which describes patience during search. We asked buyers about their alternative course of action had negotiations with the dealer broken down (see question 14). The 30% of buyers who indicated that they were very patient by responding "I would not have bought a car at that time" paid 0.59% less than other buyers (see column 6 of Table 4). Henceforth, we refer to this variable as *WillingnessToWait*. The effects of *Informed* and *CompetingOffer* are unchanged in this specification.

[3] It is perhaps surprising that buyers who claim to have learned the "fair price or market value" do not do as well as buyers who say that they learned the invoice price. We conjecture that this is because the term "fair price" is much more open to interpretation by respondents. If "fair market price" is included without the other four types of information it is negative and significant at the 10% level, suggesting it may also be colinear with invoice price.

[4] A possible explanation is that consumers first search to decide on a make and model and then search for the best price. This result is consistent with consumers no longer considering other vehicles during the price search.

4.2 Specifications with consumer traits

While we have examined the average effect on prices of consumer choices to become informed, to seek outside options, and to use referral processes, these averages likely do not measure the expected return to a customer of deciding to take one of these actions. The reason is that the average effects include selection effects, or effects that are attributable to customer traits which are correlated with the choices. In order to estimate the treatment effect, in this section we examine what various consumer choices mean for price negotiations, controlling for consumer types.[5]

In question 31, we ask consumers to rate their agreement or disagreement with a list of statements to get a measure of three consumer traits. These traits are (1) whether a consumer has a high willingness to search, (2) whether a consumer is a car enthusiast, and (3) whether a consumer has a high disutility of bargaining. To get answers that are reliable and as comparable as possible across respondents we ask survey participants questions about their behavior or attitudes, not about the traits directly. For example, we are interested in the "car enthusiast" trait to control for whether a consumer knows a lot about cars, even if they did little or no search for their car purchase. We could have asked a survey participant to agree or disagree with the statement "I am a car enthusiast," thereby leaving it up the respondent to decide what a car enthusiast is. Instead, we get more consistent answers by asking "I read car- and/or truck-enthusiast magazines regularly" and "I tend to visit dealers whenever a new model is introduced." Similarly, we get at consumers' willingness to search with statements such as "I do a lot of price comparison when making large purchases," "I am the kind of person who gathers as much information as possible before visiting car dealers," and "I frequently use the Internet to obtain information about products I am interested in." Finally, to assess whether a consumer derives a high disutility from the bargaining process, either because the buyer is afraid to be taken advantage of by a dealer or because the buyer has little time to engage in bargaining, we present consumers with the statements "I am afraid that I will be taken advantage of by a dealer when negotiating the price of a new car," and "It is hard for me to find time to shop for a new vehicle."

[5]The consumer traits we construct are based in part on consumer's assessment of their bargaining ability. These assessments are made 6-12 weeks after the consumers purchased a car. If consumers infer their bargaining ability from the price they obtained for this particular vehicle, there could be an endogeneity between prices and consumer traits. If this is the case, too much of the price effect will be attributed to consumer traits and too little to other factors, such as information search. While this endogeneity is of concern, since the primary purpose of the consumer traits is to function as control variables, we believe such endogeneity biases the results against our main findings.

We repeat the specification from column 6 of Table 4, adding controls for consumer traits to control for selection. The coefficients on *Informed* and *CompetingOffer*, decrease from -1.07 to -0.77 and -0.69 to -0.60, respectively (see column 1 in Table 5). The coefficients on *WillingnessToWait* remains nearly unchanged at -0.60. Consumer traits are related to price as following: buyers who were more afraid of being taken advantage of by the dealer pay more, suggesting that they had reason to be afraid. Other consumer trait variables are not significantly different from zero. This reflects one consequence of our approach to include all consumer trait variables in the regression. Since several of the questions are, by design, quite similar they may be only jointly significant. Hence we test the hypothesis that the subset of variables which measure each consumer trait are jointly zero. We reject the hypothesis that the variables measuring consumers' disutility of bargaining (*AfraidTakenAdvantage, NoTimeToShop*) are jointly zero (p-value 0.001). We also reject that the variables measuring consumers' willingness to search (*DoPriceComparisons, InternetForInfo, GatherMuchInfo*) are jointly zero (p-value 0.03). We cannot reject the hypothesis that the variables measuring whether a consumer is a car enthusiast (*ReadCarMagazine, VisitDealerForFun*) are zero (p-value .33).

We conclude that consumers with a high disutility of bargaining pay more while consumers with a high willingness to search pay less for a new car. Controlling for individual consumer traits adjusts downwards our point estimates of being informed or having an offer from a competing dealer. A Hausman test rejects the hypotheses that the model in column 6 of Table 4 is not misspecified. Hence, our consumer trait variables seem to play a role in controlling for selection.

