

SELLER-BUYER ETHNIC MATCHES: THE CASE OF CAR TRANSACTIONS AT TWO NORTH AMERICAN AUTO DEALERSHIPS

HIDEO OWAN

*Institute of Social Science, The University of Tokyo
Bunkyo-ku, Tokyo 113-0033, Japan
owan@iss.u-tokyo.ac.jp*

TSUYOSHI TSURU

*Institute of Economic Research, Hitotsubashi University
Kunitachi, Tokyo 186-8603, Japan
tsuru@ier.hit-u.ac.jp*

KATSUHIITO UEHARA

*School of International Politics, Economics and Communication, Aoyama Gakuin University
Shibuya-ku, Tokyo 150-8366, Japan
uehara@sipeb.aoyama.ac.jp*

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Abstract

Using personnel and transaction data obtained from two Canadian auto dealerships, we examine whether ethnic matches between salespersons and customers affect sales prices and the number of units sold by individual salespersons. Regarding prices, we detect neither premium price setting nor discounting among seller-buyer matches of the same ethnic groups relative to those of different ethnic groups. Regarding the number of units sold by individual salespersons, however, we find that, relative to customer demographics, salespersons sell larger quantities to customers of the same ethnic group. Moreover, we find that high-performing salespersons conduct more transactions with customers of the same ethnic group than low-performers, especially in months when business conditions are unfavorable.

Keywords: ethnicity, price discrimination, seller-buyer matches, car transaction, social network

JEL Classification Codes: M12, M5, J15, J33

I. *Introduction*

With populations throughout North America and other regions becoming increasingly diverse, it is all the more important to understand how ethnic affinities affect economic

transactions. Although competitive markets should eventually drive out taste-based discrimination over the long term (Becker 1957), other factors still remain, such as statistical discrimination, communication costs associated with cross-group transactions, and selling through social networks.

Empirical research on this issue is divided into two lines. The first focuses on price discrimination related to ethnic differences between employees and customers. Ayres and Siegelman (1995), conducting a controlled experiment in the Chicago area, found that the prices auto dealers offered to minorities and women were substantially higher than those to white males. In contrast, Goldberg (1996), using data taken from the Consumer Expenditure Survey, found no evidence of price discrimination. As these two studies illustrate, this line of research has produced mixed results.

The second line of research highlights the effect of ethnic matches between salespersons and customers. Churchill, Collins, and Strang (1975), for example, found that a more favorable outcome is likely to obtain when the salesperson and customer are of similar ethnicity. On the other hand, however, Leonard, Levine, and Giuliano (2010), matching data from a large-scale retail chain to data from the U.S. Bureau of Census, found that there is almost no payoff to be gained from efforts to match the ethnicities of salespersons and customers, with the exception of Asian and Hispanic ethnic enclaves.

A possible reason why research on the issue has proved to be inconclusive is that most studies tend to suffer from two shortcomings. The first is that most existing studies do not include micro-level information on both buyers and sellers. For example, Goldberg (1996) only accounts for buyers' characteristics, while Leonard, Levine, and Giuliano (2010) use aggregate data for both stores and markets. Therefore, actual seller-buyer ethnic matches are not controlled for. The second shortcoming is that most existing studies do not adequately account for the business and work environment that they focus on. Although these factors likely affect both the determinants and outcomes of transactions, they have been regarded as unobservable in research carried out to date leaving possible endogeneity issues unresolved.

Against this background, the aim of the present study is to examine the role of ethnicity in seller-buyer transactions by addressing these shortcomings. Specifically, using personnel and transaction data from two auto dealerships located in an auto mall in a large city in Canada, we are able to take into account detailed information on both sellers and buyers and to clearly identify and examine factors such as business conditions and incentives provided for salespersons that previous studies have treated as unobservable.

The crucial feature of our data is that they include the number of vehicles sold by individual salesperson at each dealership as well as details on each transaction. In addition we have detailed information on each individual salesperson, including their ethnicity, as well as information on buyers' ethnicity.

The results of our analysis suggest that ethnic similarities and dissimilarities between salespersons and customers can strongly affect economic transactions, but the nature of the effect on prices and quantities can differ greatly. Specifically, concerning transaction prices, we find no significant price differential when comparing transactions involving salesperson-customer pairs of the same ethnic group with those involving pairs of different ethnic groups. From a theoretical point of view, one might expect prices in transactions involving pairs consisting of the same ethnic group to be either higher or lower than those involving pairs of different ethnic groups. On the one hand, individual salespersons may consciously or

unconsciously offer lower prices to customers of the same ethnic group due to some kind of affinity or in the hope of attracting more business through word of mouth. On the other hand, customers might be willing to pay a premium for transacting with a salesperson from the same ethnic group to facilitate communication. However, our analysis did not find evidence of either tendency.

Regarding the number of units sold by individual salespersons, two results were obtained. First, relative to customer demographics, salespersons recorded a higher share of sales to customers of the same ethnic group as their own than to customers of a different ethnic group. The likely reason for this result is that ethnicity-based social networks provide ready channels for referrals and by facilitating contacts between sales staff and customers sharing a common language. However, no substantial price differentials between ethnic pairs and ethnically heterogeneous pairs can be detected; the evidence suggests instead that the existence of ethnic ties does not lead salespersons to offer preferential discounts to increase sales, but rather that social networks facilitate the building of trust relationships conducive to ensuring product quality and aftercare service. Second, the analysis provides insights on salesperson ability and performance. Specifically, we find that high performers make more sales to customers of the same ethnic group than low performers, and that their sales to customers of the same ethnic group increase when business conditions deteriorate. This result further affirms the importance in economic transactions of personal relationships related to ethnicity.

The rest of paper proceeds as follows. Section II provides an overview of major previous studies and sets the research agenda of this paper. Section III then explains the nature of the dataset, while Section IV outlines the incentive system employed at the two dealerships. Next, Section V examines whether ethnic matches affect prices, followed, in Section VI, by an investigation of the sources and outcomes of ethnic sorting of sellers and buyers. Section VII summarizes the results.

II. *Previous Studies and Research Questions*

This section presents our framework for examining the effects of ethnicity on sales prices and units sold by individual salespersons. We start by providing a brief review of existing studies and then outline our research questions in detail.

The auto retail sector is a classic case of an industry in which bargaining between salespersons and customers is common (Saloner, Spence, and Marti 2000). For this reason, numerous researchers have used auto sales data to attempt to determine whether intensive bargaining results in ethnicity-related price discrimination. However, as mentioned earlier, such studies have produced conflicting results. For example, Ayres and Siegelman (1995) and Ayres (2001), based on extensive paired audits, argue that discrimination is a common occurrence in retail sales. In a controlled experiment in the Chicago area, 38 testers bargained for 306 vehicles at 153 auto dealerships. For both the initial and final offers, prices quoted to blacks and white women were much higher than those made to white men. This finding strongly suggests that salespersons often engage in statistical discrimination against customers by inferring reserve prices from ethnicity or gender.

