A Review Of Econometric Estimation Of Consumer Demand For Automobiles And The Country Of Origin (COO) Effects

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Abstract

The demand for automobiles has always been an important area for the application of various theoretical econometric models and the automotive industry remains to be the leading export sector in Turkey. This paper surveys a range of important developments in the modeling and estimation of demand for new automobiles in various regions like the U.S., Europe, and Turkey. The applied econometrician can acquire a good perspective when constructing such a model and deciding on the most appropriate econometric estimation technique. However, the applied econometrician is cautioned against some of the difficulties in modeling and forecasting the demand for automobiles. Since the Country of Origin (COO) effect is known to be an important factor in explaining the demand for products including automobiles, we also review the marketing literature investigating the consumers' biases about products related to the country in which they are made.

Key words: automobile demand; disaggregation; modeling; econometric estimation; country of origin effects.

JEL Classification : M21; C30

Tüketicinin Otomobil Talebinin Tahmini Ve Ülke Menşei Etkileri Üzerine Bir Literatür İncelemesi

Özet

Otomobil talebi çoğu zaman çeşitli kuramsal ekonometrik modellerin uygulama alanı olmuş ve de otomotiv halen Türkiye'de lider ihracat sektörü konumundadır. Bu çalışmada ABD, Avrupa ve Türkiye'de yeni otomobil talebinin modellemesi ve tahmin edilmesi ile ilgili önemli gelişmeler incelenmiştir. Daha çok uygulama ile ilgilenen ekonometriciler bu tür bir modelin belirlenmesi ve gerekli ekonometrik tahmin yönteminin seçilmesi için faydalı bir bakış açısı kazanabilirler. Fakat, uygulamacı istatistikçi otomobil talebinin modellenmesi ve ileriye dönük satış miktarlarının

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tahmininde yaşanabilecek bir takım güçlüklere karşı uyarılmaktadır. Ülke menşei tüketicinin otomobil seçimini etkileyen önemli bir etken olduğu bilinmektedir ve dolayısıyla pazarlama literatüründe bulunan ürünün ülke menşei hususunda tüketici önyargılarını da inceleyeceğiz.

Anahtar Kelimeler: *otomobil talebi; toplulaştırılmamış veriler; modelleme; ekonometrik tahmin; ülke menşei etkileri.*

Jel Sınıflandırma Kodları: *M21; C30*

1. INTRODUCTION

Since the automotive industry remains to be the leading exporting sector in Turkey, it seems to be quite important to review the literature on the econometric estimation related to the consumer demand for new automobiles. Even though there have been numerous studies related to the consumer demand for automobiles using data from the US, Europe, Israil, Mexico…, there are only two recent studies conducted using Turkish data: Alper and Mumcu (2007) and Aslan et al. (2009). In this survey, we will review the literature on the demand for automobiles by examining extensively a selected sample from these studies. Various estimation models/techniques can be used for this purpose: SURE (Seemingly Unrelated Regression Equations) using disaggregated data; simultaneous model incorporating both the demand and supply sides using Three Stage Least Squares (3SLS); Nested Logit (NL) model using Non-Linear Three Stage Least Squares (NL3SLS); pooled data model using dynamic Generalized Least Squares (GLS); random and fixed effects models using panel data… just to name some.

Before we start examining our sample of studies and explain the modeling and estimation techniques, we must caution the reader against some difficulties and possible inconsistencies in the results of these surveys. For example, whereas Carlson (1978) found that the price elasticity's of the demand for automobiles to grow larger as the sizes of automobiles became larger, Wetzel and Hoffer found diminishing price elasticity's with increasing automobile sizes even though both authors used US data for about the same time period: 1965-1976.

Moreover, forecasting can be quite challenging and misleading. For example, Economist Intelligence Unit Ltd. forecasted in August 2009 the new passenger car registrations in Turkey for the years of 2009 and 2010 to be 309,000 each. However, looking back now on the actual realizations we observe the car sales in Turkey to be 369,819 and 509,784 for these two years: forecast

errors of about 20% and 65% respectively. The same forecasts were also made by Aslan et al. (2009) in September 2008 in Turkey on behalf of the Automotive Distributors' Association for the years 2009 and 2010 using the method of exponential smoothing. They found the new car registrations to be 352,263 and 360,663: forecast errors of about 5% and 41% respectively. Therefore the forecast of the demand for automobiles can be quite difficult, and especially during the booms and recessionary periods over the business cycles. Turkey witnessed an economic slump due to the global crisis beginning in the second quarter of 2008, reaching a dip in the first quarter of 2009, and recovering very fast afterwards and surpassing pre-recession levels by the first quarter of 2010.

In section 2, we will present many econometric models and methods of their estimations and also discuss the specification bias related to omitting the variable of quality of automobiles. Since the Country of Origin (COO) effect was known to be an important factor in explaining the demand for automobiles in Section 3 below, we will review the marketing literature investigating the consumers' biases about products related to the country in which they are made. Section 4 concludes the paper.

2. MODELS OF CONSUMER DEMAND FOR AUTOMOBILES

In the 1960s and 1970s Japanese and to a lesser degree European automakers began entering the U.S. market through exports. Since the first oil shock of 1973 was short-lived in terms of an increase in gasoline prices, it was not until 1979 when the second oil shock drove gasoline prices lastingly that American producers began seriously considering the small car market. In 1982 Japan was the world leader of finished vehicle exports with about six million units, mainly shipped to the U.S.

In between 1982-1995, in West Europe, market penetration by Japanese auto manufacturers increased from 10% up to 11%, whereas it increased from 18% up to 22% in the U.S. where the market was larger also. A superior vehicle quality and durability coupled with increasing popularity of small, fuel efficient cars was the driving forces of Japanese success. The "lean" production techniques such as lower inventories, just-in-time part deliveries, team work and job rotation, and continuous improvement programs for quality and productivity, pioneered and perfected by Toyota were responsible for this achievement (Sturgeon and Florida, 2000). In Section 2.1 below a multi

equation disaggregate approach to modeling automobile demand in the U.S. for 1965-75 is presented, whereas in Section 2.2 a simultaneous model is reviewed using again disaggregate data for about the same time period: 1966-76.

2.1. DISAGGREGATING THE TOTAL DEMAND FOR AUTOMOBILES INTO DIFFERENT SIZES IN THE U.S.

Carlson (1978) examined how the energy crisis (higher gasoline prices and/or possible shortages), increasing car prices and the recessionary economy affected the sales of 5 different size automobiles (subcompact, compact, intermediate, full-size and luxury)[3] in the U.S. for 1965-1975 using a multi equation model, per capita data and SURE (Seemingly Unrelated Regression Equations)[4] estimation method. In order to analyze further the trends of changing consumer buying habits which appeared more apparently in each submarket (segment) as little aggregation as possible was used in Carlson's model.

He explained that the growth of automobile sales in the late 1960's and early 1970's had been caused mainly by the emergence of the small car market. Whereas the small car sales accounted for 10% of the market in 1968, the domestic and imported small cars made up 50% of total sales by 1973. The shift in demand toward smaller cars occurred mainly at the expense of full-size cars.

Model and variables:

A preliminary study had showed that the use of per capita data reduced multicollinearity between certain variables in the model. The specification (1) below was used as the basic equation in each market segment i =1,2,…and 5, where per capita variables were labeled by the subscript *p*.

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[3] The term "compact" was coined by George W. Romney (American businessman and Republican Party politician) as a euphemism for small cars with a wheelbase of 110 inches (2,794 mm) or less. A "full-size" car is an automobile larger than a mid-size car in North America.