In conclusion, these results suggest that tactical decisions consumers make to improve their price negotiation outcomes—such as improving their information, getting a competing offer, being willing to walk out of a negotiation—have a real effect on the prices paid by these consumers and are not simply proxying for consumer types.

4.3 Relation to bargaining theory

Our results have interesting implications for what is important in the bargaining process. Consider a standard Roth-Nash bargaining model. The price paid for a car by the consumer is a function of the dealership's opportunity cost (oc), the buyer's reservation price for the car at this dealership (rp) and the bargaining power λ of the seller relative to the buyer.

$$p = (rp - oc)\lambda + oc \tag{1}$$

This model assumes that each party earns its disagreement payoff (what it would earn if negotiations fail) plus a share of the incremental gains from trade, with proportion $\lambda \in [0, 1]$ going to the seller. When $\lambda = 1$ the dealer sells at the reservation price of the buyer. When $\lambda = 0$, the dealer has no bargaining power and sells at his opportunity cost.

It is in the dealer's interest in the bargaining process to make his opportunity cost (oc) appear as high as possible (as long as there are gains from trade), for example, by portraying the invoice price of the vehicle as higher than it actually is. Also, it is in the dealer's interest to inflate the consumer's reservation price (rp). For example, the dealer can claim "other dealers don't have this car." This can increase the reservation price of the buyer because her reservation price depends not only on the utility she derives from the vehicle itself but also on her outside option; for example, the reservation price at the dealership in question will depend on the price the buyer has been able to secure at another dealership.

Our empirical results show that consumers are indeed able to obtain lower prices when they have more information about a dealer's opportunity cost and their own reservation price. For example, column 2 of Table 5 shows that consumers who know the invoice price of the vehicle (a measure of the dealer's opportunity cost) pay on average 0.56% less than consumers who do not, controlling for consumer types. Also, each increase in response scale category for the number of visited dealers (a measure of how much consumers know about their outside option, rp) decreases price by 0.46%. Similarly, consumers who have an offer from a competing dealer (another measure that is related to the consumer's rp at a given dealer) pay 0.5-0.6% less (see, for example, column 1 of Table 5).[6]

Our empirical results also show that more patient consumers pay lower prices. Patience is closely related to bargaining power. For example, Rubinstein (1982) predicts that when a player becomes more patient, his negotiated share of the pie increases. Consistent with this prediction, buyers who indicated that they were patient during search (the indicator *WillingnessToWait* was one, see page 13), paid 0.5-0.6% less than other consumers (see column 2 of Table 5 or any other specification in the Table).

In summary, the results of this section empirically validate that the factors that information economics and bargaining theory predict should matter really do—including one's outside options, knowledge of the other party's position, and bargaining power.

[6]In column 2 of Table 5 this variable is not significantly different from zero because it is highly correlated with the number of dealers visited).

5 The role of the Internet

Up to this point, we have looked at how the price a buyer negotiates is related to whether the buyer is informed and whether the buyer has investigated alternatives to buying from a particular dealer. In this section, we focus on how Internet use is related to price negotiation. Internet use is not an alternative to the effects examined in the previous section. Indeed, in that section, using the Internet was one of buyers' chief methods of gathering information. In this section, we would like to know which among several purchase-related activities that a buyer can conduct on the Internet matters most in price negotiation. Given the results of the previous section, gathering information is obviously one activity we expect to have a significant effect. We will also consider the effect of requesting a referral from either a manufacturer website or from an online buying service.

We begin with a specification which includes an indicator which is one if a buyer answered "yes" to the question "Did you use the Internet in any way to help you shop for a new vehicle? (e.g. to research vehicles, find a dealer, etc.)" (question 17). We refer to this indicator as *InternetUse*. As before, we also include whether the buyer has a competing offer, and whether she is willing to wait to buy her car later. We also control in this and all future specifications for our measures of consumer traits. We find that *InternetUse* is associated with 0.94% lower prices on average (see column 3 in Table 5). This is somewhat larger than the coefficient of 0.77% for *Informed*. In a specification with both variables, *Informed* becomes insignificant while the *InternetUse* coefficient changes to -0.75 (see column 4 in Table 5). This suggest that Internet usage captures much of what matters about being informed.

To better understand the Internet effect we next run a specification that contains the exact source of online information used by buyers. In particular, we distinguish between manufacturer websites, individual dealer websites, online buying services, informational websites, and chat rooms (see question 18). For each type of online source we construct an indicator that is one if a buyer used that source of information. Column 5 in Table 5 reports a specification that contains *CompetingOffer*, *WillingToWait*, and the indicators for how the Internet was used. We find that the only type of online site which lowers price significantly is online buying services. The coefficient is -0.92 and highly significant. Use of *ChatRooms* is weakly associated with higher prices by 0.76% (p-value 0.10).