In contrast, Goldberg (1996) detects no discrimination against women or minorities. Specifically, using data from the Consumer Expenditure Survey by the U.S. Bureau of Labor

Statistics for the period 1983 to 1987, she analyzes car purchase transactions of 1,300 households and finds no significant final price differentials for minorities (blacks and Hispanics) or women. She does, however, find a much wider variance in final prices paid by blacks than in those paid by whites.

Finally, Scott Morton, Zettelmeyer, and Silva-Risso (2003), examining 670,000 transactions involving 3,562 auto dealers from January 1999 through February 2000, do find evidence of price discrimination against minorities, but the margin of such price discrimination is smaller than indicated by earlier research. Specifically, without controls, they find a minority premium in the range of 2 percent (an average of C\$500 per car), but when controlling for search costs (using a dummy variable indicating whether a customer traded in a vehicle at the dealer), the premium declines to a range of 0.6-0.8 percent. Furthermore, using a dummy for the internet service Autobytel.com and an interaction term for ethnicity eliminates nearly all the remaining minority premium.¹

Thus, existing research has failed to produce unambiguous evidence on the existence of ethnicity-related price discrimination. Even in the studies where price discrimination has been detected, the issue often still remains whether this is a reflection of animus or of perceptions of different consumer reserve prices. Moreover, in our view, too much emphasis has been placed on the question of whether price discrimination exists, and most studies have been silent about the equally relevant question of whether and why buyers tend to make purchases more frequently from ethnically similar sellers to examine the roles of communication costs, social networks, and salesperson reputation among affiliate ethnic groups. A few exceptions include Ibarra (1992, 1995), who showed that employees may attract customers using personal connections within social networks, and Churchill, Collins, and Strang (1975), who found that placing ethnically similar salespersons amongst customers enhances communication and raises sales performance as well (see also Holzer and Ihlanfeldt 1998).

Other notable recent contributions in this context are the studies by Leonard, Levine, and Joshi (2004), Giuliano, Levine, and Leonard (2009), and Leonard, Levine, and Giuliano (2010). Using store-level data for a national retail chain in the United States with over 800 stores and more than 70,000 employees, these studies analyze the effect of salesperson-customer ethnic affinity on store performance (sales). They find that higher rates of ethnic matching do not necessarily improve store performance, except when customers (especially Asians and Hispanics) speak English poorly. However, one problem with these studies is that they base their ethnicity data on U.S. Bureau of Census data for the regions in which stores are located. Consequently, the data apply to the potential customer group (the population living near the store) rather than to the stores' actual customers. This means that it is still possible that in relatively ethnically balanced communities these stores and their competitors each have their specific ethnic clientele.

Against this background, the purpose of this study is to examine in greater detail the effect

¹ The studies mentioned here all focus on seller-side discrimination. However, studies using a variety of econometric approaches have shown that other types of discrimination can be observed in other markets. For instance, regarding buyer-side discrimination, Ayers, Vars, and Zakariya (2005), using a survey of taxi drivers in New Haven, found that passengers pay lower tips to minority taxicab drivers. Similarly, using a field experiment, Doleac and Stein (2010) detected discrimination against minority sellers of iPods through local online markets. Finally, in a study examining both seller- and buyer-side discrimination, List (2004), also using field experiments, found statistical discrimination against minority buyers and sellers in the sportscard market.

TABLE 1. SUMMARY STATISTICS OF TRANSACTION-BASED DATA (in Canadian dollars)

	Obs.	Mean	S.D.	Min.	Max.
Price	4,032	27,023	7,313	13,991	62,090
Gross profit	4,032	1,003	590	-1,452	4,538
Gross profit rate	4,032	3.76%	1.96%	-5.05%	19.32%
Commission	4,032	275.81	179.22	19.60	1,394.87
Car age	4,032	0.68	0.48	0	3
Marginal commission	4,032	1.38	145.41	-440.17	1,047.68
Bonus	4,032	36.93	99.13	0	1,000

of seller-buyer ethnic matches using micro-level data on individual salespersons and customers. Specifically, using our dataset, we examine whether we find evidence that particular ethnic groups pay a price premium or receive discounts. Moreover, we investigate whether matching ethnic pairs of seller and buyers transact with each other more frequently than non-matching ethnic pairs. Finally, given that we find that this is the case, we look at what kind of salespersons are most effective.

III. Data

1. Description of Data

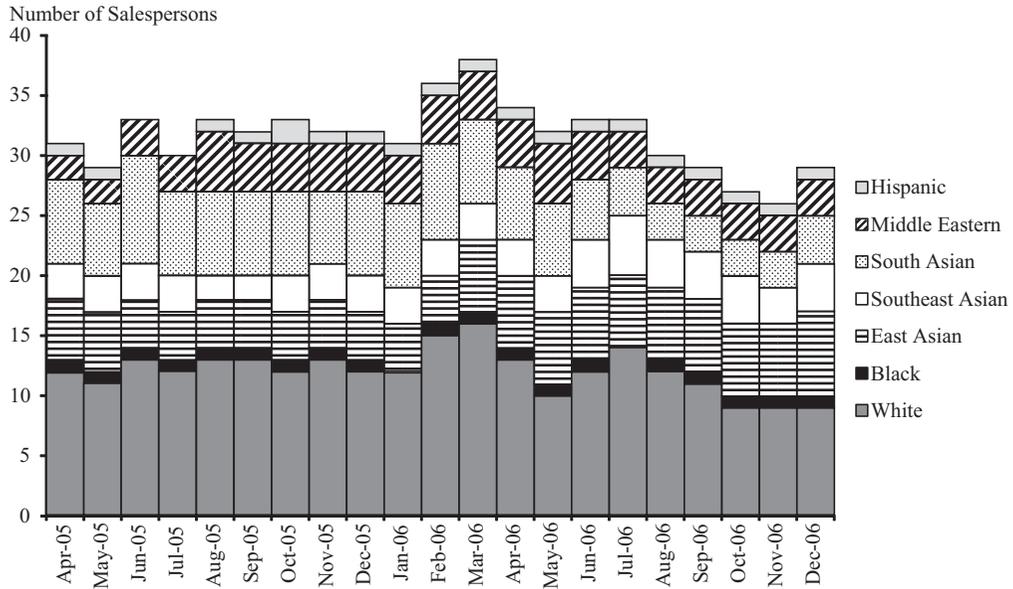
We analyze personnel and transaction data obtained from two auto dealerships located in an auto mall in a large city in Canada.² The data cover the period from April 2005 to December 2006 and include the number of vehicles sold by each dealership as well as details on each transaction, such as the specific model of the vehicle sold, the date, price, gross profit, and commission, the ID of the salesperson, and the last name of the customer. In addition we have information on each individual salesperson, including their birthday, the date they started working for the dealership, the date they stopped working for the dealership if they did so during our observation period, and their ethnicity. During the twenty-month period studied, Dealerships A and B sold 4,032 new cars and employed 69 people. All the salespersons were male. Summary statistics of our dataset are shown in Table 1.

