UNIQUENESS SEEKING AND DEMAND ESTIMATION IN THE GERMAN AUTOMOBILE INDUSTRY

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Abstract[1]

This paper empirically analyzes the determinants of demand in the German automobile industry. Our primary goal is to refine the existing literature on that topic by exploring the impact of uniqueness seeking behaviour of individuals on the demand schedule. Using a dataset on the segment of compact cars in the German market, we show that consumers have an intrinsic need for uniqueness seeking, and the degree a product satisfies this need is to be considered as an additional product characteristic.

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1 Introduction

The issue of estimating demand function using aggregate data has been given lot of attention in the past decade. More recently, the availability of data as well as the development of new econometrical techniques made it possible to overcome major endogeneity problems by controlling for a multitude of variables affecting demand (Berry et al., 1995).

Marketing literature is now experiencing a surge of studies attempting to refine and adapt this approach to more intricate empirical situation. For instance, Montgomery and Bradlow (1999) studied the impact of functional misspecification in the estimation of demand. Miravete (2002) explored the case of information asymmetries between users and producers in a monopolistic setting. Allenby and Rossi (1999) and Roy et al. (2001) discussed the role of heterogeneity across consumers. The impact of competitive interaction has been studying by Kadiyali (1996), Sudhir (2001), Nevo (2001). Bruno and Vilcassim (2008) approached the issue of demand estimation with varying product availability.

Our study aims at understanding the impact of uniqueness seeking behaviours on demand estimation. When controlling for endogeneity, a familiar result is an increase in the demand slope, which is usually explained by the fact that products with higher unmeasured quality components sell at higher prices (Berry et a. 1995, p. 875). We claim that uniqueness seeking behaviour is a necessary element to control for

endogeneity in a Berry framework because the potential for satisfying the need for uniqueness might be an additional observable characteristic of a product, which precisely grasps this unmeasured quality component.

Thus, we raise two issues here: firstly, we propose the existence of three different uniqueness seeking behavioural needs and we try to include in the empirical formulation of a demand function product characteristics which might fulfil these needs. Secondly, since uniqueness seeking behaviours root in unconscious instincts such as vanity and hedonism, we show the changing strength of their impact on the demand function across different social groups of consumers and we use this result to make our funding more robust.

The paper is structured as follows. In the next section, we put forward three different sorts of uniqueness seeking behaviours influencing the demand function. In section 3, we introduce a discrete-choice model of product differentiation (McFadden, 1978; Berry, 1994) providing a methodological framework to estimate the demand for a large number of products using market data. This is followed by a description of the dataset and a presentation of our empirical findings in section 4. Section 5 summarizes the most important results and discusses marketing implications.

2 Uniqueness seeking

People use the act of consumption as a way to differentiate from others. There exist three different sorts of uniqueness seeking behaviours and we label them distinction seeking, customization, and quality seeking behaviour (Snyder and Shane, 2002). The first one deals with the observation that consumers might desire a product different from the standard model available to most people. The second uniqueness behaviour concerns the possibility of customize a product after the decision of purchase to further enhance its distinctiveness. The latter refers to personal hedonism satisfied by quality.

These three behaviours have been neglected in empirical studies on demand estimation, although psychologists clearly pointed out the role of uniqueness motives in the act of consumption (Harris and Lynn 1997). We now turn to the analysis of each of those and explore their impact upon demand.

Distinction seeking

A part of our life consists of a race of appearance interpreted each time and by each of us in a different manner: sometimes people are a "slavish herd of imitators", while in other circumstances, they seek distinction by various means (Hazlitt, 1918). The distinction is often chased by moving apart from standard habits and by consuming in a different, unconventional, and even eccentric way. It should be noticed that this has little to do with the objective and absolute quality of a good, but, on the contrary, with a horizontal distance from the consumption of the most. A distinction seeking behaviour is thus a psycho-sociological concept, which is relative to other consumers' habits. Marketing studies identify this behaviour to be one of the engines of niche

market creation (McKenna, 1988); industrial organization studies acknowledge that only diverse preferences create the possibility to gain market power through segmentation and product differentiation (D´Aspremont et al., 1979).