5.1 Referrals to dealers

Online buying services and manufacturer websites differ from other online sources in that they go beyond providing information to consumers. All online buying services and many manufacturer websites allow consumers to request a quote from a dealer. The dealer typically calls or e-mails the referred consumer within 24-48 hours with a price quote. A consumer can ask for a price quote in a few seconds on a website, and receive it in his or her home the next day. This raises the question of whether some of the savings from using the Internet could be driven by a mechanism that is distinct from informing customers, namely the referral process. To investigate the effect of utilizing the referral process, we add to the basic Internet specification in column 3 of Table 5 an indicator that is one if a consumers answered "yes" to the question "Did you submit a formal request to any online buying service (e.g. Autobytel.com, Carpoint.com, Autoweb.com) to be referred to one of the site's affiliated dealers?" (question 19). We also add an indicator that is one if a consumers answered "yes" to the equivalent question for referrals from manufacturer websites (question 21).

We find that submitting a referral to an independent online buying service is associated with 0.7% lower prices, *in addition* to the savings of 0.86% associated with using Internet (see column 6 in Table 5). Manufacturer referrals, in contrast, have no effect on price.

This result is very important because it indicates that there is some important aspect of the business model of independent referral sites that drives the difference. The major difference between a referral from an online buying service and from a manufacturer is that the manufacturer refers consumers to the closest dealer selected from the *entirety* of its dealerships while online buying services sign contracts with only a subset of dealers. For example, out of the approximately 22,000 dealers in the US, Autobytel.com in the first quarter of 2001 contracted with 5,000 dealerships. Online buying services assign dealers exclusive territories, and refer all customers within that territory who submit a purchase referral for the dealer's nameplate to that dealer. Since only a subset of dealers are affiliated with a given online buying service, this dealer's exclusive territory will be larger than the territory in which it is the closest dealer of that nameplate. This implies that referrals from an online buying service will more often be incremental to the dealership's regular customers than referrals from manufacturers. Manufacturers will refer to dealers only customers for whom the dealer is already the closest dealer of that nameplate. Provided the incremental stream of customers generated by the online buying service is valuable to the dealership, the dealership has an incentive to quote prices low enough to convert a substantial number of referrals into sales. This is because online buying services

monitor the percentage of referrals that result in a sale, and if the percentage is too low, the dealer may be terminated and replaced by another dealer in that area. The implied threat is not only that incremental sales get lost, but also that the replacement dealer will then "steal" some of the dealership's own consumers. Such a threat is not available to manufacturers.

We provide one additional piece of evidence to show that the "Internet effect" can be broken into a referral and an informational component. In a regression that controls for the referral effect, the variable *InternetUse* and the variable *Informed* are almost interchangeable (see column 6 and 7 in Table 5). The *InternetUse* coefficient is estimated at -0.86 in the first column. The second specification no longer includes *InternetUse* but yields a coefficient estimate of -0.77 for *Informed*. The effect of a referral is similar in the two specifications.

In summary, buyers who use the Internet to shop for a car seem to be paying lower prices for two distinct reasons. First, they become on average better informed than other buyers. This information allows consumers to counter a dealer's attempts to make its opportunity cost appear to be a high as possible and to inflate the consumer's willingness to pay at that dealership. Second, buyers seem to be able to take advantage of any pressure that online buying services exert on dealers through their ability to direct customers among dealers. In a sense, the referral service increases the bargaining power λ of an individual buyer by bargaining on behalf of a group of consumers.

5.2 Does the Internet benefit all consumers equally?

Finally, we investigate whether the Internet and referral effects accrue to all buyers equally. In particular we are interested in finding out whether consumers who already consider themselves to be good bargainers derive any benefit from using the Internet. To interpret our results more easily, we create an indicator which is one if a buyer derives a higher disutility from the bargaining process than the median buyer, either because the buyer is more afraid to be taken advantage of by a dealer or because the buyer has less time to engage in bargaining. We derive such an indicator using two different approaches. In our first approach we construct a variable which is the sum of the normalized values of the answers to the two questions "It is hard for me to find time to shop for a car" and "I am afraid that I will be taken advantage of by a dealer when negotiating the price of a new car."[7] We then create an indicator which is one for a buyer with a higher value on this variable than the median buyer. We call this dummy variable *DislikeBargaining*.

[7]For each variable we subtract the mean and divide by the standard deviation.

