

**“One discriminatory rent” or “double jeopardy”:  
Multi-component negotiation for new car purchases**

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About half of new car transactions actually consist of two transactions, one in which the customer buys a new car from a dealer, and the other in which the customer sells his existing car to the dealer as a trade-in. At most dealerships, both the price of the new car and the price of the trade-in are negotiated. The conventional wisdom in the new car business is that car dealers are willing to trade off profits made on the new car versus profits made on the trade-in. To an economist, this suggests that the dealer may see the new car customer as the source of a certain amount of extractable profit—“one discriminatory rent”—that can be subdivided into two equivalent buckets, the new car margin and the trade-in margin. Economic models of bargaining tend to use a similar paradigm, modeling the amount of total economic surplus created by the transaction, and supposing that each party will get a share of that surplus determined by the party’s bargaining power. It is usually recognized that there are multiple price mechanisms that could convey the same division of surplus to the two parties.

If this is the case, then one should expect new car profit margins and trade-in profit margins to be negatively correlated, at least after controlling for the new car, the trade-in and customer demographics. The better the deal the customer gets on a new car, the less good deal one should expect the customer to get on the trade-in.

An alternative view of this multi-component negotiation is that customers or dealers—or both—view the transaction as two separate negotiations, and that customers are exposed to “double jeopardy.” Car dealers are generally supposed to make inferences about how much a customer is willing to pay based on their interactions with the customer. If that inference corresponds to what economists would think of as the customer’s type, or the degree of

bargaining power that the customer has, then it may be that customers tend to either do well in both the new car and the trade-in negotiations, or they do poorly in both. If this is the case, then one should expect to see new car and trade-in margins be positively correlated, controlling for new car, trade-in, and customer demographics.

We investigate empirically which of these two patterns is more prevalent by using a large dataset of detailed information on individual new car transactions. Our results yield insights on how car dealers and new car customers think about new car negotiations, and what the implications are for the division of surplus between the two parties.

## **I. Theoretical motivation**

This paper is connected to a theoretical literature on multi-issue bargaining. (Chen, 2006 provides an overview.) One of the primary issues considered in this literature is agenda-setting: namely, how agents settle on the order in which they consider issues, or which issues to consider together and which issues to consider separately. Some models consider settings in which the economic efficiency of the outcomes is an issue. Some consider “pie-splitting” problems where the main question is allocation.

This paper can be seen as an example of the latter. The negotiation between a new car dealer and a new car customer is a division of surplus between the two. However, the aim of this paper differs from that of the theoretical literature: while the theoretical literature attempts to solve for equilibrium outcomes when issues are considered together or separately, this paper examines negotiation outcomes in an attempt to ascertain whether customers and dealers are considering the components of the negotiation together or separately, estimates empirically what the size of these effects are.

## **I. Data**

We use detailed data on individual automobile transactions from a sample of 20% of all dealerships in the U.S. from July 1, 2006 to December 31, 2007, a time period that corresponds roughly to the 2007 model year. The data were collected by a major market research firm, and include every transaction that occurred within the time period for the dealers in the sample. For each transaction we observe the exact vehicle purchased, the price paid for the car, the dealer's cost of obtaining the car from the manufacturer, information on any vehicle that was traded in, and (census-based) demographic information on the customer.

We are interested primarily in the relationship between two variables: the dealer's profit margin on the new car and the profit margin on the trade-in car. The dealer's profit margin on the new car is measured as the purchase price for the new car negotiated between the buyer and the dealer *minus* the invoice price paid by the dealer to the manufacturer to obtain the car *minus* the costs of any after market options (such as upgraded tires or sound system) installed by the dealer. We measure the dealer's profit margin on the trade-in as the "actual cash value" of the trade-in as booked by the dealer *minus* the price of the trade-in negotiated between the new car buyer and the dealer. (In industry jargon, this would be the negative of the trade-in-overallowance.) We have good reason to believe that the trade-in-overallowance is indeed the dealer's best assessment of the market value of the trade-in car. This is an internal number for the dealership's use. It is not seen by the new car buyer, and therefore has no relevance to the negotiation.

## **III. Empirical approach**

The ideal experiment that we would like to perform in order to test our hypothesis involves a hypothetical. Specifically, we would like to observe both the new car and trade-in margins negotiated for a particular transaction that involved a trade-in. Then we would like to suppose that the dealer had been able to negotiate a higher new car margin. What we would like to know is how, in that case, the trade-in margin would have compared to the trade-in margin that was actually negotiated. If the trade-in margin would have decreased by exactly the amount that the new car margin increased, then the changes in the two margins are exactly offsetting, and the dealer's profits (and consumer's surplus) will be the same in the two transactions. This is the most extreme form of "one discriminatory rent." If the dealer would have been able to negotiate a higher trade in margin than before, then that suggests that the worse a customer does in one negotiation, the worse he or she will do in another—this is the "double jeopardy" case. There is an intermediate case, in which the trade-in margin falls, but not by as much as the new car margin increases. In this case, the buyer is able to partially substitute a lower trade-in margin for the increased new car margin, but the dealer gains to the extent that the two margins do not completely offset each other.