For this reason, the capability of a product to satisfy a consumer's need of distinction should therefore be taken into account when estimating demand. In the empirical part, we measure the degree of diversity of a product as its Euclidean distance from a theoretical standard model.

If the diversity of a product fulfils to a certain degree the need for uniqueness of an individual, *id est* his need of being different from others, we can hardly expect the market share of a product being positively associated with its diversity.

Hypothesis 1: a product's diversity has a negative impact on its market share.

Customization

Customization is the possibility given to consumers to refine their purchasing choices and it is widely considered as a crucial strategy in the marketing mix (among others Logman 1997). However, customization serves an additional need related with the uniqueness seeking: Harris and Lynn (1996) show that "the preference for customized products is positively related to the strength of consumers' self-attributed uniqueness". Based on this empirical evidence, Harris and Lynn (1997) and Snyder and Shane (2002) considered customization as a further way to enhance distinctiveness.

In this paper, we proxy the product characteristic fulfilling the need for customization with the number of available variants for each model. This availability is a way for consumers to enhance distinctiveness even in the case of purchasing a standard product. For this reason, we do not expect availability being negatively correlated with market shares as it was the case for diversity. On the contrary, we expect it to be positively correlated. Indeed, the possibility of refining a choice is a source of additional value for consumer which, *ceteris paribus*, increases the purchase probability.

Hypothesis 2: the availability of variants of a product has a positive and significant impact on its market share.

Quality seeking

There is a third and more subtle element, which, in some circumstance, reveals a further uniqueness seeking behaviour: individual hedonism might also be satisfied through the quest for quality.

Veblen (1899) is oft mentioned as the author to bring in the economic realm the effect of ostensive consumption, but Robinson (1961) first carried out an attempt both to analyse the economic foundations of such an individual hedonism and to "transcend the rather heavy-handed and somewhat prejudicial projections of Veblen" (ibid. p. 376). Robinson suggested that "rarity" is a key factor when appraising the uniqueness seeking potential of a good. The concept of rarity has here little to do with the economic term of scarcity, but it is rather to be understood as "highly

distinguished" or "unusually excellent" good. Therefore, although Robison barely glanced at this, the concept is intrinsically related with the quality of a good.

Demand estimation models solely based on aggregate data might fail in capturing quality since it is impossible to take into account all possible characteristics related with the quality of a good (Trajtenberg, 1989; Berry et al., 1995). "Unusual excellence" of a product might be so intangible and rely on such indefinable aspects that can not be completely grasped by any measurable characteristics. In the automobile industry, elements such as the design or the appeal of the vehicle are not quantifiable aesthetic qualifications. For this reason, dummy variables for the manufacturer of a product are often employed to capture those residual effects, including a quality effect linked with the brand (Berndt et al., 1995; Chow, 1967).

However, not only an external observer, but also consumers are often incapable to measure the aesthetic qualifications of a good because either they require a process of learning (Stiglitz, 1987) or they are willing to follow fashion waves that are difficult to predict (Robinson, 1961).

For this reason, not only Veblen, but also very pioneer works in the field by Thurstone, (1931), Scitovsky (1945) and Kalman (1968) suggested that consumers try to overcome the problem of limited information to judge the quality of a product by taking the price as a quality indicator. To put it in Kalman´s interpretation of Veblen "leisure class", "more expensive necessarily means better".

These early works suggested that price is a term in the utility function and, therefore, urge to consider demand functions, which are not homogenous of degree zero in price and income. A stream of literature explores the issue of price dependent utility function (Kalman, 1968; Stiglitz, 1987; Mossetto, 1992), but almost all of these studies refer to the case of artistic goods. However, other goods might have at least a component of aesthetic qualification and disregarding this element might lead to a misinterpretation of the data estimation.