[4] SURE is an econometric model which can be used when there might be contemporaneous correlation between the random errors in a set of equations at a given point in time. One way to estimate this model is to use Zellner's two-stage Aitken estimator which is the generalized least squares approach. Ozcam, et al. (1991) examined the risk properties of a pre-test estimator in the case when there might also be heteroscedasticity between the set of equations.

$$D_p^i = B_0 + B_1 Y_p^E + B_2 P^i + B_3 G + B_4 C + B_5 S_p^i + B_6 Z + e \qquad (1)$$

D_p^i is demand per capita for car size i , Y_p^E is expected purchasing power per capita, P^i is average of car prices for car size i, G is gasoline price, C is the consumer attitude, S_p^i is stock per capita for car size i and Z is a dummy variable to account for shifts in demand brought about by gasoline shortage in the first and second quarter of 1974. The number of models differed between time period and car size (in each segment). Once the prices for all models were obtained for a given quarter, the average selling price for each size (P_i) was calculated using a sales weighted average procedure. Constant-dollar auto prices were employed by dividing the current prices by the CPI. The constant-dollar prices of subcompacts, compacts, intermediates and luxury automobiles decreased until mid-1973 in which the demand for them increased. On the other hand the demand for full-size cars declined since the late 1960's while their prices rose. This inverse relationship over this time period found in this study is suggested *ceteris paribus* by the economic theory. Assuming a 25 % rate of depreciation per year, the total stock of automobiles (S_p^i), defined as number of new cars and new car equivalents on the road (adjustment for age composition) could be derived from the past purchases of new cars.

Since expected income (Y_p^E) is a measure of purchasing power that cannot be observed, disposable income (Y_p^D), and Friedman's permanent income variable (Y_p^F) were used as proxies. A preliminary study showed that the use of Y_p^D and Y_p^F variables gave much better results than a Koyck transformation using the demand variable lagged one period, a first-difference term in disposable income, or one period lagged values of disposable income. If past income or wealth affects auto demand, then Y_p^F, the permanent income must be used. On the other hand, if consumers' expected future income is more important as suggested by research on consumers' attitudes, then current disposable income is preferable. Unfortunately, the consumer sentiment C and the current income variables did not have the expected signs in all of the 5 car size equations. C was retained and income was omitted from the full-size car equation. The final specifications chosen were as follows;

$$D_p^1 = f(P^1, Y_{p,}^D, G, Z) \text{ -subcompact,}$$
$$D_p^2 = f(P^2, Y_{p,}^D, G, S_p^2, Z) \text{ -compact,}$$
$$D_p^3 = f(P^3, Y_{p,}^D, G, Z, Z_A) \text{ -intermediate,}$$
$$D_p^4 = f(P^4, C, G, Z, Z_A) \text{ -full,}$$
$$D_p^5 = f(P^5, Y_{p,}^D, G, S_p^5, Z, Z_A) \text{ -luxury.} \tag{2}$$

Where Z_A is a second dummy variable representing the effects of a United Auto Workers strike in the fall of 1970. Given the estimated correlations between the error terms of these 5 equations, the generalized least squares estimation of SURE model was expected to be about 20% more efficient than OLS due to having lower standard errors. Moreover, the subcompact equation was found to be autocorrelated which was corrected transforming the original observations to remove the suspected first order autoregressive scheme.

Estimation results:

Carlson (1978) calculated the following price elasticities: Subcompact: 0.817; Compact: 1.21; Intermediate: 1.3; Full-size: 1.54 and Luxury: 2.07. These elasticities were found similar to previous studies; they increased going from smallest-sized to larger and luxurious cars. The subcompacts are inelastic whereas compacts, intermediate and full-sized autos being slightly elastic. While automobiles are thought to be necessities, the larger ones are luxury items. Moreover, larger ones command a greater share of consumer budget and they have more substitutes than smaller ones which are mostly purchased for their performance (even as a second car). While people seemed to substitute small cars for full-sized cars, the demand for luxury cars was not affected as much. However, the high elasticity, 207 for luxury cars indicate that there are many fringe buyers who are responsive to price.

Carlson also pointed out that the disposable income, Y_p^D was the variable of greatest interest since consumer purchasing power was the primary determinant of expenditures on durable goods. Moreover, sales price, P^i was a powerful variable unlike most previous studies, whereas stock of autos, S_p^i was not significant in any equation. This conflict was interpreted as a result of high

degree of aggregation in previous studies. Carlson calculated prices of cars through an averaging procedure that could have eliminated trends, while stock was computed by an additive method that could only amplify trends in data.

Subcompact and luxury cars:

Income seemed to be relatively more important in subcompact category and luxury cars. On the other hand, sales price appeared to have a lesser importance on subcompact and luxury cars than on compact, intermediate and full-size automobiles. While it is possible that income influences luxury demand more than the sales price, this effect does not seem to be that strong for subcompacts. One possible reason may be that subcompacts became popular as a second car due to increasing standards of living and economy of these small cars. Therefore, the model supported the belief that income and not sales or gasoline price caused the growth of the small-car market.

Compact, intermediate and full-size cars:

In these submarkets, sales price becomes important in the purchase decision of the consumer. Moreover, the model suggested that sales of intermediate and full-size autos were adversely affected by the price of gasoline and poor fuel economy has been a primary factor for these cars losing sales prior to 1978. However, higher gasoline prices positively affected demand for subcompact and compact cars. The shortage dummy increased the demand only for subcompacts showing that consumers felt that the smallest cars were real gas economy cars.

Forecasting:

The long run demand could decline down to less than its pre-1974 levels of 11.5 million/year unless income increases at rates equal to prerecession levels of around 5% even under favorable assumptions about energy and automobile prices. For example, the model predicted a demand of 10.3 million cars for 1977, and no more than 11 million for any year before 1980 if income increased by 5%, and all other variables following simple trend. While the sales were at a record pace in 1977, it could be only a short-run surge due to the obvious backlog in demand accumulated in 1974-76.

A gasoline shortage and/or higher gasoline prices might cause a shift in demand toward smaller sized cars over the longer run, since habits and American love affair with the large automobile may still be effectual in the short run. However, with the memory of gasoline shortages vanishing and

gasoline prices returning to normal levels, consumers may somewhat go back to buying full-size and luxury cars. Overall, we can state that the level of the demand for automobiles depends mainly on income while its distribution is a function of energy and auto sales prices.

Section 2.2 develops a simultaneous approach using both demand and supply equations for automobiles using the Three Stage Least Squares estimation technique (3SLS) for about the same time period: 1966-76 as Carlson's work above.

2.2. INTERACTION OF DEMAND AND SUPPLY AS CODETERMINANTS OF PRICE AND QUANTITY OF AUTOMOBILES

The demand for automobiles in the U.S. by size class was also estimated by Wetzel and Hoffer (1982) using data for 1966-1976. Like Carlson they argued that since the mid-1970s a new happening had been occurring in the automobile market: the volatility of consumer demand within the automobile size classes had exceeded the volatility of the overall market. Given the limited product mix flexibility of the suppliers, this volatility resulted in periods in which inventories had not been balanced. In 1981, domestic manufacturers and their dealers found themselves stockpiled with small cars, whereas the inventory levels of larger cars were only modest. Hence in 1981 and 1982, manufacturers took on heavy consumer and dealer price rebate programs concentrated in the compact market.