2. Salespersons' Ethnic Composition

Given that our key interest is in the effect of ethnicity on sales transactions, let us take a closer look at the data on the ethnicity of the salespersons and their customers. We start by looking at the 69 salespersons employed at the dealerships during our observation period. The most numerous group was whites (29 persons), followed by South Asians (15) and East Asians (9). There were only two blacks and two Hispanics. Figure 1 shows the ethnic composition on a month-to-month basis. It also indicates that about 30 sales staff were employed in any given month, with whites accounting for about one-third of the total. Over the course of the period,

² Because of confidentiality agreements, the location of the dealerships cannot be disclosed. It should be noted, though, that the dealerships are in an area with a diverse population and therefore suitable for our analysis.

FIG. 1. NUMBER OF SALESPERSONS BY ETHNICITY



the number of South Asians declined somewhat, while that of East Asians grew. The total number of black and Hispanic salespersons was always either zero or one.

3. Customers' Ethnic Composition

Since information on car buyers' ethnicity was not included in the dataset, we obtained this information in the following manner. First, we classified customers by race/ethnicity/national origin using data provided by the U.S. Bureau of Census, which discloses the ethnic distribution for each surname for which sufficient data exist. We identified a customer as white, black, Asian, or Hispanic if more than 50 percent of citizens with that surname were categorized as such by the U.S. Bureau of Census. Surnames that did not correspond to any group and names that did not meet the 50 percent threshold were labeled "Other." (We rely on information from the United States, because Statistics Canada does not provide equivalent information.) Second, we classified Asian surnames into four subgroups with the assistance of economists and sociologists who themselves are of either East Asian, Southeast Asian, South Asian, or Middle Eastern descent.³

Table 2 shows the ethnic composition of transactions. It indicates that East Asian salespersons sold the largest number of vehicles (1,111 units of the 4,032 units sold by individual salespersons during the observation period, or 27.6 percent), followed by whites (955 units, 23.7 percent) and South Asians (689 units, 17.1 percent). Turning to buyers, Table 2

³ To ensure accuracy, all of the initial results were double-checked by scholars from the same region working in pairs.

TABLE 2. ETHNIC COMPOSITION OF TRANSACTIONS

Ethnicity	Total	White	Black	East Asian	Southeast Asian	South Asian	Middle Eastern	Hispanic	Other
Sellers	4,032 100%	955 23.7%	107 2.7%	1,111 27.6%	432 10.7%	689 17.1%	620 15.4%	118 2.9%	N.A.
Buyers	4,032 100%	1,508 37.4%	27 0.7%	528 13.1%	163 4.0%	606 15.0%	127 3.1%	155 3.8%	918 22.8%

Note: Data for sales during the period April 2005 to December 2006. Vehicles sold by sales managers are excluded from the table.

TABLE 3. COMMISSION SCHEDULE USED BY DEALERSHIPS A AND B, NEW CAR SALES

Number of New Cars Sold	Commission Rate
1-11	25% with pack
12-13	25% without pack
14-15	30% without pack
16 and over	35% without pack

Note: Commission = (gross profit - pack) × commission rate

Pack is 2% of the purchase price or C\$400, whichever is smaller. For example, given a gross profit of C\$1,000 and a pack of C\$400, which is ensured if the car price is no less than C\$20,000, the commission per car sold is as follows:

25% with pack: $(1,000 - 400) \times 25\% = \text{C}\150

25% without pack: $(1,000 - 0) \times 25\% = \text{C}\250

further indicates that white customers accounted for the largest share of the 4,032 vehicles (1,508 units, 37.4 percent) sold, followed by South Asian (606 units, 15.0 percent) and East Asian customers (528 units, 13.1 percent). Excluding transactions for which the ethnicity of the buyer could not be determined (918 units, 22.8 percent), the shares of the three largest ethnic groups of buyers closely matched those of the salespersons. Although not shown here to conserve space, a similar strong correlation can be observed on a month-to-month basis.

IV. *The Incentive System*

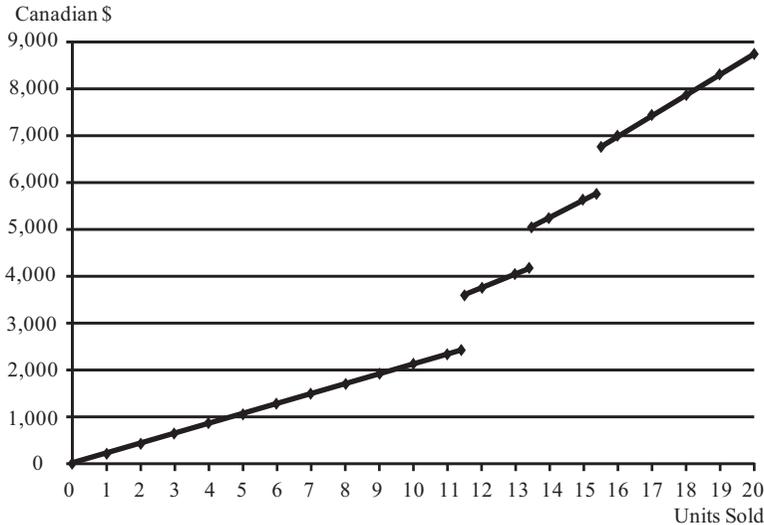
This section presents an overview of the compensation scheme adopted by Dealerships A and B. In both dealerships, pay is 100 percent commission-based.

1. **Non-linear Pay Scheme**

As can be seen in Table 3, Dealerships A and B utilize the same incentive system, a compensation scheme in which the commission rate rises stepwise according to the number of vehicles sold in a month.⁴ For salespersons in charge of selling new cars, the commission rate, retrospectively applied to all units sold during a particular month and based on gross profit, is (1) 25 percent with pack (see explanation below) if the total monthly sales volume is between

⁴ Dealerships A and B are owned by the same business person.