Kalman (1968) analytically showed that an increase in price causes to two counteracting effects. The first is the traditional substitution/income effect, which except for Giffen goods, has always a negative impact on demand. The second effect, labelled "price offsetting income effect", is positive when the marginal utility of price is considerable high, *i.e.* when consumers exhibit a strong quality seeking behaviour and use price as signal. In this case even an upward sloping demand schedule might be observable when price offsetting income effect exceeds the traditional substitution/income effect.

Our empirical part deals with the automobile industry where the symbolic and aesthetic value of the product definitely plays a role. However, rather than presuming an upward demand schedule as in the case of a pure aesthetic good, in our case, we expect at least a reduction of the price parameters or its insignificance. Unfortunately we can not disentangle these two effects, because it is not possible to

identify which component of the price is related to the unobservable aesthetic value of the good.

Thus, we will not be able to test sufficient conditions for the presence of quality seeking effect. In the next paragraph, we therefore proceed by identifying only necessary conditions. These conditions should be observed if our conjecture is true, but they are not sufficient to imply it.

Uniqueness seeking mechanisms vary across social groups since they deal with unconscious and social constructed instincts such as vanity and hedonism. If parameters of relevant variables vary across different social groups, we can rule out that the significance is due to supply related mechanisms since firms can not price-discriminate among social groups. Especially in the case of quality seeking behaviour this rationale serve us to identify necessary conditions: prices serve as a signal to satisfy quality seeking behaviour *only* if we observe a change in price coefficients across groups. Accordingly,

Hypothesis 3: necessary condition for the presence of quality seeking behaviour is a variation of price coefficients across social groups.

The following table sums up our theoretical expectations.

Table 1: from behavioural needs to market shares

Behavioural need	Product characteristics fulfilling the need	Expected impact on the market shares
Distinction seeking	Diversity from other products in the market	Negative and significant,
Customization	Availability of variants for each product	Positive and significant,
Quality seeking	Price	Varying across age groups

3 The model

Discrete-choice models of product differentiation (McFadden, 1978; Berry, 1994; Berry et al., 1995) provide a general framework for studying the determinants of demand. In these models, products are described as bundles of characteristics, and consumers choose those products maximizing the utility derived from these characteristics. According to Berry (1994), the utility of consumer *i* for product *j*, $j = 1,...,J$, can be expressed by

$$u_{ij} = \beta x_j + \alpha p_j + \xi_j + \varepsilon_{ij} \qquad (1)$$

where x_j is a vector of product *j*'s attributes, and p_j is the price of a product. The term ξ_j represents an unobservable product attribute of *j* that is known to consumers and producers but not to the econometrician. Since ε_{ij} denotes an identically and independently distributed extreme value that captures the effects of random taste parameters, the mean utility of product *j* is:

$$\delta_j = \beta x_j + \alpha p_j + \xi_j . \qquad (2)$$

Berry (1994) consider also the opportunity for consumers to buy an outside good. The outside good can simply be regarded as the choice of not purchasing any of the products available. In standard practice, the utility of the outside good is normalized to zero.[2] Given the set of assumptions and applying a usual logit formulation, it can be shown that the observed market share of product *j* equals the purchase probability of product *j*:

$$s_j(\delta) = \frac{e^{\delta_j}}{1+\sum_{j=1}^{J} e^{\delta_j}} \quad \text{and} \quad s_0(\delta) = \frac{1}{1+\sum_{j=1}^{J} e^{\delta_j}} \tag{3}$$

where $s_j(\delta)$ is the observed market share of product *j*, and $s_0(\delta)$ is the market share of the outside good. Following Berry et al. (1995), we use the number of all private households in a given year to define the total market size. This assumption allows us to derive the market share of both the inside and the outside good.[3] By substituting (2) in (3) , taking the logarithm, and rearranging, it follows:

$$\ln(s_j) - \ln(s_0) = \beta x_j + \alpha p_j + \xi_j . \tag{4}$$

The parameters of this demand function can be estimated using OLS.