Wetzel and Hoffer contended that most previous studies had aggregated over all automobile size classes, and had used OLS (ordinary least squares) as an estimation procedure since single equations models had been adopted neglecting any impact supply might have on the price-quantity determination. To validate such an approach, it was sometimes assumed that the supply of new cars was perfectly elastic at a price exogenously fixed by the manufacturer. They pointed out that Carlson (1978) had recognized seemingly unrelated estimation nature of the disaggregated data. However, Wetzel and Hoffer indicated that their model explicitly admitted the need to develop a model that is disaggregate in nature and specifically dealing with the problem of identification and removing the simultaneous equation bias in studying the interaction between demand and supply for autos.

Model and variables:

To be able to explain these developments Wetzel and Hoffer (1982) used a model of demand for automobiles based on the economic theory of consumer choice and of the firm. While consumers maximized their utility, firms maximized their profits. A set of prices and outputs are simultaneously determined in each of the 4 markets of different size class automobiles: domestic standards, intermediates, compacts and imports[5]. The classifications were similar to those used by *Automotive News* in its weekly issues. The quantity demanded of a specific size of automobile i, was assumed to be a function of its own price P_i, the prices of substitutes P_s, the prices of complements P_c, measures of economic environment E, other factors F and a seasonal dummy S

$$D_i = f(P_i, P_s, P_c, E, F, S) \qquad (3)$$

Used cars and new cars in other size categories constituted substitutes for a specific size of auto, while motor fuel prices (G) were complements. The objective measure of economic environment was represented by the real personal disposable income, and the anticipatory measure (subjective evaluation of the current and anticipated strength of the economy) was assessed by high income component of University of Michigan's Index of Consumer Sentiment (CS). Moreover, consumer preferences were thought to be affected also by non-price factors such as styling and technological change in model year. Finally, a dummy variable was introduced for the fourth quarter of each year since this was the time period in which the automobile industry had been traditionally launching its new models.

The supply of automobiles was conjectured to depend on its price P_i, input prices P_A, and the level of technology T in each sub-market

$$S_i = f(P_i, P_A, T) \qquad (4)$$

Two variables were used on the domestic supply side: own prices and input prices obtained from BLS (Bureau of Labor Statistics) table, "Producer Price

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[5] The "full-size" term first appeared in the early 1960s to define what also became known as "standard size" cars to distinguish them from the new compact and intermediate models then being introduced.

Indices", 1966-1976. In the imported market, similar statistics were obtained from Bank of Japan annual volumes and Federal Republic of Germany Statistics Office annual volumes.

Estimation results:

The submarkets were estimated using a Three Stage Least Squares (3SLS) method to account for both the supply and demand interaction and the seemingly unrelated regression nature of the model[6]. The own price was the only significant demand determinant in every submarket modeled. As expected, several other variables influenced demand in different submarkets:

a) <u>domestic standard submarket</u>: in addition to price (P_i) variable, motor fuel prices (G), the consumer sentiment (CS) and the seasonal factor (S) were significant. The elasticity of price was found to be -1.95 in the standard submarket being the smallest in all submarkets. This may have been a reason for large cars not being included in consumer and dealer rebate programs by manufacturers in 1981 and 1982. The motor fuel price (G) was estimated to be negative during the quarter of price change and positive when it was lagged one quarter in all submarkets. These latter coefficients were significant only in standard submarket. Thus, it could be concluded that the fuel prices have significant but temporary effect on consumer demand for the largest American cars. High income consumer sentiment (CS) was important and the seasonal factor (S) verified to be a better economic environment measure in the standard market as higher income individuals and fleets' deliveries were disproportionately heavy in the fourth quarter.

b) <u>domestic intermediate submarket</u>: the significant variables were price, consumer sentiment, the lagged motor fuel price and the styling factor. The styling-technological variable was significant only in the intermediate submarket showing the highest degree of non-price competition with GM and Ford completely retooling on a two to five-year cycle and making frequent facelifts in the period under consideration.

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[6] 2SLS is a consistent estimator of each just or overidentified structural equation in a system of equations since it makes use of information about all the exogenous and predetermined variables in the whole system. Alternatively, 3SLS is an asymptotically more efficient estimator, due to additionally incorporating information about the endogenous variables in other equations, and the error terms.

c) <u>domestic compact submarket</u>: the significant factors were price and size of the market measured by U.S. non-institutionalized population over 25 years old (PP), a demographic variable. The compact submarket had the highest price elasticity of any domestic markets. When these two variables are taken together, we can conclude that the domestic compact market represents an entry level situation. Furthermore this suggests that the second car is likely to be a smaller car.

d) <u>imported submarket</u>: the significant factors were market size, income and price. The significance of market size indicated that imports are particularly attractive to new entrants to automobile market as buyers. Moreover, It is known that imports are identified as having higher quality standards. The high income elasticity of 1.90 for imported cars suggests that they are perceived as superior goods rather than inferior goods. This result is also supported by the negative coefficient for American compacts. Consequently, the demand for American compacts had been cyclic with increases in demand in economic downturns while the imports had steadily increased over the long run.

Overall, the shift toward smaller cars appeared to be a long run swing caused by factors other than energy prices. Changes in energy prices do not affect the distribution of cars in general; they influence only the standard size category in the short run. These energy price effects dissipate quickly once prices stabilize. In can also be concluded that the downsizing in the domestic market was imposed by long run market forces rather than by government mandate like Corporate Average Fuel Economy standards. Furthermore, import penetration appears to be linked to the belief that foreign cars are high quality superior goods, rather than changes in energy prices.

Section 2.3 below discusses the international price discrimination (IPD) in the European automobile market using an oligopolistic Bertrand-Nash equilibrium model and the data of 1990. Three sources of IPD were found: domestic market power in Italy, the United Kingdom, Germany and France; substantial import quotas for Japanese cars in Italy and France; possibility of collusion in the United Kingdom and Germany. In this model the classifications of cars are even more disaggregated compared the models in Section 2.1 and 2.2 above, since each car model is estimated separately rather than grouping them into size classes.

2.3. INTERNATIONAL PRICE DISCRIMINATION IN THE EUROPEAN OLIGOPOLISTIC CAR MARKET

Verboven (1996) modeled and estimated the oligopolistic European car market to analyze whether international price discrimination (IPD) could explain the large differences in observed car prices across European countries. The observed cross-country price differences could originate either from variations in marginal costs of operating in these markets, or from systematic mark-ups, i.e., international price discrimination (IPD). Three possible causes of IPD were considered: price elasticities, binding import quota constraints on Japanese cars and the possibility of collusion.

European car market:

In 1990, the number of car registrations in five countries (Belgium, France, Germany, Italy and the United Kingdom) was 10.2 million making up about 84% of all new car registrations in the EU. To analyze whether there were systematic price differences across countries, a "hedonic" price index which adjusted for "quality" differences as measured by the observed physical features, was constructed. Assume that the price of a car j in market (country) m, p_{jm} is a function of its observed physical characteristics, a vector w_{jm}:

$$p_{jm} / (1 + t_m) = \exp(w_{jm}\gamma + \omega_m + \omega_{jm}) \tag{5}$$

where ω_{jm} is an error term. The term ω_m is a fixed effect representing the market-specific portion of car prices that cannot be ascribed to physical characteristics and are estimated using 4 dummy variables with Belgium as the reference country. Equation (5) can be estimated by Ordinary Least Squares (OLS) by simply stacking all j car models for each market on top of the other. The price $p_{jm} / (1 + t_m)$ is the consumer list price before taxes and w_{jm} consists of horsepower, weight, width, height and a set of 7 country-of-origin dummy variables categorizing French, German, Italian, U.K., U.S., and Japanese cars from "other" (mainly East European) cars. The ω_m's can be used to form the hedonic price index calculated as $p_m = \exp(\omega_m)$. The pretax prices in 1990 obtained in Verboven's study were 120, 116, 110, 105 and 100 for U.K., Italy, Germany, France and Belgium respectively, showing differences in price levels

not accounted for variations in physical characteristics of cars in these countries. The hedonic price index would have been interpreted as a marginal cost function as in Rosen's (1974) perfectly competitive model with price taking firms. However, this is highly unlikely due to the factors explained in the next paragraph which are present in the EU car market.