FIG. 2. ILLUSTRATIVE COMMISSION SCHEDULE AT DEALERSHIPS A AND B



Note: The calculation is based on a price of C\$25,000 and a gross profit rate of 5%.

one and eleven units; (2) 25 percent without pack for twelve or thirteen units; (3) 30 percent without pack for fourteen or fifteen units; and (4) 35 percent without pack for sixteen units and more.

Pack, which is widely used in the auto retail business to structure pay schemes in North America, is the amount subtracted from the gross profit before applying the commission rate to calculate the commission. At Dealerships A and B, pack is 2 percent of the invoice price, but is capped at a maximum of C\$400. For example, if pack is charged on a gross profit of C\$1,000, the commission is $(1,000 - 400) \times 0.25 = \text{C}\150 , while without pack the commission is $1,000 \times 0.25 = \text{C}\250 . Pack fulfils two purposes: it provides a penalty to ensure that salespersons work hard to avoid being charged pack, and it helps the company to recover fixed employment costs such as fringe benefits in the case of low performers.

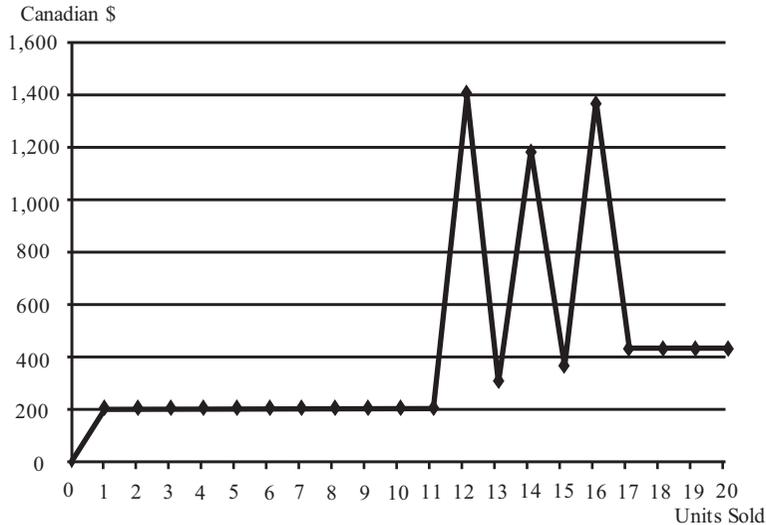
Figure 2 indicates employees' monthly commission depending on the number of units sold, assuming an average price of C\$25,000 and a gross profit of 5 percent for new cars.

2. Marginal Commission

Next, in order to obtain the incentive intensity provided by the non-linear compensation scheme used by Dealerships A and B, we calculate the marginal commission on car sales. The marginal commission is the increase in monthly commission income earned through the sale of each additional car, which is contingent on where on the commission schedule a salesperson lies at the time the purchase is made. Given the commission scheme outlined above, this means that at certain points on the commission schedule, the commission rate changes discontinuously, since it depends on how many vehicles the salesperson has already sold in the month.

For example, if a salesperson who has already sold 13 units during a given month sells

FIG. 3. FIG. 3. ILLUSTRATIVE MARGINAL COMMISSION FOR NEW CAR SALES



Note: The calculation is based on a price of C\$25,000 and a gross profit rate of 5%.

one additional car (notching a 14th sale), his commission rate for the month increases from 25 percent to 30 percent, not only for the 14th car but for all 14 cars sold. Therefore, the increase in monthly commission achieved by reaching one of the three thresholds is substantially larger than the actual commission for a particular sale below the threshold. Figure 3 shows how the marginal commission, given the same conditions assumed for Figure 2, changes along the commission schedule. As can be seen in Figure 3, the marginal commission makes a sudden jump upon reaching each of the thresholds.

3. Compensation Scheme and Practices Implemented

Having outlined the characteristics of the compensation scheme, let us examine how interaction with customers and compensation are handled in practice. We consider four aspects. The first is the way in which salespersons and customers interact. In this context, it should be noted that customers tend to be either walk-in customers or people referred by earlier customers. People referred by earlier customers, typically by repeat customers, likely are employed at the same workplace, a member of the same social organization, or a resident of the same community, as the earlier customers. The reasons that new customers seek referrals or recommendations include the desire to get a better price, to ensure quality, and/or, in some cases, to speak with sales staff conversant in languages other than English.

While customers deficient in English will likely wish to deal with particular salespersons, walk-in customers are typically assigned to available sales staff by the reception staff in a pre-determined order. Without a pre-determined order, salespersons may compete to serve or poach customers, creating a poor working environment. However, receptionists will generally ignore the order system in the case of customers with English communication problems (notably Asian

customers in the case of Dealerships A and B) and try to pair them with sales staff conversant in the customer's native language.

The second aspect of actual practices that needs to be considered is that some sales are joint sales, involving two or three salespersons in a single transaction. In these cases, commission rates are determined on a case-by-case basis. The most common scenario is that it is clear who the main salesperson is and the assisting salesperson simply helps with delivery of the vehicle. The assisting salesperson generally receives a C\$50 fixed rate allowance drawn from the main seller's commission. In such cases, only the main seller receives credit for the sale with regard to calculation of the commission. In our analysis below, we omit such cases and focus on sales conducted by single salespersons only.

A third aspect concerns the setting of the sales price. Only managers have the authority to set car prices, but salespersons often bargain energetically with managers, demanding lower prices in order to make sales. In this way, sales staff also exert a significant impact on actual prices.

The fourth aspect, finally, is that there are several types of irregular bonuses. For example, special bonuses called "spiff" are paid for the first deal concluded on a Saturday. Bonuses are also paid when cars are sold from "dead stock" (i.e., in inventory for more than 100 days).

V. *Do Ethnic Matches Affect Prices?*

We are now ready to examine whether ethnic matches affect prices. Specifically, we use two different approaches to determine whether an ethnic match between salespersons and customers affects gross profits on new car sales. First, in Section V.1, the average gross profit rate for new car sales is calculated and correlated with the ethnicity of salespersons and customers to determine whether transactions concluded between persons of the same ethnic group are associated with significantly higher or lower profit rates than other transactions. Second, in Section V.2, the determinants of the average gross profit rate of new cars are analyzed after controlling for the incentives created by the non-linear compensation system described in the preceding section. Doing so enables us to examine the findings in Section V.1 in greater detail.