Of course, we do not observe both the actual terms and a set of hypothetical terms for a single transaction.<sup>i</sup> Instead, we approximate such a comparison by using pairs of carefully matched transactions, all of which use trade-ins. Specifically, we group transactions by calendar month, dealer, and "car type," where "car type" is the interaction of make, model, model year, trim level, doors, body type, displacement, cylinders, and transmission.<sup>ii</sup> Within each such group, we match the transactions randomly into pairs (drawing without replacement). This gives us more than 650,000 transaction pairs. In each pair, we label the transaction with the higher new car margin as transaction A and the transaction with the lower new car margin as transaction B.

By doing so,  $NewCarMarginDiff = NewCarMargin_A - NewCarMargin_B$  is always positive. We then calculate  $TradeInMarginDiff = TradeInMargin_A - TradeInMargin_B$ . We will investigate, in several ways, how this difference in trade-in margins compares to the difference in new car margins.

### III. Results

In order to investigate this, we use a simple parametric approach, estimating the following regression:

$$TradeInMarginDiff = \alpha_0 + \alpha_1 NewCarMarginDiff + \varepsilon_1. \quad (1)$$

If  $\alpha_1$  equals -1, then new car margin increases are associated (on average, across customers in our data) with one-for-one decreases in trade-in margins. If  $\alpha_1$  is between -1 and 0, then partially offsetting trade-in margin decreases are associated with new car margin increases, with the extent of the offsets being lower (and dealers being better off) the closer  $\alpha_1$  is to 0. If  $\alpha_1$  is greater than zero, then increases in new car margins are associated with concomitant increases in trade-in margins.

Column 1 of Table 1 reports the results of estimating Equation 1. The estimated  $\alpha_1$  coefficient is -0.862. This suggests that customers who pay dealers higher new car profit margins (for the same new “car type” at the same dealer in the same month using the same make-model-model year trade-in) give dealers lower profit margins when they sell dealers their trade-ins. However, the lower profit margins on the trade-ins don’t fully offset the higher new car profit margins that they pay. One way to interpret this is that customers do recognize that the profit margins on the two components of the transactions are linked, but that they fail to negotiate prices that reflect their being fully substitutable.

While Equation 1 measures the relationship between new car margins and trade-in margins in the data, there may well be significant heterogeneity across customers in this relationship. Most people's anecdotal experience is that some customers like negotiating, are good at it, and tend to get good prices, while the opposite is true for other customers. Previous research has shown more systematically that this is true (Scott Morton, Zettelmeyer, and Silva-Risso, 2006).

We account for this heterogeneity by using a broad set of census-based demographic characteristics of the buyer or of the buyer's census block group.<sup>iii</sup> We use these characteristics, plus indicators for whether the car was purchased on a weekend, at the end of the month or at the end of the year, and "car type" fixed effects to predict the new car profit margin for 2,316,402 transactions that did *not* use a trade-in.<sup>iv</sup> For these transactions, the new car margin is the total profit margin for the dealer.<sup>v</sup> We use the estimated coefficients from our no-trade-in sample and the demographic and purchase timing covariates from the trade-in sample to create an index, based on the out-of-sample coefficient estimates, for whether a particular customer is likely to be a "high-margin" customer or not on the basis of their demographics, purchase timing, and the car they buy. For each of our paired transactions, we can now measure how different the two customers are on this index,  $IndexDiff = Index_A - Index_B$ . We expect that  $IndexDiff$  will capture something about how different customer A and customer B are in terms of underlying bargaining ability. While we have sorted transactions such that customer A pays the higher new car margin, a positive value for  $IndexDiff$  means that customer A would also be expected (on the basis of demographics and purchase timing) to pay a higher total margin than customer B, while a negative value for  $IndexDiff$  would mean that customer B would be expected to pay a higher total

margin. We divide customers into quintiles on the basis of *IndexDiff*, and interact these quintiles with the *NewMarginDiff* variable in Equation 1. We estimate:

$$\text{TradeInMarginDiff} = \beta_0 + \beta_1 \cdot \mathbf{Q}(\text{IndexDiff}) \cdot \text{NewCarMarginDiff} + \varepsilon_2 \quad (2)$$

where  $\mathbf{Q}(\text{IndexDiff})$  are indicator variables for the quintiles of *IndexDiff*. The estimated coefficients are reported in Column 2 of Table 1. While we find that there is some variation in the estimated coefficients on the basis of how different the customers in the pairs are, the rate of substitution between new car margin and trade-in margin is fairly similar across the quintiles of differences.