The presence of international price discrimination (IPD) is validated by the presence of geographical market segmentation due to substantial arbitrage costs arising from regulations like restrictions of sales of new cars in the EU to dealers chosen only by manufacturers, national approval requirements of the imported model purchased from abroad by final consumers, differences in national standards for safety and environmental reasons making modification of imported cars costly…etc. Moreover, in most countries only a few large firms operate, and this is reflected by high concentration ratios like 91.8% (highest) for Italy and 72.9% (lowest) for Belgium for the 7 largest firms in these markets and by high domestic market shares around 50-70% except Belgium where there is no local producer. Finally, Japanese firms have a large market share in Belgium, a significant market share in Germany and the U.K., and a small market share in Italy and France implied by the import quota regimes of these countries. All these factors seem to cause the differences in car prices that are difficult to be explained by discrepancies in costs of production, and suggest that firms may be engaged in IPD.

Model and variables:

There are F multiproduct firms that are present in M markets (countries). In each market m, a firm f sells a subset F_{fm} of the J_m car models sold in that market. The total cost of producing a typical car j, $C_j(q_{j1}(p_1),..q_{jM}(p_M))$, is a function of the sales of car j, $q_{jm}(p_m)$ in the M markets and firm f's total profit is[7]

$$\Pi_f = \sum_{m=1}^{M} \sum_{j \in F_{jm}} p_{jm}^w q_{jm}(p_m) - \sum_{j \in F_{jm}} C_j(q_{j1}(p_1),..q_{jM}(p_M)) \qquad (6)$$

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[7] Notice that sales $q_{jm}(p_m)$ of car model j in market m depends only on the automobiles' price vector in that market due to prohibitive arbitrage costs to consumers.

where p_{jm}^w is the wholesale price of a car j received by the firm, which is typically less than the consumer price which includes value added taxes and dealer markups. The firms are conjectured to maximize profits by choosing their wholesale price for every car they sell given the prices set by their competitors. Therefore, the $J = \sum_{m=1}^{J_m} J_m$ (total number of models in the EU) first-order conditions below comprise a Bertrand-Nash equilibrium. For a car j in market m owned by firm f

$$\sum_{k \in F_{fm}} (p_{km}^w - \frac{\partial C_k}{\partial q_{km}} - \lambda_{fm}) \frac{\partial q_{km}}{\partial p_{jm}^w} + q_{jm} = 0 \qquad j = 1, 2, \dots J \qquad (7)$$

In equation (7), in choosing an optimal price, p_{jm}^w for car j in market m, the firm f takes into account its effect on the sales of the car j itself, through $\frac{\partial q_{jm}}{\partial p_{jm}}$, but also on the sales of the other cars it sells in market m, through $\frac{\partial q_{km}}{\partial p_{jm}}$. In the same equation, λ_{fm} are the firm-specific Lagrange multipliers if firm f is subject to import quota, and equal to zero if the firm is a domestic producer. Assuming that a pure-strategy Nash equilibrium exists, the J first-order conditions can be transformed to obtain J pricing equations. For each car j in market m

$$p_{jm}^w = \frac{\partial C_j}{\partial q_{km}} + \Delta_{jm}^{-1} \Theta_m + \lambda_{fm} \qquad (8)$$

where Δ_{jm}^{-1} is the j-th row of Δ_m^{-1}, the inverse of a J_m-by-J_m matrix containing the partial price derivatives of the car models of the same firm in market m, and Θ_m a J_m-by-1 vector with a typical element q_{jm}. The price equations in (8) show that equilibrium price of each car j in market m is made up of 2 additive components: its marginal cost and a markup over marginal cost. The markups show that there are at least two sources of international price

discrimination (IPD). First, there might be cross-country differences in price elasticity's. Markups are inversely related to the firm's perceived price elasticity's of demand represented by own and cross demand derivatives in Δ_{jm}^{-1}. Secondly, the values of Lagrange multipliers show the differences in import quota constraints. Moreover, the collusive behavior of firms may be modeled as joint-profit maximizing of a group of firms.

The functional form of the marginal cost in equation (8) above is

$$\frac{\partial C_j}{\partial q_{jm}} = \exp(w_{jm}\gamma + \gamma_q \ln Q_j + \omega_m + \omega_{jm}) \tag{9}$$

The coefficient of term $Q_j = \sum_{m=1}^{M} q_{jm}$, the world (total) sales of a car j in market m, indicates whether marginal costs are increasing, constant or decreasing in output. The fixed effect ω_m captures unobserved characteristics that systematically affect the marginal cost of all cars in the same market such as the required use of catalytic converters in Germany. Note that when markups in equation (8) approach zero due to perfect competition, and when $\gamma_q = 0$, this equation reduces to the simple hedonic specification (5). The specific relationship between the firm's wholesale price and the consumer list price assumes the following functional form

$$p_{jm}^w = p_{jm} / \{(1+t_m)(1+\tau_m)\} \tag{10}$$

where t_m and τ_m are the observed value-added taxes and unobserved dealer markups respectively.

The functional forms of the own and cross derivatives in the pricing equations (8) are derived from a version of the *nested logit model* which intends

to incorporate the demand side of the European differentiated car market[8]. There are L_m potential consumers located in m markets. The consumers either buy one the J_m car models, or buy an "outside good". They are assumed to choose first "class (mini, small, medium...luxury, and sports)" (group) and then "country of origin (French, German, Italian, U.S...East European)" (subgroup) for a specific car model if they decide to purchase a car. The specific functional form of the aggregate demand q_{jm} for a car j in market m adopted by Verboven (1996) is explained in detail in his Appendix. Using these aggregate demand functions, the demand derivatives can be calculated and substituted in the price equations in (8). Moreover, the nested logit model generates several testable hypotheses about the correlation of individual's preferences across groups and subgroups (McFadden (1978)).