[2] The inclusion of the outside is of importance. Otherwise price increases of all products would not lead to a decline of total the demand in the market contradicting the Say's law.
[3] Information on the number of private households is obtained from Statistisches Bundesamt (2008).

A first econometric concern in the estimation of (4) is that prices are likely to be correlated with the unobserved characteristics ξ_j. The correlation is due to the fact that producers know the unobserved components, ξ_j , and take its value into account in their pricing decision. Ignoring the resulting endogeneity will lead to biased estimations. Recently, there is a debate in marketing literature about how to deal with this endogeneity problem (Chintagunta et al., 2006a; Guo, 2006; Mazzeo, 2006). One approach is the use of a reduced model with instrumental variables (IV). On the other hand, it is also possible to estimate a system of equations not only including the demand side, but also modelling firms´ maximizing behaviour (Berry et al., 1995). As correctly pointed out by Chintagunta et al. (2006b), a structural model is more suitable to test theories or to attain predictions. Nevertheless, a reduced form does not impose a structure on the data and, therefore, it is more appropriate to identify new empirical phenomena. Moreover, it reduces both the computational burden and the risk of imposing the wrong behavioural assumptions. Because the aim of the paper is to search for the existence of uniqueness seeking behaviour we rather let the data "talk" and, therefore, we favour a reduced form model.

A second drawback of the simple logit specification is that the variations in consumer tastes enter only through the additive term ξ_j, which is assumed to be i.i.d. across consumers and choices. Several model extensions have been developed in order to relax these constraints such as the nested logit model. The nested logit model allows for more flexible substitution patterns by grouping all products into predetermined exhaustive and mutually exclusive sets, while retaining the i.i.d. extreme value

assumption of the unobserved consumer utility component, ξ_j. As explained in the next paragraph, since we analyse only one segment of the entire German car market, a nested logit is not required.

4 Empirical analysis

4.1 Data

The subject of the empirical analysis is the segment of compact cars in the German market. The empirical analysis is based on two distinct databases. Sales data are made available from the *Kraftfahrtbundesamt* (KBA), Germany's national road vehicle registration authority. In the "New registrations for motor vehicle and vehicle trailer by type, size class, producer and federal state"[4] the KBA annually issues data on sales of specific car models and sales distributions across different age-groups of buyers. In fact, the data permits to distinguish three groups of consumers: car buyers under thirty years; car buyers between thirty and sixty; and over sixty. The data collected covers the period 2001 to 2005. We identify compact cars and non-compact cars according to the standard KBA classification.

Information on prices and quality attributes for each car model were made available by ADAC, Germany's largest automobile club. The ADAC annually published electronic catalogues with data on prices, technical and non-technical features of new cars. This electronic database provided information on 43 quality attributes for each

4 Statistics for „Neuzulassungen von Kraftfahrzeugen und Kraftfahrzeuganhängern nach Fahrzeugarten, Größenklassen Herstellern, Typen und Bundesländern".

car model. Note that the price for new cars does not incorporate any sales returns or rebates, a frequent practice in car purchasing. However, in the absence of more detailed price information, we assume that the list price is the most reliable proxy available.

4.2 Econometric specification and estimation procedure

The estimation of demand equation (4) is our econometric problem. The model assumes that individuals choose a particular car model based on a set of characteristics. The dependent variable is the natural logarithm of the yearly net share (s_j / s_0) of each car model. Prices enter (4) in natural logarithm as well.[5] Among the explanatory variables specifying the vector of product characteristics x_j, we can distinguish between physical model attributes, diversity (*diversity*) and availability of variants (*availability*). In order to control for unspecified time effects (*e.g.* declining total market size), we include yearly time dummies. Among control variables, producer dummies capture the impact of brand-specific factors on the demand of certain car models (De Pelsmacker, 1988; Mannering and Winston, 1991; Nichols, 1998). There are seven physical model attributes that enter the demand equation. The maximum engine power to weight ratio (*performance*) is used as proxy for the engine performance of a car. Fuel-efficiency *(efficiency)*, defined as the reciprocal of fuel consumption, indicates either the environmental friendliness of a car model or its