1. **Comparison of Average Gross Profit Rates**

This section compares the average gross profit on transactions conducted by pairs of the same ethnic group with that of other transactions and examines whether there are significant differences between them. From a theoretical perspective, the effect of ethnic matches on the gross profit on sales, and hence on short-term firm profitability, could go either way. On the one hand, it is possible that, as examined in the next section, salespersons seeking to attract more business through word of mouth in their ethnic network may offer preferential discounts to members of their own ethnic group. Large preferential discounts, however, reduce profitability. On the other hand, it is possible that customers dealing with a salesperson speaking their native language may be willing to pay some degree of premium in order to facilitate communication. This pattern, of course, would enhance firm profitability. At the same time, higher gross profits in the case of ethnically matched pairs could also be the result of

TABLE 4. AVERAGE GROSS PROFIT RATE BY ETHNIC MATCH,
NEW CAR SALES BY SINGLE SALESPERSONS

Salesperson Ethnic Group	Customer Ethnic Group								Average
	White	Black	East Asian	Southeast Asian	South Asian	Middle Eastern	Hispanic	Other	
White	3.86	3.93	3.41	3.10	3.47*	3.18	4.44	3.83	3.78
Black	4.31	2.90	3.40	4.52	3.89	3.20	4.65	4.54	4.16
East Asian	3.78	3.56	3.29***	3.65	3.50*	2.94*	3.90	3.68	3.56
Southeast Asian	3.66	N.A.	3.85	3.20**	3.75	3.34	3.63	3.36**	3.56
South Asian	4.18*	4.94	3.13	4.50	3.97	4.38	4.93***	4.44***	4.19
Middle Eastern	3.71	4.10	3.66	3.05*	3.49	3.81	3.85	3.75	3.67
Hispanic	3.89	4.05	3.85	4.99	3.56	4.70	5.64*	3.72	3.94
Average	3.86	3.87	3.38	3.50	3.69	3.70	4.22	3.84	3.76

Notes: Cells shaded in grey are for salespersons and customers belonging to the same ethnic group.

“Other” includes transactions for which customers’ ethnic group could not be identified.

The figures in the table are based on transactions involving new cars only and conducted by a single salesperson.

A *t*-test was conducted to test whether profit rates for particular ethnic pairs were significantly different from the reference pair, the white-white pair.

***, ** and * indicate significance at the 1, 5 and 10% level, respectively.

price discrimination in the case of non-matching pairs, as suggested by Ayres and Siegelman (1995) and Scott Morton, Zettelmeyer, and Silva-Risso (2003), who have shown that price discrimination could occur when salespersons and customers are of different ethnic groups.

The average gross profit rates for all the different ethnicity matches between salespersons and customers are presented in Table 4. The diagonal cells (shaded) show the average gross profit rates on sales involving pairs of the same ethnic group. In order to rule out irregular sales circumstances (e.g., the sale of inventory stock at substantially discounted prices) that could cause bias in our analysis, the sample is limited to standard transactions not involving spiff or other bonuses. The results indicate that the profit rates on transactions among pairs of the same ethnic groups are below the average, which is 3.76 percent, for some ethnic groups including blacks (2.90 percent) and Southeast Asians (3.20 percent). To examine whether these differences in the average gross profit rates in transactions among ethnic pairs were statistically significant, we conducted a *t*-test using the white-white pair as the reference group. We found that the difference was significant for three ethnic pairs: East Asians, Southeast Asians, and Hispanics, with average prices being significantly lower for the first two groups and significantly higher for the last group.

In addition, to examine whether the gross profit rates for any particular customer ethnic group(s) differed notably from the rest, the bottom row of the table shows the average gross profit rate by customer ethnicity. However, while the average gross profit rate for Hispanics, at 4.22 percent, was slightly higher than that for other ethnic groups, for which it was in the 3 percent range, the difference does not appear to be significant.

2. Regression Analysis Controlling for Incentives and Other Transaction Characteristics

The significantly higher or lower average gross profit rates for some matching ethnic pairs relative to the white-white pair do not necessarily indicate price discrimination, as it is possible

to imagine a number of other mechanisms that could produce such an outcome. First, if customers who have a preference or need for particular car models or timing of purchase tend to choose a salesperson with a similar ethnic background, differences in profitability for particular ethnic matches may be the result of spurious affects due to the presence of heterogeneous market segments. Second, salespersons facing a stronger incentive intensity may be more likely to seek business using their social network. Since the incentives created by the non-linear compensation scheme or the sales incentives associated with a particular car model affect such salespersons' willingness to offer discounts, which again may cause a spurious correlation between gross profit rates and ethnic matches. To account for heterogeneous market segments and the incentive intensity each salesperson faces, we examine the effects of ethnic matches on gross profit rates by controlling for various attributes of transactions, including car models, the timing of purchases, marginal commissions, etc. Specifically, using ordinary least squares (OLS), we estimate the determinants of the gross profit rate on new cars sold (R_j) employing the following specification:

$$R_j = X_j\beta + B_j\gamma + M_j\lambda + \varepsilon_j,$$

where subscript j refers to a particular transaction, R_j is the gross profit rate on that transaction, X_j is a vector of variables affecting the gross profit rate, including variables on the timing of purchase constructed based on the transaction date (the day of the week, the week of the month, and the month of the year) and the car model. B_j is a vector of three variables indicating the incentive intensity: the amount (in Canadian dollars) of the marginal commission generated by the transaction, a dummy variable indicating whether a discretionary bonus applied, and the amount of any such bonus. M_j is a set of dummy variables for different ethnic pairs.

The results of the estimation are shown in Tables 5. Using transactions involving whites either as the salesperson or the customer as the reference category, the coefficients on the ethnicity dummies (both interactive and non-interactive) indicate that in most ethnic pairings the gross profit rate is not significantly different from the reference category. The only exception is when South Asian salespersons sell to East Asians or Hispanics, in which cases the coefficients are weakly significant (at the 10 percent level). This means that gross profit rates for pairs of the same ethnic group are not significantly different from those for other pairs.