Econometric considerations and data:

The model to be estimateed is composed of the pricing equations (8) and the demand equations derived from the nested logit model. They are estimated by Nonlinear Three-Stage Least-Squares estimator (NL3SLS) which is appropriate for systems of simultaneous, nonlinear equations with endogenous variables, and with possibly correlated errors (ξ_m and ω_{jm} below), since in this case unobserved physical characteristics may affect both marginal cost and demand. But first, the equations must be transformed such that the error terms enter linearly. This results in the following model for demand (11) and for pricing (12) respectively

$$\ln(q_j/L_m)=\ln[1-Q_m/L_m]+\sigma_1\ln(q_j/Q_{hgm})+\sigma_2\ln(Q_{hgm}/Q_{gm})+x_{jm}\beta-\alpha\frac{(p_{jm})^\mu-1}{\mu}+\xi_m+\xi_{jm}$$

(11)

$$\ln p_{jm}+\ln(1-m_{jm})=w_{jm}\gamma+\gamma_q Q_j+\ln(1+t_m)+\tau_m+\omega_m+\omega_{jm}$$

(12)

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[8] There are also some other versions of the nested logit model in this context examined by Berry (1994), Berry et al. (1995), and Goldberg (1995).

where Q_{hgm} refers to the number of cars in a subgroup *h* of group *g* in market *m*, whereas Q_{gm} refers to the number of cars in a group *g* of market *m*. The term m_{jm} includes prices, quantities and Lagrange multipliers…

The pricing equation (12) is subject to some identification problems. The market specific fixed effects ω_m estimated using dummy variables, or the Lagrange multipliers cannot be identified separately from τ_m. However, even though the absolute wholesale markups received by firms are impossible to be computed, the relative wholesale markups can easily be computed from the estimates. The relative markup for a car *j* in market *m* is

$$\frac{p_{jm}^{w} - \partial C_j / \partial q_{jm}}{p_{jm}^{w}} = m_{jm} \tag{13}$$

where m_{jm} is as defined by equation (12). The data consisted of 512 base car models in 1990 in 5 European countries. The vectors of physical characteristics, w_{jm} and x_{jm}, affecting marginal cost in equation (12) and demand in equation (11) respectively contained the same elements: technical characteristics of cars like horsepower, weight, width and country-of-origin dummies (a total of 7 countries of different origins). The country-of-origin dummies must be interpreted carefully since they represent both the differences in productivity across countries and unobserved differences in tastes for cars of a given origin, in addition to differences in cost-increasing and demand reducing trade restrictions imposed on imported cars. All prices are consumer list prices using period average market rates converted to transactions prices using dealers' discounts. The number of potential consumers in each market *m*, L_m may be estimated using market-level data such as population, income or the total demand for cars; however, this term was set equal to a known variable which is the total number of households in the economies (markets) assuming that each household is a potential buyer of a new car in every year.

Estimation results:

First, the quasi-likelihood ratio test of Gallant and Jorgenson (1979) rejected several other specifications of the nested logit model, including a case in which cars belonging to the same subgroup behaved as a collusive coalition.

In Table-1 in second column, the horse power and width variables (technical characteristics) affect demand significantly. Interpreting the country-of-origin variables as capturing differences in taste, consumers have the highest preference for German cars, a lower preference for French and European-built U.S. cars and the lowest preference for U.K., Italian, Japanese and East European cars.

Going to third column, the coefficient on Returns to scale is -0.11 showing that the marginal cost is decreasing in total output (increasing returns to scale). The technical characteristics contribute significantly to marginal cost, and the country-of-origin variables show that German cars have the highest marginal cost of producing cars, whereas that of the East European cars are the smallest. The fixed effects are all significant indicating that either there are systematic differences in the marginal cost of operating in various markets, or systematic discrepancies in dealer markups in these markets.

The coefficients that are present in both the demand and the pricing equations $\alpha, \sigma_1, \sigma_2, \mu$ are all consistent with the restrictions of the nested logit model. Using the estimates of these parameters, we can calculate the own price elasticity's to vary between 5-15. Domestic cars have the smallest own price elasticity's which may be due to genuine consumer preferences for domestic cars or to better established dealer network by domestic firms. Also inexpensive cars from low classes tend to have higher own price elasticity's due to more competition than do expensive cars from high classes which are less crowded with firms. With respect to cross price elasticity's; a decrease in the price of a car has a relatively high influence on the demand for cars from the same origin (domestic or foreign) within a class, a smaller impact from a different origin within a class and much smaller impact from different classes. This last result is due to both the nested logit formulae for the price elasticity's and the data. The Lagrange multipliers (quotas for Japanese firms) are significant for only Italy and France.

TABLE-1 NL3SLS Estimates of Nested Logit (512 observations)

	Demand Equation estimates	Pricing Equation estimates
Fixed effects	**(relative to Belgium)**	**(relative to Belgium)**
France	0.463	-0.008
Germany	0.359	0.060
Italy	0.673	0.020
United Kingdom	1.408	0.116
Technical characteristics		
Horse power	2.148	0.075
Weight	0.411	0.119
Width	13.846	1.711
Height	-0.187	-0.447
Country of origin	**(relative to East Europe)**	**(relative to East Europe)**
France	1.033	0.171
Germany	1.805	0.322
Italy	0.495	0.056
United Kingdom	0.647	0.052
United States	1.187	0.231
Japan	0.401	0.105
Return to scale	-	-0.116
Quotas for Japanese firms		
France	-	826.5
Germany	-	-176.9
Italy	-	1,820.8
United Kingdom	-	214.3

Note: standard errors are not reported.

Source: Verboven, F. (1996) "International price discrimination in the European car market", *RAND Journal of Economics*, 27, 240-68, page 257

The presence of international price discrimination (IPD):

The question arises as to whether the estimates of price elasticity's and the import quotas expose anything about the presence of international price discrimination (IPD)? The relative wholesale markups were shown by Verboven (1996) as in the equation (13). Then, based on the estimates in Table-1 above, Verboven found that :

a) The firms were able to charge substantially higher markups on their cars sold domestically than on their cars sold abroad. In other words, domestic firms price discriminated against the consumers of their home market, since they had

high domestic market power as suggested by small price elasticities that were estimated.

b) The markups of Japanese cars were relatively high in countries where the quota constraints were binding.

c) The high-class car producers tended to charge the highest markups.

In Sections 2.1 and 2.2, the demand for automobiles was disaggregated at only four or five size classes. In Section 2.3 all car models were estimated using only physical/technical characteristics of cars like horsepower, weight, width and height… Moreover, Toder, Cardell and Burton (1978), Bresnahan (1981), Dixit (1987), Levinsohn (1988), Tarr and Morkre (1984) also estimated the demand for automobiles in the context of various issues like the welfare effects of trade/antitrust policies, manufacturers' markup over marginal cost…

However, in Section 2.4, Trandel (1991) argues that in order not to cause a specification bias and to provide an accurate estimate of the demand for an assortment of a product like an automobile, researchers must necessarily include the heterogeneous feature of the good reflected by its "quality" in addition to its physical characteristics,.

2.4. THE BIAS DUE TO OMITTING QUALITY WHEN ESTIMATING AUTOMOBILE DEMAND

Trandel (1991) noticed that few researchers had estimated demand elasticity's for a heterogeneous good using a variable intended to quantify the subjective concept of "quality". He contended that if quality affected the demand for a heterogeneous product and was positively correlated with price, excluding the quality from regression might have resulted in estimated price elasticity's biased towards zero. Therefore, the differentiated nature of the heterogeneous product must be included in any estimation method. In the case of demand for automobiles, even though most researchers had controlled for physical characteristics like auto size, horsepower…etc, a more subjective characteristic like the quality of the car was not included probably due to the difficulty of measuring such a subjective feature. Hence, to show the magnitude of the bias in the case when the quality variable was omitted, Trandel (1991) added a measure of quality to Levinsohn's model (1988) of the automobile market. The findings suggested that the omission of such a variable could actually cause a substantial bias in the estimated price elasticity's. Therefore,

the authors referred to above may have underestimated the sensitivity of automobile consumers to changes in prices.