[5] The use of a log-log formulation has the clear advantage that coefficients can be interpreted as elasticities. The model is however robust with a log-linear specification.

running costs. As an indicator for the loading capacity, we utilize the luggage space *(luggage)* in litres, and, as a proxy for safety, we employ the dimension (length*width*height) of a car in cubic meter *(size)*.[6] We include also the variable *vintage* as an additional attribute, which is the number of years since market introduction of a car model. Since car buyers might prefer more recent models, the variable captures a vintage effect.

In order to test our hypotheses, we introduce two variables capturing the degree of a model's diversity and the availability of variants. *Diversity* is measured by the Euclidean distance in a multidimensional characteristics space from a theoretical average (Saviotti 1988). Since this measure depends on the unit of measurement, we normalise the univariate distance using the mean value. Accordingly, the degree of a product's diversity is given by

$$D_j = \sqrt{\left(\frac{X_{1j} - \overline{X}_1}{\overline{X}_1}\right)^2 + \left(\frac{X_{2j} - \overline{X}_2}{\overline{X}_2}\right)^2 + \ldots + \left(\frac{X_{nj} - \overline{X}_n}{\overline{X}_n}\right)^2} \qquad (5)$$

where $X_{1j},\ldots,X_{nj}$ denote a vector of product characteristics of a car model *j*, and $\overline{X}_1,\ldots,\overline{X}_n$ represent a vector of *n* average product characteristics. We compute the distance measure D_j for each product by employing the subset of model attributes mentioned above.

[6] According to Papahristodoulou (1997) size can proxy safety better than number of airbags because of low variation of the latter.

Secondly, in order to identify the availability of a product's variants, we use the number of available trims for each model[7] *(availability).* Descriptive statistics of variables involved in the estimations are presented in Table 2.

Table 2: descriptive statistics

Variable	Mean	Min	Max	Std. Dev.	Obs
Price	18247.31	7200	38150	3522.416	1005
Performance	0.0649042	0.0384279	0.1326531	0.0146049	1005
Size	10.82476	8.549536	12.50186	0.6336249	1005
Efficiency	15.16827	8.064516	23.25581	2.91641	1005
Luggage	401.9313	177	580	86.91089	1005
Vintage	3.552239	2	10	1.565473	1005
Availability	5.510448	1	30	4.798026	1005
Diversity	0.337211	0.0756859	1.131082	0.1517296	1005

As suggested above, we estimate equation (4) using instrumental variable methods: any factors correlated with price, but are not correlated with the demand disturbance, ξ_j, serve as appropriate instruments. Firstly, we tried the demand instruments suggested by Berry et al. (1995) such as the characteristics of car model *j*, the sum of each characteristic across own-firm car models, and the sum of each characteristic across all models produced by rival firms. In general, it turned out that the latter two sets instruments poorly performed in our context. Therefore, we suggest the use of alternative instruments: since a product's characteristics determine the price, and are independent of unobserved characteristics, they are a first good candidate for instruments. Next, instead of the sum of each characteristic across models produced by rival firms, we make use of the average characteristics values.

[7] A trim is a specific variant of a car model that differs from another version of the same model by a few attributes such as the availability of optional items.

The key identification assumption is that rival product attributes are likely to be correlated with a car model's price but are not correlated with unobserved attributes. However, since the variables caused multicollinearity, we had to restrict the set of appropriate instruments to the average size of rival car models only. As a last instrument we employed the number of models sold by rival firms which captures the intensity of competition, and, presumably, has a negative impact on a car models' price.