We run a specification in which we interact both *InternetUse* and *OBSReferral* with *DislikeBargaining* (see column 1 in Table 7). We find that consumers who *DislikeBargaining* pay 2.2% more than consumers who do not. We also find that consumers who obtained a request from an online buying service pay 0.78% less than those who do not (p-value 0.09); these savings accrue equally to buyers who do and do not *DislikeBargaining*. (The *DislikeBargaining-OBSReferral* interaction term is statistically zero.) Using the Internet, however, only benefits consumers who dislike bargaining (by 1.7%); consumers who like to bargain (presumably because they are good bargainers) do not benefit from using the Internet other than by obtaining a referral.

To ensure the robustness of these findings we employ a second approach to derive our indicator variable. In this approach we use a factor analysis to construct measures of the three consumer traits, namely whether a consumer derives a high disutility from the bargaining process, whether a consumer has a high willingness to search, and whether a consumer is a car enthusiast. Three factors have eigenvalues above 1 and their interpretation corresponds exactly to our three consumer traits (see Table 6 for the scoring coefficients).[8] We name the new three variables *BargainingDisutility*, *WillingnessToSearch*, *CarEnthusiast*. We then create an indicator *DislikeBargaining* which is one if a buyer derives a higher *BargainingDisutility* than the median buyer.

We repeat the previous specification, however, instead of including the consumer trait measures directly, we make use of the factors *WillingnessToSearch* and *CarEnthusiast* to control for consumer types. The results are similar to the previous specification (see column 2 in Table 7). We find that consumers who *DislikeBargaining* pay 2.0% more than consumers who do not. We also find that consumers who obtained a request from an online buying service pay 0.74% less than those who do not (p-value 0.07); again these savings accrue equally to buyers who do and do not *DislikeBargaining*. As before we find that using the Internet only benefits consumers who dislike bargaining (by 1.5%); consumers who like to bargain or have the time to do so do not benefit from using the Internet other than by obtaining a referral. The sum of the marginal Internet effects is shown in the following table.

Our first result of this section is that buyers who like the bargaining process do not benefit from being informed. One can argue that, colloquially, this is the very definition of being a good bargainer: to be able to do well without knowing much about one's own and the other party's outside options.[9]

[8]The coefficients in Table 6 represent the weights with which the normalized responses to the individual statements enters each composite measure of a consumer trait.

[9]For example, being able to negotiate a salary raise after having received a competing job offer is not a sign

Table 1: Marginal Internet Effects by Bargaining Disutility

	Likes bargaining	Dislikes bargaining
Used Internet for information (but did not request referral)	0%	-1.5%
In addition, requested referral	-0.7%	-0.7%
Total Internet effect	-0.7%	-2.2%

The second key result is that the benefits of requesting a referral accrue equally to all buyers. We have argued in section 5.1 that a referral from an online buying service lowers prices at a dealer because of the implicit threat to direct customers to the dealer's competitors. Consistent with our findings, if this threat operates, it seems reasonable that it should apply uniformly across consumers.

It is important to note that our result that buyers who like the bargaining process do not benefit from being informed is not specific to the Internet specification: we repeat the basic *Informed* specification from column 3 of Table 5 with the *DislikeBargaining* dummy and the interaction of the dummy with *Informed*.[10] We find that consumers who *DislikeBargaining* pay 2.6% more than consumers who do not (see column 3 in Table 7). We find the same qualitative result as in our two Internet specification, namely that the benefits of being *Informed* accrues only to consumers who dislike bargaining (by 2.0%).

Finally, if a subset of consumers gain disproportionately from using the Internet to buy a car, economic theory suggests that this group should be disproportionately likely to use the Internet. Our final specification in Table 5 is a probit that relates a buyer's decision to use the Internet the consumer trait measures constructed in the factor analysis. We find that buyers with a higher disutility from the bargaining process are more likely to use the Internet.

6 Conclusion

In this paper we use direct measures of search behavior and consumer characteristics in the car industry to investigate how different types of search and purchasing behavior affect negotiated prices in car retailing. We match transaction data on 1,500 car purchases in California with the responses to a survey which asks buyers detailed questions about their search and purchase behavior, their Internet usage, their attitudes towards information search and bargaining, and

of good bargaining skills. However, negotiating a raise without such an offer may very well be.

[10] We construct the dummy according to the first approach in this subsection.

their demographics.