Levinsohn (1988) had estimated both own-price and cross-price demand elasticity's of 100 models of automobiles that were sold in the U.S. between 1983-1985. His data were obtained from the *Automobile News Market Data Book*. He first estimated a hedonic price regression using automobiles' physical characteristics. Subsequently, he defined a norm to categorize which cars were neighborhoods in terms of physical characteristics space. He next assumed that a car competes for sales with only its characteristic-space neighbors whose average price constituted the cross-price substitution effect. Averaging the prices of competitors reduced the number of coefficients to be estimated substantially. The sales equation estimated by Levinsohn reported in Trandel (1991) is

$$Logsales = 6.1 - 1.96 Logprice + 1.11 Logcomp \_ price$$
(14)

where *Logcomp_price* is the logarithm of the competitors' average price. He also included dummy variables for the years 1984 and 1985, and whether the car was produced in the U.S. or not. The physical characteristics that defined the neighbors had little additional explanatory power and were found insignificant on the basis of joint F test. Levinsohn ascribed this deficiency in explanatory power to multicollinearity between an auto's price and its physical characteristics.

In order to investigate the magnitude of possible bias of the estimated coefficients in equation (14) above, Trandel reestimated it adding a quality variable represented by specific ratings of many automobile features evaluated in *Consumer Reports* magazine. The following features were rated: fuel economy, engine drivability, shifting, acceleration, accident-avoidance ability, handling precision, braking, ride, noise, driving position, front seating, rear seating, climate control, controls, displays, predicted repair incidence, and servicing ease. The averages of these ratings constituted a single "quality score" for each car during 1982-1985. Of the 100 models in Levinsohn's study, only 70 were both analyzed by *Consumer Reports* and had appropriate neighbors as defined by Levinsohn. The reduction in sample size had little effect on the parameters estimates. To determine whether adding quality variable would affect the coefficient estimates, the equation (14) above was enhanced with each

car's quality score (*qlty*) and average quality score of each car's neighbors (*comp_qlty*)

$$Logsales = 3.86 - 2.42\beta_1 Logprice + 0.989\beta_2 Logcomp\_price$$

$$+1.706\beta_3 qlty - 0.654\beta_4 comp\_qlty$$

(15)

Both of the newly added variables: own quality (qlty) and competitors' quality (comp_qlty) are statistically significant now, and have the right signs: 1.706 and -0.654 respectively. Then, if the quality of cars increases by one standard deviation from its mean of 3.624, the expected sales increases by more than 45% ((exp(3.845-3.624)*1.706). More importantly, the inclusion of the quality variables has substantially changed the estimated price coefficients. The estimated own price elasticity increased in absolute value from 1.955 up to 2.42 showing a substantial bias toward zero. The market elasticity (sum of own and cross elasticity's) also increased in absolute value from 0.847 up to 1.43.

In Section 2.5 below Alper and Mumcu (2007) discuss the estimation of demand for automobiles in Turkey right after its entry to Custom Union with European Union (EU) in 1996. They asserted that even though the demand for automobiles were estimated for US, EU, Israil, Brazil, and Mexico, their article was the first investigating the situation for countries in transition of Central and Eastern Europe in the process of joining EU.

2.5 . THE INTERACTION BETWEEN PRICE, QUALITY AND COUNTRY OF ORIGIN (COO) WHEN ESTIMATING AUTOMOBILE DEMAND: THE CASE OF TURKEY

Alper and Mumcu (2007) used quarterly data on quantity, price, quality, country of origin about 120 different models of automobiles, as well as some macroeconomic variables like real GDP growth rate and real interest rate to estimate the market demand for new automobile sales during 1996-1999 in Turkey. They pointed out that the country-of-origin effect was discussed extensively in empirical marketing studies as a factor affecting the quality assessment of consumers about a particular product. Data on the quality ratings of the automobiles measured by test drive results were obtained from *OTO*

HABER magazine. The competitors' prices of a model were constructed by using the average prices of cars that belonged to the same segment. Automobiles were categorized into 9 market segments: A, B, C, D, E, F, G, SUV (Sports Utility Vehicle) and MPV (Mini Personal Van). The model was estimated in two alternative equations. The first equation was

$$Sales_{it} = \beta_0 + \beta_1 DUM_{i1} + \beta_2 DUM_{i2} + \beta_3 FL_{it} + \sum_j \delta_{1j} PRICE_{it} * DUM_{ij}$$

$$+ \sum_j \delta_{2j} CPRICE_{it} * DUM_{ij} + \alpha MACROV_t + \gamma SALES_{i,t-1} + \varepsilon_{it}$$
(16)

where the 3 dummies refer to domestically produced, imported from EU and imported other than EU respectively, CPRICE is the competitors' average price for a model in the same segment, and FL is the facelift variable. The second equation included own quality (QUAL) and competitors' quality (CQUAL) as additional regressors, since Trandel (1991) had argued that omitting the quality variable could cause downward bias in estimated price coefficients ($\delta_1's$).

Model 1 is the regression given by the equation (16) (see Table-2 below), which does not include the quality variable as a regressor. The own price of domestic origin automobiles is found insignificant with a counterintuitive positive sign. In Model 2, own and competitors' quality are added to the regression. The coefficient of the price of domestic origin automobiles has now the correct sign, but still statistically insignificant. The price elasticity of EU automobiles increased by 25%, from -0.271 up to -0.785. Likewise, the price elasticity's of other automobiles increased by about 77%. While an increase in the quality variable affects the quantity demanded for foreign origin automobiles, it does not have an influence on demand for domestic cars. The presence of the lagged dependent variable implies that the price coefficients are related to the short run. Therefore the long run price elasticity's automobile demands from EU and others origin are elastic and equal to -2.04 and -2.02 respectively. As for the market price elasticity's, a 1% decrease in all automobiles' prices (for example a 1% tax cut) is expected to increase the demand for EU automobiles by 0.31% in the short run and by 1.089% in the long run. The same elasticity's for the same time periods are 0.48 and 1.685 respectively for non-EU origin automobiles. These progresses are thought to

occur due to the inclusion of the quality variable. Therefore, overall, we can say that the quality, own price and competitors' price are not significant for domestically produced cars, whereas the magnitudes by which they affect EU and non-EU car demands differ.

Since the Country of Origin (COO) effect was acknowledged to be an important factor in explaining the demand for automobiles in the works of authors above, in the following section we review the marketing literature investigating the consumers' biases about products related to the country in which they are made.

TABLE-2 AUTOMOBILE DEMAND ESTIMATION (1996-1999)
Dependent variable: Log of Sales

VARIABLE	Model 1	Model 2
Constant	3.295	3.318
EU	0.243	0.432
Domestic	- 7.71	-7.844
Real INTEREST RATE	- 0.003	-0.004
Real GDP	0.010	0.013
QUALITY	-	-
EU	-	1.538
Domestic	-	-0.013
Others	-	2.604
COMP. QUALITY	-	-0.905
PRICE	-	
EU	-0.271	- 0.785
Domestic	0.048	- 0.035
Others	- 0.308	- 0.778
COMP. PRICE	-	-
EU	0.059	0.477
Domestic	0.504	0.322
Others	0.094	0.302
SALES(-1)	0.777	0.717
Facelift	0.181	0.328

Note: standard errors are not reported. The sample size is 1130.
Source: Alper, C. E. and Mumcu, A. (2007) "Interaction Between Price, Quality and Country of Origin When Estimating Automobile Demand: the Case of Turkey", *Applied Economics*, 39, page 1794

3. COUNTRY OF ORIGIN (COO) EFFECTS

Due to the globalization in the last thirty years, the places where the products are manufactured and marketed changed. The increasing need for lower costs of production and of transportation forced developed countries' producers to move to other countries for manufacturing. Several researchers searched whether Country of Origin (COO) affects the consumers' product evaluations. According to Verlegh and Steenkamp (1999), COO was perceived as a "cognitive" cue by consumers. On the other hand, Botschen and Hemettsberger (1998) defined COO as an "emotional" meaning for consumers that can relate to feelings.