4.3 Results

We estimate the parameters of demand equation (4) using both pooled ordinary least squares with robust standard errors (column A) and a two-stages least squares estimation that accounts for the endogeneity of prices (column B). Moreover, we run separate regressions for each age-group in both model specifications. Estimation results are reported in Table 3.

Table 3: OLS and 2SLS regression results for different age groups

	Model A: OLS			Model B: 2SLS with IV		
VARIABLES	under 30	30 to 60	over 60	under 30	30 to 60	over 60
Price	-3.528***	-3.042***	-3.143***	-3.673	-4.564*	-4.567*
	(0.435)	(0.411)	(0.476)	(2.972)	(2.554)	(2.539)
Perfomance	44.60***	20.65***	6.100	45.91*	34.32	18.88
	(5.621)	(4.989)	(5.314)	(27.01)	(23.06)	(22.73)
Size	0.439***	0.495***	0.204**	0.451*	0.618***	0.320
	(0.120)	(0.104)	(0.104)	(0.260)	(0.226)	(0.225)
Efficiency	0.161***	0.0790***	-0.0779***	0.164***	0.104**	-0.0543
	(0.0198)	(0.0173)	(0.0167)	(0.0520)	(0.0440)	(0.0435)
Luggage	-0.00421***	-0.00202***	0.000405	-0.00420***	-0.00197***	0.000453
	(0.000742)	(0.000652)	(0.000664)	(0.000745)	(0.000682)	(0.000691)
Vintage	-0.130***	-0.143***	-0.186***	-0.131***	-0.153***	-0.196***
	(0.0297)	(0.0273)	(0.0289)	(0.0378)	(0.0342)	(0.0349)
Availability	0.0708***	0.0737***	0.0936***	0.0700***	0.0651***	0.0855***
	(0.0110)	(0.0102)	(0.0103)	(0.0203)	(0.0175)	(0.0169)
Diversity	-1.221***	-1.183***	-2.547***	-1.206***	-1.024**	-2.398***
	(0.325)	(0.310)	(0.333)	(0.447)	(0.431)	(0.448)
Constant	11.93***	11.08***	16.82***	13.09	23.19	28.14
	(3.629)	(3.469)	(4.064)	(23.72)	(20.41)	(20.30)
producer dummies	yes	yes	yes	yes	Yes	yes
year dummies	yes	yes	yes	yes	Yes	yes
F-statistic	19.71	17.43	31.10	18.12	15.92	29.38
p-value	0.000	0.000	0.000			
p-value Hansen J				0.7154	0.3101	0.802
Observations	1005	1005	1005	1005	1005	1005
R-squared	0.3411	0.3233	0.4620	0.341	0.3114	0.4538

Dependent variable: $\text{Log}(s_j / s_0)$; * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses.

The econometric estimations are robust to different specification strategies. The use of instruments generates substantial changes only in the *price* and *performance* coefficients, which increase in the absolute value and they loose significance. This result is fully in line with theory suggesting that if we treat price as exogenous, the estimates of the price coefficient will be biased downward (Berry et al., 1995). As reported in Table A1 in the Appendix, the first-stage regression of prices on exogenous variables and the instruments does not reveal a problem of weak

instruments: besides relatively high R-squared values, parameter estimates of the instrumental variables are significant, which implies a reasonable relationship between price and instruments. Further, we run a Sargan-Hansen test for the validity of the instruments employed. The p-values of Hansen's J statistic reported in Table 2 suggests that instruments are valid, *i.e.* uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

Consider now the estimated coefficients for automobile attributes in model B. As pointed out above, *performance* is not significant, while the estimates for *efficiency*, luggage space *(luggage)*, *size* engine exhibit the expected sign across different age-groups; the significant and positive coefficients for *efficiency* and *size* indicate a clear preference for cars with low fuel consumption and superior safety properties. The negative impact of luggage capacity on market share discloses a preference for sportiness since a larger luggage capacity comes at the expense of an aggressive design and speed. Anyway, the small magnitude suggests minor importance of this variable in the buying decision. The implications concerning the role of *vintage* are reasonable: the coefficients are all negative and significant, revealing a higher attractiveness of newer car models.