Our results are consistent with the predictions of information economics and bargaining theory. In our first set of results we find that buyers who visit more dealers and who obtain an offer from a competing dealer pay less (0.6%). Also, buyers who reported collecting information on the specific car they eventually purchased pay lower prices (0.9%). Alternative measures of being informed, such as the hours of research activity or knowledge of the invoice price have the same effect. We also find that buyers who are willing to postpone their purchase should negotiations with the dealer break down pay lower prices (0.6%). The combined savings of these effects equal 1/3 of the average dealer margin. Our survey data enable us to control directly, at an individual level, for heterogeneity in attitudes towards search, Internet use, and bargaining disutility which are normally unobservable. Our estimates of the effects of different search and purchasing strategies are therefore not the result of differences between consumer types.

We find that the benefit of gathering information differs by consumer type. While buyers with a high disutility of bargaining pay 2% less when they have collected information on the specific car they eventually purchase, buyers who like the bargaining process do not benefit from such information.

We also examine the role of the Internet in these negotiations. We show that the Internet lowers prices for two distinct reasons. First, the Internet informs consumers. Second, the incentives provided by online buying services' contracts with dealerships help consumers obtain lower prices through a referral process. Referrals from manufacturer websites do not lower prices. Since both types of referral services lower search costs to the same degree, this finding suggests that lower search cost are not the only reason why the Internet leads to lower prices. Instead, we believe that online buying services are more effective because, unlike manufacturers, they can exert pressure on dealers by directing incremental business to affiliated—and away from unaffiliated—dealerships.

The point estimates of the combined Internet and referral price effects range between -1.6% and -2.5%; these estimates are close to estimate of Zettelmeyer, Scott Morton, and Silva-Risso (2002). They found that, after controlling for selection, Autobytel.com lowered prices by 2.2%. Since Autobytel.com is a major online buying service, we can compare this estimate with the sum of our *InternetUse* and *OBSReferral* coefficients in the last subsection, 1.5%, or with the estimate of 2.2 to 2.5% for consumers with a high disutility from bargaining. The similarity of the coefficient estimates is remarkable given that Zettelmeyer, Scott Morton, and Silva-Risso

(2002) uses data from 1999, the height of the Internet boom and a time of experimentation by both consumers and retailers. In contrast, the data in this paper are from April and May of 2002, when the Internet had become more mainstream.

More generally, the results in this paper empirically validate that the factors that information economics and bargaining theory predict should matter really do—including one's outside options, knowledge of the other party's position, and bargaining ability. Our results suggest that tactical decisions consumers make to improve their price negotiation outcomes—such as improving their information, getting a competing offer, being willing to walk out of a negotiation, and using the negotiating clout of an online buying service—have surplus redistributing effects. The results speak both to the significance of the Internet in making information more easily available, and also to the potential of Internet institutions to affect the distribution of surplus even in established offline industries like auto retailing.

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Table 2: Response bias

	Non-respondents					Respondents				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
%CollegeGrad	2580	27.0	16.4	0	100	1948	30.5	16.41	0	83.6
%<HighSchool	2580	17.7	15.9	0	100	1948	13.70	12.81	0	79.3
%Female	2715	30.8	46.10	0	1	2021	30.3	45.90	0	1
%Black	2580	5.3	12.3	0	98.3	1948	4.0	9.35	0	96.8
%Hispanic	2580	20.5	14.0	0	55.7	1948	16.7	12.30	0	56.4
Med.HHInc.	2578	54732	24158	12608	150000	1948	58945	23661	12975	150000
Med.HouseVal.	2516	213529	98012	22500	500000	1921	227345	103293	19063	500000

Table 3: Summary Statistics[†]

	Obs	Mean	Std. Dev.	Min	Max
Price	1436	23284.92	5499.61	9800	38750
Age	1436	3.03	0.91	1.00	5.00
Education	1436	4.82	1.44	1.00	7.00
Income	1436	5.18	2.19	1.00	10.00
Black	1436	0.03	0.18	0.00	1.00
Hispanic	1436	0.20	0.40	0.00	1.00
Female	1436	0.40	0.49	0.00	1.00
%HouseOwnership	1436	0.67	0.24	0.01	1.00
MedianHouseValue	1436	2.28	1.06	0.19	5.00
%Professional	1436	0.16	0.08	0.00	0.62
%Executives	1436	0.17	0.08	0.00	1.00
%BlueCollar	1436	0.27	0.16	0.00	0.91
%Technicians	1436	0.03	0.02	0.00	0.16
TradeIn	1436	0.30	0.46	0.00	1.00
EndOfMonth	1436	0.20	0.40	0.00	1.00
Weekend	1436	0.30	0.46	0.00	1.00
Competition	1436	4.50	3.06	0.00	16.00
MonthMay	1436	0.52	0.50	0.00	1.00
SouthernCal	1436	0.62	0.48	0.00	1.00

[†] Age, education, income represent response categories.
MedianHouseValue in $100,000.
Competition: number of dealers of same nameplate in a 10 mile radius of dealership.