Baker and Michie (1995) showed that COO had a significant impact on consumers' willingness to buy an automobile . Chinen, Enomota and Castley (2000) supported this idea by their research. Lawrence et.al.(1992) studied New Zealand consumers' attitudes towards cars from Germany, France, Italy and Japan and concluded that COO was an influential factor in their buying process. Another research result showed that American undergraduate students strongly preferred cars made by American companies compared to those manufactured by Japanese companies (Levin et.al.1993). Haubl (1996) showed that COO had a significant impact on consumers' evaluations of automobiles in Germany and France. The impact of the COO on the overall evaluation of the automobile was found to be related to cars' appearances. A number of empirical studies pointed to the consumers' perception of cars' qualities (Han,1989; Han and Terspstra,1988; Johansson and Nebezzahl, 1987). Chakraborty et. al. (1996), found that highly ethnocentric consumers evaluate counterfeits to be lesser quality when car is made in the US rather than in Germany. On the other hand, Moroccan consumers make a distinction between the different dimensions of country of origin information and that their perceptions are significantly affected by each dimension (Sadrudin and d'Astous, 1995).

Josiassen (2010) explained that the Country of Origin (COO) effects/biases on consumer purchase behavior had been thoroughly investigated by many marketing researchers since the mid-1960s. However, since the 1980s it has been believed that consumer needs and wants were converging and that nation states were false appearances of little value. The argument was then that since the world was changing and young consumers were accustomed to seeing goods from an array of countries, they do not seem to have the country biases that COO effect had specified. Unlike recent research on young Chinese consumers (Wong et al. 2008), Josiassen presented some results indicating that young

Australian consumers discriminate between products made in different countries.

Chowdhury (2010) explained that consumers are willing to pay top prices for products made in a particular country such as Japanese mechanizes, French perfumes, Italian fashions etc.. A country's image about the workmanship and technological advancement may be associated with the features of products made in that country. However, he contended that very few studies had attempted to find out whether COO effects existed for consumers in the developing countries such as Asia and South America, and there was a need to study the situations in developing countries in order to take a broader view of previous research findings in the global framework, since large differences in market structures and consumer behavior were known to be prevalent between developed and developing countries. Furthermore, studying consumer attitudes toward goods originating from different nations may be helpful in shaping multinational strategic marketing policies.

During the last two decades, firms carried part of their manufacturing operations overseas due to the globalization. Multinational firms started selling their products under the same brand names in many countries throughout the world. Some studies found that in view of established brands, COO of a product may not be an important factor for consumers' product appraisals (Chowdhury, 2010). However, other studies concluded that the sourcing country has a greater effect on consumers' evaluations of the quality of products than the brand name. Does this mean that COO would lose its information value in the epoch of globalization where brands of multinational are marketed globally?

The situation may be more complicated when consumers try to evaluate a global brand like, say a Sony TV which may be designed in Japan, assembled in Malaysia, and its parts produced in China. Then, the brand name, Sony and the country associations are connected with different sets of information and affective reactions. The information integration literature explains that in these kinds of situations, consumers put together their affective responses to each piece of information in forming their final decisions.

Another study investigated Taiwanese consumers' perceptions of luxury handbags with respect to COO and the brand name, aiming also to generate practical inference for manufacturers that plan to move their production into similar regions like Taiwan (Han, 2010). He found the COO to be an important information signal for product assessment and it appeared to be more critical

than the brand name based on 223 surveys. Taiwanese consumers were willing to pay more for the reputable COO products, like France and U.S., and expected significant price discounts for less reputable COO goods, like China. Therefore, utilization of COO can be a basis for competitive advantage, and help devise better manufacturing and marketing policies. Not considering the COO effects on consumers' perceptions of quality of products may make the multinationals vulnerable to loosing sales and customers.

Today, consumers are offered products from many countries and have more knowledge about the products they purchase in multinational markets. COO is believed to be one of the most relevant features for customers to assess the quality of the product resulting in buyer behavior. Some specific product class could be related to a particular country like French wine or German car. However, in today's global markets, consumers can easily be puzzled and perplexed when they are faced with a huge amount of products. There are inconclusive and conflicting findings in the COO literature, perhaps due to methodological differences and continuously changing consumers' habits and tastes. Recently, some researchers found that the role of COO has been weakening and other product attributes like price, performance and brand name have becoming more prevalent. For example, in a study, Dutch consumers were found to consider the intrinsic product characteristics like appearance, color, shape… more than the extrinsic product attributes like price and the COO. The luxury product market has experiencing a fabulous growth reaching an estimated some \$63 billion in global markets. Some people believe that consumers are paying premium prices for not only the luxury goods themselves, but also for the status and lifestyle that these types of products convey. The Chinese Economic Area (CEA) consists of China, Hong Kong and Taiwan, and is the main force for economic growth in East Asia with a market size of 1.2 billion consumers. Many studies have concluded that Asian consumers depend on the COO cue in their product evaluations and buying behavior, and believe that luxury comes from European countries.

It is especially interesting to study the COO effects in the context of luxury handbags. In Han's sample of 223 respondents, female consumers of twenty years of age or over, and interested in purchasing luxury bags were taken to be the target group. Using the systematic sampling where every 25th eligible consumer entering a designated department store in Taipei city, the capital of Taiwan, was asked to participate in the survey during August 8th to August 14th 2006. 95% of the respondents' age ranged from 20 to 49, confirming that more

and more young female consumers were willing to purchase luxury branded products. The results indicated that the consumers rated products made in different countries differently when forming their overall evaluation of product quality, prestige and workmanship. The ratings for the French-made handbags were appreciably higher than for both the American-made and French-made handbags. Furthermore, respondents had stronger intention to purchase a luxury bag made in France compared to those made in U.S. or China. Finally, the COO had a greater effect on product evaluation than the brand name, and both Louis Vuitton and Coach handbags made in reputable countries had higher scores in overall product evaluation than their comparables made in less reputable countries. Overall, the marketing efforts like advertising for products made in favorable countries may use the positive country images existing in consumers' psyches by stressing the products' COO, whereas for products made in less favorable countries, the aim of the marketing policy should be directed to other product attributes such as reasonable price, style, quality. Therefore, considering the fact that the Coach handbags are made in China, the Coach handbags producers may keep consumers concentrate on their U.S. brand origin by putting in an American environment in their stores, brochures and products' appearances and not the product origin which is China. Han's research also showed that the effect of COO was greater than the brand name even when the brand name of the handbag was well set up.

China was found the least preferred source country, and she needed to transform its country image to a modern and developed one, in order to boost her exports by attracting foreign capital and establishing joint ventures of local producers with well-known worldwide companies. In this respect, the Chinese government needs to have a long term and well thought out plan to change its low profile COO appearance in order to gain acceptability from consumers all over the world.

Another study by Apil and Kaynak (2010) investigated the Georgian consumers' evaluation of products sourced from European Union member countries. The study included 313 consumers from Tbilisi, Batumi, Kutaisi and Rustavi in May-June 2005. A five-point Likert scale was used to measure the respondents' evaluations of quality of ten products available in the Georgian market. The products made in Germany are perceived as high quality, where Italy is rated high in some specific product classes such as clothing and fashion goods. Polish goods' quality is not rated high, but their lower prices are welcome by Georgian consumers. The "made in Europe" label may affect the

appraisal of products coming from Poland. The research confirmed the findings of an earlier study that the product evaluations were affected by the economic development of the originating country, and that the effects of demographic variables on COO perceptions were differentiated.