Of course, the fact that no significant differences in profit rates were found could be due to preferential discounting offered by salespersons to attract business through word of mouth in their ethnic network and price premiums paid by customers to facilitate communication cancelling each other out in our estimation. We might be able to pick this up if discounting or premiums depend on the car model or price range. For example, one might assume that most buyers of high-end cars will have a relatively high income, speak English without difficulty, and have little trouble communicating with salespersons. Further, buyers of more expensive cars may receive significant discounts. On the other hand, customers searching for low-end cars may tend to have a relatively low income and speak English with difficulty. In addition, profit margins on cheaper cars are likely to be considerably smaller, meaning that significant discounts are unlikely. We therefore re-estimate the model above, but divide observations into various subsamples, e.g., transactions involving minivans/SUVs vs. those involving sedans/trucks or those involving expensive cars vs. those involving cheaper cars. The results (not shown here to conserve space), however, again indicate that there is no significant difference in

TABLE 5. DETERMINANTS OF GROSS PROFIT RATE, NEW CAR SALES BY SINGLE SALESPERSONS, OLS

ln (Car age)	-0.0826 (0.1239)
Marginal commission	-0.0013*** (0.0002)
Bonus dummy	-2.5402*** (0.0865)
Bonus amount (C\$1,000)	0.0010*** (0.0004)
Interaction terms of salesperson ethnic group and customer ethnic group	See below
Day of week dummy	Yes
Week of month dummy	Yes
Month of year dummy	Yes
Number of observations	4,032
F-statistics	23.16
Adjusted R-squared	0.3593

Coefficients for the Interaction Terms of Salesperson Ethnic Group and Customer Ethnic Group

	Non-Interactive Salesperson Ethnic Group Effect	Customer Ethnic Group						
		Black	East Asian	Southeast Asian	South Asian	Middle Eastern	Hispanic	Other
Non-Interactive Customer Ethnic Group Effect		-0.162 (0.478)	-0.305 (0.216)	-0.197 (0.414)	-0.205 (0.151)	-0.274 (0.351)	0.497 (0.387)	0.036 (0.116)
Black	0.634* (0.349)	-0.853 (0.986)	-0.312 (0.659)	0.107 (0.714)	-0.453 (0.621)	-0.786 (0.698)	-0.607 (0.667)	-0.348 (0.494)
East Asian	-0.568*** (0.116)	-0.609 (0.714)	-0.230 (0.248)	0.118 (0.458)	0.024 (0.234)	-0.465 (0.451)	-0.590 (0.445)	-0.237 (0.178)
Southeast Asian	-0.211 (0.129)		0.526* (0.314)	-0.293 (0.458)	0.208 (0.316)	-0.205 (0.462)	-0.833* (0.460)	-0.267 (0.212)
South Asian	-0.301** (0.138)	0.770 (0.816)	-0.205 (0.432)	0.583 (0.699)	-0.060 (0.220)	0.226 (0.508)	-0.057 (0.505)	0.207 (0.223)
Middle Eastern	-0.628*** (0.130)	0.272 (1.418)	0.212 (0.348)	-0.388 (0.547)	-0.143 (0.258)	0.202 (0.439)	-0.184 (0.469)	0.061 (0.208)
Hispanic	-0.291 (0.353)	-0.524 (1.459)	0.024 (0.572)	0.790 (1.332)	-0.033 (0.567)	0.276 (0.701)	0.856 (1.416)	-0.055 (0.495)

Notes: The reference group is transactions involving white salespersons and customers.

Cells shaded in grey are for salespersons and customers belonging to the same ethnic group.

The figures in the table are based on transactions involving new cars only and conducted by a single salesperson.

The figures in parentheses are standard errors.

***, ** and * indicate significance at the 1, 5 and 10% level, respectively.

profit rates across different ethnic pairings. Thus, the regression results suggest that, at least in the case of transactions at the two dealerships we focus on, no substantial differences in profit rates across the various ethnic pairings emerged. In particular, we found no preferential

discounting or premiums in the case of transactions involving salespersons and customers of the same ethnic group.

VI. *Ethnic Sorting of Sellers and Buyers*

Social networks based on ethnicity may play an important role in promoting communication and building trust, and in disseminating information on individuals' reputations. Such arguments have long been advanced by human resource managers as well as social scientists conducting research on diversity (Bantel and Jackson 1989; Cox 1993). However, there is little empirical evidence for such arguments. This section attempts to help fill this gap by examining whether there are any differences across ethnic groups in terms of the frequency of sales transactions.

We start by using cross tabulations to determine whether a significant difference in the frequency of transactions between persons of the same ethnic group and all other transactions can be found (Section VI.1). Based on the findings, we then conduct a regression analysis examining salespersons of which ethnic group are most likely to transact frequently with customers of the same ethnic group (Section VI.2).

1. Transactions by Ethnic Match

Let us begin by looking at the distribution of new car sales by ethnic group. The results are shown in Table 6, where the ethnic group of the salesperson is shown in the column on the left and the ethnic group of the customer is shown in the row at the top. The shaded diagonal cells show transactions involving pairs of the same ethnic group, with the upper figure in the cells indicating the actual number of transactions and the lower figure indicating the percentage that such transactions make up in the overall sales of the salespersons of a particular ethnic group. Comparing these percentages with the percentage share of customers of different ethnic groups overall, shown in the bottom row, suggests that disproportionately more frequent transactions take place within the same ethnic groups. For example, sales to East Asian customers accounted for only 13.1 percent (528 vehicles) of the two dealerships' total sales, but 31.3 percent (348 vehicles) of sales made by East Asian salespersons were to East Asian customers. While the gap between the percentage of sales made to customers of the same ethnic group (i.e., the percentages in the grey cells) and the percentage of that ethnic group in customers overall (i.e., the percentage in the row labeled "Average"), which provides some indication of the extent to which sales are concentrated among customers of the same ethnic group, is largest for East Asians, similar tendencies can also be observed for other ethnic groups except Hispanics. In other words, customers are especially apt to buy cars sold by salespersons from their own ethnic group.⁵

⁵ Table 6 considers transactions conducted by single salespersons only. We initially suspected that transactions conducted by two or more salespersons, which account for 13.3 percent of total transactions, would have an above-average rate of linkage to ethnic-related referrals. However, further investigation into the transactions involving more than one salesperson shows that their patterns, including the rate of sales concluded within the same ethnic group, closely resemble those of single-person sales.

TABLE 6. NEW CAR SALES BY ETHNIC MATCH (above: number of sales; below: percentage of the total sales made by the salespersons in each ethnic group) (%)

Salesperson Ethnic Group	Customer Ethnic Group								Average
	White	Black	East Asian	Southeast Asian	South Asian	Middle Eastern	Hispanic	Other	
White	467 48.9	8 0.8	55 5.8	12 1.3	100 10.5	26 2.7	28 2.9	259 27.1	955 100
Black	41 38.3	4 3.74	8 7.5	3 2.8	17 15.9	4 3.7	4 3.7	26 24.3	107 100
East Asian	305 27.5	6 0.5	348 31.32	61 5.5	111 10.0	15 1.4	41 3.7	224 20.2	1,111 100
Southeast Asian	157 36.3	0 0.0	40 9.3	50 11.57	47 10.9	10 2.3	27 6.3	101 23.4	432 100
South Asian	237 34.4	4 0.6	19 2.8	13 1.9	211 30.62	27 3.9	32 4.6	146 21.2	689 100
Middle Eastern	255 41.1	3 0.5	48 7.7	21 3.4	98 15.8	37 5.97	19 3.1	139 22.4	620 100
Hispanic	46 39.0	2 1.7	10 8.5	3 2.5	22 18.6	8 6.8	4 3.4	23 19.5	118 100
Average	1,508 37.4***	27 0.7***	528 13.1***	163 4.0***	606 15.0***	127 3.2***	155 3.8	918 22.8	4,032 100***

Notes: Cells shaded in grey are for salespersons and customers belonging to the same ethnic group.