Finally, we consider a third profit margin for dealers, which is the profit margin from financing. This profit margin is calculated as the net present value of the expected profits from dealer-provided financing and leasing.<sup>vi</sup> We re-estimate Equation 1, substituting the financing margin for the trade-in margin. Specifically, we estimate:

$$\text{FinanceMarginDiff} = \gamma_0 + \gamma_1 \text{NewCarMarginDiff} + \varepsilon_1. \quad (3)$$

The coefficient estimates are reported in Column 3 of Table 1.

In these results, we find a stark contrast to the trade-in margin results. While the trade-in margin results suggested that car buyers are pretty good at making sure that new car margin increases are compensated by trade-in margin decreases, they fail to do this in the financing margin. In fact, the higher the profit margin the dealer earns on the new car, the higher the profit margin the dealer earns on financing. Specifically, the coefficient estimate is that for every \$100 increase in new car profit margin, the financing profit margin rises by \$4. (Note that this is not a scale effect; this is not that the amount financed increases as the new car price increases, but that the profit margins increase together). This suggests that while customers manage to hold dealers



to “one discriminatory rent” when they negotiate new car and trade-in prices, they are exposed to “double jeopardy” when negotiating financing.

#### **IV. Conclusion**

We investigate the correlation in the profit margins negotiated between automobile customers and dealers separate components of a new car transaction. We find that the dealer’s profit margin on the new car and the profit margin on the trade-in are generally negatively correlated, which suggests that customers recognize that these are two substitutable components of the dealer’s overall profit margin. However, the two profit margins do not reflect one-for-one offsets, suggesting that when the dealer is able to push up one of the profit margins, customers do not manage to negotiate a decrease in the other profit margin that is large enough to offset the increase.

We find a very different pattern for new car profit margins and financing profit margins. For these margins, we find that higher new car margins are associated with higher financing profit margins, which suggests that customers are less successful in holding dealers to “one discriminatory rent” with respect to these two margins, and may be more exposed to “double jeopardy.”

## References

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**Table 1**

	1 <i>(TradeMarginDiff)</i>	2 <i>(TradeMarginDiff)</i>	3 <i>(FinanceMarginDiff)</i>
<i>NewCarMargin</i>	- 0.862 (0.00152)		0.0410 (0.000656)
<i>NewCarMargin*</i>		- 0.860 (0.00294)	
<i>IndexDiff Quintile 1</i>			
<i>NewCarMargin*</i>		- 0.862 (0.00288)	
<i>IndexDiff Quintile 2</i>			
<i>NewCarMargin*</i>		- 0.880 (0.00932)	
<i>IndexDiff Quintile 3</i>			
<i>NewCarMargin*</i>		- 0.869 (0.00249)	
<i>IndexDiff Quintile 4</i>			
<i>NewCarMargin*</i>		- 0.854 (0.00267)	
<i>IndexDiff Quintile 5</i>			
<i>Constant</i>	338.402 (1.854)	338.611 (1.855)	12.267 (1.034)
<i>Number of observations</i>	667,087	666,838	426,206
<i>R<sup>2</sup></i>	0.673	0.673	0.0214

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<sup>i</sup> See Zhu, Chen, and Dasgupta (2008) for an experimental setup that asks participants to consider two hypothetical sets of terms for a single transaction.

<sup>ii</sup> For example, one “car type” in our data is a 2007 Honda Accord EX 4-door sedan with a 4-cylinder 2.4-liter engine and automatic transmission.

<sup>iii</sup> These characteristics include gender; racial composition of the census block group (percent white, black, Asian, and Hispanic); percent of residents with less than high school and with college educations; employment composition of the census block group (management, profession, health, sales, repair, etc.), average income, household size, house value, and number of vehicles per household; percent of homes owned and percent vacant; average travel times to work; percent of residents unemployed, with poor English skills, and in poverty.

<sup>iv</sup> The results of this regression are unreported, but available from the author. Most of the characteristics listed have a statistically significant effect, and affect the new car profit margin by tens to hundreds of dollars.

<sup>v</sup> Except for the financing profit margin, which we consider subsequently, and profit margins on aftermarket options, insurance, and service contracts, which are less common.

<sup>vi</sup> The profits are expected profits since customers may, for example, pay a loan back early.