Table 4: Price effects of search and purchasing behavior[†]

Dep. Var. ln(price)	(1)	(2)	(3)	(4)	(5)	(6)
Informed		−1.01	−0.89			−1.07
		(0.37)**	(0.38)*			(0.37)**
CompetingOffer		−0.65	−0.42	−0.63	−0.67	−0.69
		(0.25)**	(0.26)	(0.25)*	(0.26)*	(0.25)**
#DealersVisited			−0.48			
			(0.17)**			
HoursResearched				−0.01		
				(0.01)		
HoursResearched=0				0.88		
				(0.36)*		
KnowCars					0.49	
					(0.33)	
KnowDealers					−0.20	
					(0.27)	
KnowMSRP					0.54	
					(0.34)	
KnowInvoice					−0.96	
					(0.29)**	
KnowMarketPrice					−0.28	
					(0.29)	
WillingToWait						−0.59
						(0.27)*
CustomerAge	−0.01	−0.05	−0.05	−0.13	−0.04	−0.06
	(0.14)	(0.14)	(0.14)	(0.14)	(0.15)	(0.14)
Education	−0.45	−0.41	−0.41	−0.40	−0.43	−0.42
	(0.10)**	(0.10)**	(0.10)**	(0.10)**	(0.10)**	(0.10)**
Income	−0.30	−0.28	−0.24	−0.32	−0.38	−0.28
	(0.26)	(0.25)	(0.25)	(0.26)	(0.26)	(0.25)
Income^2	0.04	0.04	0.04	0.05	0.05	0.04
	(0.02)*	(0.02)*	(0.02)+	(0.02)*	(0.02)*	(0.02)*
Black	0.51	0.48	0.45	−0.06	0.73	0.48
	(0.87)	(0.87)	(0.87)	(0.88)	(0.83)	(0.86)
Hispanic	0.52	0.42	0.41	0.37	0.48	0.41
	(0.38)	(0.38)	(0.38)	(0.39)	(0.39)	(0.38)
OtherRace	0.18	0.30	0.31	0.12	0.10	0.33
	(0.45)	(0.44)	(0.44)	(0.44)	(0.45)	(0.44)
Female	0.48	0.49	0.45	0.50	0.44	0.50
	(0.26)+	(0.26)+	(0.26)+	(0.27)+	(0.27)	(0.26)+
%HouseOwnership	−0.83	−0.69	−0.71	−0.79	−0.97	−0.65
	(0.57)	(0.57)	(0.56)	(0.57)	(0.57)+	(0.57)
MedianHouseVal. (000s)	−0.44	−0.45	−0.47	−0.43	−0.43	−0.45
	(0.14)**	(0.14)**	(0.14)**	(0.15)**	(0.15)**	(0.14)**
%Professional	0.60	0.66	0.62	0.24	0.70	0.38
	(2.19)	(2.18)	(2.18)	(2.19)	(2.20)	(2.18)
%Executives	2.82	2.97	3.38	2.63	3.40	2.79
	(2.55)	(2.53)	(2.50)	(2.54)	(2.68)	(2.53)
%BlueCollar	0.03	0.14	0.26	−0.12	0.47	−0.02
	(1.71)	(1.69)	(1.68)	(1.72)	(1.75)	(1.68)
%Technicians	−10.28	−9.23	−9.38	−7.86	−8.24	−9.23
	(6.05)+	(6.01)	(6.02)	(6.07)	(6.02)	(6.00)
Trade	0.69	0.62	0.58	0.59	0.54	0.67
	(0.29)*	(0.29)*	(0.29)*	(0.29)*	(0.29)+	(0.29)*
EndOfMonth	−0.21	−0.26	−0.23	−0.28	−0.30	−0.26
	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)	(0.30)
Weekend	−0.22	−0.24	−0.20	−0.24	−0.30	−0.24
	(0.28)	(0.28)	(0.28)	(0.28)	(0.28)	(0.28)
VehicleCost	98.11	98.42	98.33	98.79	98.55	98.31
	(2.31)**	(2.31)**	(2.32)**	(2.36)**	(2.37)**	(2.31)**
Competition	0.05	0.05	0.06	0.05	0.04	0.05
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Constant	1,006.47	1,007.29	1,008.23	1,006.80	1,006.79	1,007.71
	(1.43)**	(1.45)**	(1.51)**	(1.44)**	(1.46)**	(1.47)**
Observations	1436	1436	1432	1402	1406	1436
R-squared	0.96	0.96	0.96	0.96	0.96	0.96

* significant at 5%; ** significant at 1%; + significant at 10% level. Robust standard errors in parentheses.
† Unreported are car, month, and region fixed effects.
All coefficients are multiplied by 100. MedianHouseValue in $100,000.