The figures in the table are based on transactions involving new cars only and conducted by a single salesperson.

*** in the bottom row indicates significance at the 1% level of the result for the Pearson's Chi-square test conducted for each column (customer ethnic group) and the joint test.

2. Ethnic Matching and Sales Volumes

Likely reasons for the high concentration of sales among pairs of the same ethnic group include trust, a common language, and ease of communication. Another possible reason is that many customers are probably referred to particular salespersons through social networks (colleagues at the workplace, acquaintances, etc.) that at least to some extent may reflect, e.g., cultural, religious, or residential ties.

Against this background, the question arises what kind of salespersons it is that are responsible for the majority of transactions among pairs of the same ethnic group. One possible hypothesis is that it is low performers that need to rely on customers referred to them through social ties. An alternative hypothesis, however, is that it may actually be high performers that account for the majority of transactions among pairs of the same ethnic group, that is, such high performers utilize their social ties to maximize their sales.

To explore these alternative hypotheses, we divide salespersons into high and low performing groups to find out whether any significant differences in sales ratios to persons of the same ethnic group can be observed. We define high performers as those who earned high commissions without pack in over half of the months they were employed between April 2004

TABLE 7. SALES CHARACTERISTICS BY SALESPERSON ETHNICITY AND ABILITY

Salesperson Ethnic Group		Customer Ethnic Group								Average	
		White	Black	East Asian	Southeast Asian	South Asian	Middle Eastern	Hispanic	Other		
East Asian	High performers	Number of cars	209	5	278	35	75	11	33	161	807
		Percentage	25.9%	0.6%	34.4%	4.3%	9.3%	1.4%	4.1%	20.0%	100%
		Profit rate (%)	3.66%	3.71%	3.23%	3.56%	3.14%	2.82%	4.00%	3.41%	3.41%
	Low performers	Number of cars	96	1	70	26	36	4	8	63	304
		Percentage	31.6%	0.3%	23.0%	8.6%	11.8%	1.3%	2.6%	20.7%	100%
		Profit rate (%)	4.04%	2.84%	3.52%	3.76%	4.26%	3.27%	3.52%	4.37%	3.97%
Total	Number of cars	305	6	348	61	111	15	41	224	1,111	
	Percentage	27.5%	0.5%	31.3%	5.5%	10.0%	1.4%	3.7%	20.2%	100%	
	Profit rate (%)	3.78%	3.56%	3.29%	3.65%	3.50%	2.94%	3.90%	3.68%	3.56%	
South Asian	High performers	Number of cars	117	1	6	5	134	16	16	81	376
		Percentage	31.1%	0.3%	1.6%	1.3%	35.6%	4.3%	4.3%	21.5%	100%
		Profit rate (%)	4.53%	3.65%	4.14%	5.26%	4.10%	4.64%	4.93%	4.75%	4.44%
	Low performers	Number of cars	120	3	13	8	77	11	16	65	313
		Percentage	38.3%	1.0%	4.2%	2.6%	24.6%	3.5%	5.1%	20.8%	100%
		Profit rate (%)	3.84%	5.37%	2.67%	4.02%	3.75%	4.00%	4.93%	4.05%	3.89%
Total	Number of cars	237	4	19	13	211	27	32	146	689	
	Percentage	34.4%	0.6%	2.8%	1.9%	30.6%	3.9%	4.6%	21.2%	100%	
	Profit rate (%)	4.18%	4.94%	3.13%	4.50%	3.97%	4.38%	4.93%	4.44%	4.19%	
Other Ethnic Groups	High performers	Number of cars	232	2	36	17	84	33	17	115	536
		Percentage	43.3%	0.4%	6.7%	3.2%	15.7%	6.2%	3.2%	21.5%	100%
		Profit rate (%)	3.63%	4.83%	3.43%	2.53%	3.22%	3.83%	3.74%	3.58%	3.53%
	Low performers	Number of cars	734	15	125	72	200	52	65	433	1,696
		Percentage	43.3%	0.9%	7.4%	4.3%	11.8%	3.1%	3.8%	25.5%	100%
		Profit rate (%)	3.87%	3.58%	3.67%	3.43%	3.70%	3.48%	4.20%	3.80%	3.80%
Total	Number of cars	966	17	161	89	284	85	82	548	2,232	
	Percentage	43.3%	0.8%	7.2%	4.0%	12.7%	3.8%	3.7%	24.6%	100%	
	Profit rate (%)	3.81%	3.73%	3.62%	3.26%	3.56%	3.62%	4.11%	3.75%	3.73%	

and December 2006, and low performers as those who earned commissions with pack in over half of the months they were employed during the same period. We then select high performing salespersons in the various ethnic groups. Doing so, we identify a total of seven high performing salespersons from two ethnic groups, East Asians and South Asians. We then investigate how patterns in their sales differ from those of low performing salespersons.

The results are shown in Table 7. As can be seen, the share of East Asian salespersons' sales to customers of the same ethnic group was 31.3 percent (348 vehicles), which simply replicates the result shown in Table 5. However, we now have a breakdown of which salespersons drove this result. That is, the share of total sales by high performing salespersons to East Asian customers was a high 34.4 percent (278 vehicles), while the share of sales by low performing salespersons to East Asian customers was just 23.0 percent (70 vehicles). While the share of 23.0 percent for low performing salespersons was still high relative to other ethnic groups, it is much lower than the share for high performers. On the other hand, however, low performers had a slightly higher average profit rate (3.52 percent) than high performers (3.23 percent).

A similar pattern is observed for South Asian salespersons. High performing South Asian salespersons made 35.6 percent (134 vehicles) of their new car sales to customers of the same ethnic group, while for low performing South Asian salespersons the share is just 24.6 percent (77 vehicles). In contrast with their East Asian colleagues, however, South Asian high

performers also attained higher profit rates on their sales to customers of the same ethnic group (4.10 percent) than their low performing counterparts (3.75 percent).