The field of international marketing is continuously being researched due to globalization of markets, production and tremendous advances in cross-border trades. The multinational firms did not only offer more variety of products, but also offered them at more competitive prices. This fact, together with the increased standards of living and enhanced lifestyles of consumers, target customers in markets around the world started selecting goods from a much wider range than before. Hence, the global marketers had to understand much better the factors that affected the customers' perceptions and evaluations of foreign products versus the domestic ones in developing countries since the market opportunities in their homelands reached saturation and prices became extremely competitive due to a large number of producers. The marketers have started to investigate the marketplace behavior of consumers in different regions of the world. Despite this increased interest, studies investigating the COO effects in developing countries have remained relatively limited even though the multinationals faced considerable challenges. However, a general conclusion is that a product's COO can influence consumers' behavior for certain product classes, even though described by "ethnocentrism" , a tendency for consumers to prefer their domestic products may also exist. In general, German cars, Japanese electronics and French wines are perceived differently by consumers from Italian cars, Taiwanese electronics and Greek wines. Moreover, in different countries, consumers may develop different preferences for a given country's products. Americans perceived German and Japanese labeled products more advantageously than the French. Worldwide, European products labeled "made in Europe" were generally perceived to be lower quality than those tagged "made in Japan" or "made in USA".

Another finding of the previous studies was that the COO effect could vary with different product classes. Accordingly, electronics from Italy might be perceived inadequately although Italian shoes would receive premium marks from customers. By the same token, Japan may be ranked high in electronics and low in food products. Moreover, in some cases consumers may form impressions (positive or negative) of foreign countries which subsequently affect their belief and knowledge formation about the willingness to purchase products originating from these nations. For example, England had a solid

country impression in the USA for luxury cars due mostly to Bentley and Rolls Royce.

Substantial developments have taken place in the economic environment of emerging markets of former USSR and Eastern Europe. The transition from centrally planned economic structure to a free market oriented economy has created many varied and unsatisfied needs of people living in this region. Consumers started developing the intention to buy and consume foreign products as their economic well-beings ameliorated with the entrance of European and other foreign business ventures. These foreign businesses obtained the first mover advantages and benefited from the intact consumer and industrial markets. Therefore, the Georgian consumers have witnessed the escalation of foreign products' existence and increased advertising and promotional efforts by private companies in their markets. In the meantime they constructed their own evaluation norms to compare domestic products with their foreign counterparts. The 2005-2008 data reveal that 24% of Georgian exports were shipped to Europe, and European goods accounted for 19.3% of the total Georgian imports. Turkey was the largest exporter, and Ukraine the second. Germany was the biggest exporter from Europe whereas Italy was the second. Poland, being a former Eastern bloc country and a new EU member country had close relationships with Georgia, even though it is not a major trading partner. However, their low prices are well appreciated by certain segments of the Georgian market. For Georgian consumers, Germany was acknowledged to be a country producing high quality products throughout the technological progress of Western Europe. Historical relations with Poland as a post-Eastern bloc nation gave rise to more favorably appreciation of Polish products.

Kumara and Canhua (2010) had 170 undergraduates interviewed in China in order to understand better consumer profiles based on their perceptions of COO information cues and then used Confirmatory Factor Analysis to examine four types of consumer expectations of foreign products: economic, information, social and personality. The conclusion was that, when a consumer purchase a foreign product she evaluates the economic value of the product, wants to acquire more information, judges as to what extent the product has an influence on her social status and how the product improves personality. However, since a limited sample of undergraduates was used for convenience, a more representative sample of the population was necessary to justify the results of the model presented in this study.

Prendergast, Tsang and Chan (2010) explained that globalization had separated the concept of country of origin into the country of origin of manufacture (COM) and the country of origin of the brand (COB). 168 young adults of age 15-34 years old in Hong Kong were interviewed and presented with mock advertisements of personal computers with brands from Japan and Korea. Their personal involvements and purchase intentions with computers were measured. From a theoretical point of view it was important to examine how COB interacted with the degree of personal involvement to eventually affect the purchase decision. COB was observed to a factor influencing the purchase behavior of the consumers with a low level of personal involvement with computers and not that of the consumers with a high level of personal involvement. This finding may have been resulted due to highly personally involved subjects being more risk-averse in making purchase decision and therefore depending more on factually relevant type of information whereas subjects with a low level of personal involvement being vulnerable to secondary cues like COB. Consequently, the marketing managers of companies whose products are branded in a country with a favorable impression can emphasize their COB, whereas the company managers whose products are branded in a country with less positive impression may highlight other nonessential cues when faced with low involvement consumers. The authors argued that as globalization continued to increase at a fast speed more companies would be inclined to outsource and collaborate with foreign partners or create new centers overseas and therefore the relevance of COO was to be attenuated further.

Tigli, Pirtini and Erdem (2010) investigated the consistency of Turkish consumers in associating some product groups and their country of origin. The study used a sample 500 students/professionals from major universities and business institutions in Turkey. In the questionnaire a total of thirty nine product groups from thirty five developed and developing countries were selected. Paired t-test was employed to determine whether a systematic relationship existed between products and their countries of origin. It was found that the Turkish consumers were consistent in matching products and countries for only eight pairs: Gold-south Africa, Beer-Mexico, Cell phone-Finland, Education-Switzerland, Cinema-India, Olive oil-Spain, Wine-Spain and Wine-Portugal. Therefore, they concluded that the subjects were not consistent in associating the names of the products with their counties of origin.

4. CONCLUSION

In this study, the literature on the econometric modeling and estimation starting from the 1980s related to the consumer demand for new automobiles was reviewed extensively for some selected papers. We hope that the applied econometricians like masters' or doctorate students can acquire a good starting point and additional perspectives in building such a model and choosing the appropriate econometric estimation techniques. However, we caveat the applied statisticians on some of the difficulties in modeling and forecasting the demand for automobiles, since in general it is quite difficult to foresee the demand for a durable good like automobiles especially during the relatively severe downturns and upturns of the overall macroeconomic fluctuations in our globalized markets. Moreover, some studies covering the same time period for the same country did have quite contradictory price elasticity's of demand for different segments of cars to begin with.

We tried to highlight various estimation models/techniques that can be used for studying the demand for automobiles: SURE (Seemingly Unrelated Regression Equations) using disaggregated data; simultaneous model incorporating both the demand and supply sides using Three Stage Least Squares (3SLS); Nested Logit (NL) model using Non-Linear Three Stage Least Squares (NL3SLS); pooled data model using dynamic Generalized Least Squares (GLS); random and fixed effects models using panel data… just to name some.

The segmentation of automobiles can be based on some commonly used categorizations already provided by some automobiles associations in the industry or it could be defined theoretically drawing on a formal demand model. Some models used commonly accepted definitions to categorize automobiles. However, Levinsohn (1988) first estimated a hedonic price regression using automobiles' physical characteristics. Subsequently, he defined a norm to categorize which cars were neighborhoods in terms of its physical characteristics. Both approaches can be experimented depending on the study to be undertaken.

Finally, it would be interesting to investigate whether the Country of Origin (COO) effects are still prevalent in the context of the automobile industry in Turkey nowadays. In the local car market in Turkey, there are about 400 different types of automobiles imported through Turkish distributors from major car producers all over the world and from the generally joint-venture Turkish

producers with Italian, German, French, Japanese partners. Since Turkey envisions to be an automobile production and export base in the Middle East, and its turnover figures both from the import and export sides are quite high, it seems that the Country of Origin (COO) effects are somewhat irrelevant for Turkey.

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