Table 5: Price effects controlling for consumer traits[†]

Dep. Var. ln(price)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Informed	−0.77			−0.50			−0.77
	(0.39)∗			(0.41)			(0.39)∗
InternetUse			−0.94	−0.75		−0.86	
			(0.39)∗	(0.40)+		(0.39)∗	
ManufacturerSite					0.09		
					(0.28)		
DealerSite					−0.24		
					(0.30)		
InformationSite					−0.18		
					(0.29)		
ChatRoom					0.76		
					(0.46)+		
OBSSite					−0.92		
					(0.27)∗∗		
OBSReferral						−0.70	−0.79
						(0.28)∗	(0.28)∗∗
ManufReferral						0.07	0.06
						(0.34)	(0.34)
KnowInvoice		−0.56					
		(0.27)∗					
#DealersVisited		−0.46					
		(0.17)∗∗					
CompetingOffer	−0.60	−0.38	−0.57	−0.57	−0.54	−0.49	−0.50
	(0.26)∗	(0.27)	(0.26)∗	(0.26)∗	(0.26)∗	(0.26)+	(0.26)+
WillingToWait	−0.60	−0.52	−0.56	−0.59	−0.61	−0.58	−0.62
	(0.27)∗	(0.28)+	(0.27)∗	(0.27)∗	(0.27)∗	(0.28)∗	(0.27)∗
AfraidTakenAdvantage	0.43	0.45	0.43	0.43	0.46	0.43	0.44
	(0.13)∗∗	(0.13)∗∗	(0.13)∗∗	(0.13)∗∗	(0.13)∗∗	(0.13)∗∗	(0.13)∗∗
NoTimeToShop	0.22	0.23	0.23	0.22	0.24	0.22	0.21
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
DoPriceComparisons	−0.24	−0.33	−0.32	−0.28	−0.31	−0.32	−0.24
	(0.24)	(0.24)	(0.23)	(0.24)	(0.23)	(0.23)	(0.24)
InternetForInfo	−0.16	−0.19	0.01	0.01	−0.08	0.05	−0.09
	(0.16)	(0.16)	(0.18)	(0.18)	(0.17)	(0.18)	(0.16)
GatherMuchInfo	−0.28	−0.26	−0.25	−0.24	−0.25	−0.24	−0.26
	(0.21)	(0.21)	(0.20)	(0.20)	(0.21)	(0.20)	(0.21)
ReadCarMagazine	0.25	0.24	0.23	0.23	0.26	0.22	0.24
	(0.17)	(0.17)	(0.16)	(0.17)	(0.17)	(0.16)	(0.17)
VisitDealerForFun	−0.08	−0.07	−0.08	−0.09	−0.08	−0.10	−0.11
	(0.20)	(0.21)	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
CustomerAge	−0.10	−0.11	−0.13	−0.13	−0.12	−0.13	−0.11
	(0.15)	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Education	−0.40	−0.39	−0.40	−0.39	−0.38	−0.39	−0.39
	(0.10)∗∗	(0.10)∗∗	(0.10)∗∗	(0.10)∗∗	(0.10)∗∗	(0.10)∗∗	(0.10)∗∗
Income	−0.23	−0.21	−0.23	−0.22	−0.24	−0.23	−0.23
	(0.25)	(0.25)	(0.25)	(0.25)	(0.25)	(0.25)	(0.25)
Income^2	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	(0.02)∗	(0.02)+	(0.02)∗	(0.02)∗	(0.02)∗	(0.02)∗	(0.02)∗
Black	0.64	0.88	0.66	0.66	0.70	0.69	0.68
	(0.86)	(0.81)	(0.86)	(0.86)	(0.87)	(0.87)	(0.87)
Hispanic	0.40	0.39	0.40	0.38	0.50	0.41	0.40
	(0.38)	(0.39)	(0.38)	(0.38)	(0.38)	(0.38)	(0.38)
OtherRace	0.38	0.27	0.34	0.36	0.38	0.31	0.34
	(0.42)	(0.42)	(0.41)	(0.41)	(0.42)	(0.42)	(0.42)
Female	0.34	0.25	0.36	0.35	0.35	0.35	0.34
	(0.27)	(0.27)	(0.27)	(0.27)	(0.27)	(0.27)	(0.27)
Census demographics	...	...	...	...	...	...	...
Other controls	...	...	...	...	...	...	...
Constant	1,007.39	1,008.31	1,007.27	1,007.36	1,007.11	1,007.20	1,007.30
	(1.77)∗∗	(1.84)∗∗	(1.76)∗∗	(1.77)∗∗	(1.76)∗∗	(1.76)∗∗	(1.77)∗∗
Observations	1436	1402	1436	1436	1436	1436	1436
R-squared	0.96	0.97	0.96	0.97	0.97	0.97	0.97

∗ significant at 5%; ** significant at 1%; + significant at 10% level. Robust standard errors in parentheses.