The comparison of sales patterns has shown that both East Asian and South Asian salespersons – with both groups represented by multiple employees – made a high proportion of their sales to customers of the same ethnic group. It further suggests that selling to customers of the same ethnic group was a major factor underlying the strong performance of both groups. However, in terms of average gross profit rates, no clear pattern suggesting that high performing salespersons in terms of the number of vehicles sold also registered high profit rates emerged. Closer inspection of the sales pattern shows that, in contrast with the general tendency that more expensive cars yield larger profit margins, high performing East Asian salespersons tend to sell more expensive cars at a lower profit rate, while high performing South Asian salespersons tend to sell cheaper cars at a higher profit rate.

In order to see how the sales behavior of high and low performing salespersons differs, we examine whether they differ in the way they adapt to changes in business conditions, which we proxy by the number of monthly new car sales in the province overall. Specifically, using monthly data, we regress the logarithm of the share of cars each salesperson sold in a particular month to customers of the same ethnic group ($\ln(c_s_same_ethnicity)$) on a number of variables explained below. The specification looks as follows:

$$\ln(c_s_same_ethnicity) = \alpha \ln(c_ethnicity) + \beta \ln(s_ethnicity) + \gamma High_performer_dummy + \delta High_performer_dummy * \ln(Prov_car_sales) + \epsilon Company_A_dummy + \xi Month_of_year_dummies + e$$

As variables influencing the share of sales that a particular salesperson makes to customers of the same ethnic group, we include the share of customers of the same ethnic group as the sales person ($c_ethnicity$) and the share of salespersons of that ethnic group in salespersons overall ($s_ethnicity$). Customers here are persons that bought a new car in that particular month and the shares are calculated separately for Dealerships A and B. In addition, we include a dummy for high performers ($High_performer_dummy$), a cross-term of this dummy and provincial car sales ($High_performer_dummy * \ln(Prov_car_sales)$), a dummy for Dealership A to control for dealership-specific characteristics, and dummies for the month of year to control for seasonal fluctuations of sales in a year ($Month_of_year_dummies$).

The variable of key interest is the interaction term of the high performer dummy and provincial new car sales. A negative coefficient on this interaction term would indicate that the dependence of high performers on customers of the same ethnic group rises when economic conditions are favorable, while a positive coefficient would signify that they are less dependent on such customers during favorable periods. Moreover, to check the robustness of our results, we introduce three alternative specifications of high performers. High performers are defined as salespersons who earned a commission without pack (i.e., they sold 12 vehicles or more per month) in more than 70 percent (Case 1), more than 50 percent (Case 2), or more than 30 percent (Case 3) of the months they were employed at the car dealerships between April 2004 and December 2006 (33 months). For example, in Case 1, high performers are those who received a commission without pack in more than 23 of the 33 months, while in Case 3, high performers are those who received a commission without pack in more than 10 of the 33 months.

The results of the regression are shown in Table 8. The high performer dummy is positive and significant (at the 10 percent level) in two of the three cases (Cases 2 and 3). On the other

TABLE 8. DETERMINANTS OF THE RATIO OF SALES TO CUSTOMERS OF THE SAME ETHNIC GROUP, OLS

Dependent variable = Ratio of sales to same ethnic group	Three definitions of high performers		
	70%	50%	30%
Share of customers of same ethnic group	1.033*** (0.138)	1.023*** (0.136)	1.020*** (0.137)
Share of salespersons of same ethnic group	-0.073 (0.187)	-0.050 (0.186)	-0.057 (0.186)
High performer dummy	13.074 (8.928)	14.425* (8.263)	14.151* (7.762)
Provincial new car sales (units)	-0.923 (2.458)	-0.840 (2.452)	-0.684 (2.512)
High performer dummy × Provincial new car sales	-1.256 (0.875)	-1.384* (0.810)	-1.363* (0.760)
Dealership A dummy	0.566*** (0.126)	0.546*** (0.129)	0.550*** (0.129)
Month of year dummies	Yes	Yes	Yes
cons	8.799 (23.963)	7.796 (23.896)	6.202 (24.494)
Number of observations	464	464	464
F-statistics	19.29	19.44	19.15
Adjusted R-squared	0.3532	0.3566	0.3564

Notes: We define high performers as those who earned high commissions without pack in: (a) over 70%; (b) over 50%; or (c) over 30% of months they were employed. The figures in parentheses are standard errors.

***, ** and * indicate significance at the 1, 5 and 10% level, respectively.

The mean and standard deviation of provincial new car sales are 27,304.8 and 4,577.9.

hand, the coefficient on the interaction term for the high performer dummy and provincial car sales is negative and significant (at the 10 percent level) in the same cases (and again not significant in Case 1). In short, high performers are heavily dependent on customers of the same ethnic group to maintain their high performance. Moreover, high performers depend more on sales to customers of the same ethnic group during months of low sales, but less so during months when economic conditions are favorable.

The analysis in this section allows the following conclusions. First, customers and salespersons are inclined toward conducting transactions with persons of the same ethnic group. Second, the reasons for this tendency do not appear to be the desire for preferential pricing or ease of communication (the latter of which would be expressed in a price premium), so that other factors, such as, for example, the desire to build mutual trust to ensure product quality and reliable after-sales service may be at play. However, such enhanced communication and mutual trust are not associated with price premiums. Third, when distinguishing between high and low performers, our evidence suggests that high performers may be relying on the skillful use of social relationships to enable them to maintain strong sales performance even when business conditions are unfavorable.

VII. *Conclusion*

Using detailed data on car sales transactions at two Canadian auto dealerships, this study examined how ethnic matches between salespersons and customers affect transaction prices and sales volumes. The main findings can be summarized as follows.

First, we found no evidence of significant price differences, as measured by gross profit rates, between pairs of the same ethnic group and pairs of different ethnic groups. This means that neither did salespersons attempt to increase their sales by offering preferential prices to customers of the same ethnic group nor were customers willing to pay higher prices for dealing with salespersons of the same ethnic group to facilitate communication.

Second, relative to the customer demographic, salespersons sold more to customers of the same ethnic group than to other ethnic groups. The likely reason for this result is the effect of social networks in enhancing communication by providing ready channels for referrals and by facilitating contacts between sales staff and customers sharing a common language. Taken together, the finding that ethnic matches do not result in noticeably higher or lower prices than for other customers but are associated with a larger number of sales suggests that ethnic ties help to build trust relationships, for example with regard to product quality and aftercare services.

Third, the analysis provided insights on salesperson ability and performance. Our results indicate that high performers make more sales to customers of the same ethnic group than low performers and that their sales to customers of the same ethnic group increase when business conditions deteriorate. These findings confirm the importance of personal relationships in facilitating economic transactions.

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