† Unreported are car, month, and region fixed effects, *EndOfMonth*, *Weekend*, *TradeIn*, *Competition*, *VehicleCost*, and census demographics.
Response scale on trait variables (question 31) is reversed: Now 1="Disagree Strongly", 4="Agree Strongly."
All coefficients are multiplied by 100.

Table 6: Scoring coefficients

Questions	WillingnessToSearch	CarEnthusiast	BargainingDisutility
AfraidTakenAdvantage	-0.06505	0.00499	0.62192
NoTimeToShop	-0.00967	0.05865	0.66193
DoPriceComparisons	0.43543	-0.02251	-0.13682
InternetForInfo	0.37095	-0.05131	0.07503
GatherMuchInfo	0.43978	0.01168	0.00276
ReadCarMagazine	-0.01274	0.59679	0.08828
VisitDealerForFun	-0.03766	0.58151	-0.00713

Table 7: Price effects by bargaining disutility and Probit on Internet use[†]

Dep. Var.	(1) ln(price)	(2) ln(price)	(3) ln(price)	(4) InternetUse
InternetUse	0.10	-0.02		
	(0.48)	(0.42)		
DislikeBargaining	2.16	2.00	2.63	
	(0.52)**	(0.54)**	(0.66)**	
InternetUse*DislikeBarg	-1.73	-1.49		
	(0.62)**	(0.63)*		
OBSReferral	-0.78	-0.74		
	(0.46)+	(0.40)+		
OBSReferral*DislikeBarg	0.21	0.20		
	(0.57)	(0.54)		
Informed			0.41	
			(0.51)	
Informed*DislikeBarg			-2.03	
			(0.71)**	
CompetingOffer	-0.48	-0.48	-0.62	
	(0.26)+	(0.25)+	(0.26)*	
WillingToWait	-0.56	-0.54	-0.59	
	(0.27)*	(0.27)*	(0.27)*	
DoPriceComparisons	-0.24		-0.18	
	(0.24)		(0.24)	
InternetForInfo	0.03		-0.17	
	(0.18)		(0.15)	
GatherMuchInfo	-0.24		-0.30	
	(0.20)		(0.20)	
ReadCarMagazine	0.19		0.23	
	(0.16)		(0.16)	
VisitDealerForFun	-0.10		-0.08	
	(0.20)		(0.20)	
WillingnessToSearch		-0.29		0.76
		(0.16)+		(0.05)**
CarEnthusiast		0.05		-0.18
		(0.13)		(0.04)**
BargainingDisutility				0.16
				(0.04)**
CustomerAge	-0.08	-0.11	-0.05	-0.22
	(0.14)	(0.14)	(0.14)	(0.05)**
Education	-0.39	-0.38	-0.39	0.06
	(0.10)**	(0.10)**	(0.10)**	(0.03)*
Income	-0.24	-0.21	-0.24	0.02
	(0.25)	(0.25)	(0.25)	(0.09)
$Income^2$	0.04	0.04	0.04	0.01
	(0.02)*	(0.02)+	(0.02)+	(0.01)
Black	0.76	0.71	0.68	0.03
	(0.87)	(0.87)	(0.85)	(0.23)
Hispanic	0.42	0.38	0.38	-0.36
	(0.38)	(0.38)	(0.38)	(0.11)**
OtherRace	0.40	0.40	0.47	-0.02
	(0.42)	(0.42)	(0.42)	(0.20)
Female	0.42	0.38	0.42	-0.02
	(0.27)	(0.27)	(0.27)	(0.09)
Census demographics	...	...	...	
Other controls	...	...	...	
Constant	1,007.45	1,006.24	1,007.47	0.94
	(1.74)**	(1.46)**	(1.77)**	(0.48)*
Observations	1436	1436	1436	1436
R-squared	0.97	0.97	0.97	

* significant at 5%; ** significant at 1%; + significant at 10% level. Robust standard errors in parentheses. All coefficients are multiplied by 100.

† Unreported are (columns 1-3) car, month, and region fixed effects, *EndOfMonth*, *Weekend*, *TradeIn*, *Competition*, *VehicleCost*, and (columns 1-4) census demographics.
Response scale on trait variables (question 31) is reversed: Now 1="Disagree Strongly", 4="Agree Strongly."