With regard to the parameters measuring uniqueness seeking behaviours, the coefficients of *diversity* are all negative and significant across all age groups. This result corroborates hypothesis 1 and suggests that consumers exhibit a distinction seeking behaviour influencing the demand curve. Note that the coefficient for the

age-group above sixty is much smaller compared to the other age-groups. The coefficient of *availability* is always positive and significant. The results reveals that consumer value the possibility of customizing their choice. Thus, *availability* increases the likelihood of a model to be purchased and supports hypothesis 2.

Because of space limitations, Table 2 does not show the coefficients of producer dummies, which measure a consumer's subjective valuation of a specific brand. Most of the producer dummies are significant and explain some residual idiosyncratic effects of a producer's characteristics: for instance, especially Skoda and Audi models performed well in terms of market shares across all age-groups whereas models of Hyundai or Lada perform rather poorly. In general, we observe a decline in the absolute values of the parameter estimates across age-groups. We explain this evidence with decreasing impact of brand-specific factors over age.

Price coefficients deserve here a scrupulous discussion. Negative estimates across all age-groups imply a downward sloping demand curve which is in line with findings of related studies on that topic (Berry et al., 1995, 2004; Nevo, 2000; Train and Winston, 2007; Moral and Jaumandreu, 2007). However, this evidence does not advocate *per se* for the absence of quality seeking behaviour. As we explained, in this market aesthetic evaluations play only a partial role in purchasing choices. For this reason, we never forecasted an upward sloping demand function, but rather a reduction of price elasticities. As discussed above, because it is impossible to disentangle traditional substitution/income effect from the "price offsetting income

effect", we compare price elasticities across the three age groups. Since, as a matter of fact, the impact of all supply factors is the same across social groups, we suggest that the observed difference should root in some psycho-sociological variations such as individual hedonism and uniqueness seeking behaviour.

After correcting for endogeneity of prices, there is a difference in the estimates across the age-groups. Certainly, this difference among social groups can support Hypothesis 3 and it provides some preliminary evidence of the presence of quality seeking behaviour. Indeed, the low significance of parameters might be the result of counteracting effects of substitution/income effect versus price offsetting income effect.

5 Conclusion

By applying discrete-choice models of product differentiation, the paper aimed at estimating the determinants of demand in the German compact car market. From related research on this issue a multitude of factors affecting the demand for automobiles are known. One of main concern in the literature is to control for unmeasured quality, which can be a source of endogeneity. Our study is contributing to the existing literature by explicitly exploring the impact of uniqueness seeking behaviour on demand. We basically claim that potential consumers have an intrinsic need for uniqueness and the degree a product satisfies this need can be considered as an additional product characteristic. We distinguish three different sorts of uniqueness seeking behaviour: i) distinction seeking, ii) customization, and iii)

quality seeking behaviour. Since uniqueness seeking behaviour is likely to vary across different social groups, we separately estimate our econometric models for three distinct age-groups. Our results show that satisfying the need for distinction has a positive impact on price and negative impact on the demand for a product.

On the contrary, the possibility of customizing a product positively influences the its market share. Further, we can not exclude that prices are used by consumers as a signal to satisfy the quest for uniqueness.

How can firms leverage on this human hedonism? On the one hand, they can exploit the distinction seeking behaviour and produce an expensive product for the few. On the other, they can benefit from mass production economies of scale and, still, give consumers the flavour of uniqueness by allowing some degree of customization. I order to gain a better understanding of the relationship between quality and price in the consumers´ perception further empirical evidence is required.

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Appendix

Table A.1: First-stage regression of prices on explanatory variables and instruments

Dep. Variable	price
Performance	8.978***
	(0.385)
Size	0.0812***
	(0.0114)
Fuel efficiency	0.0166***
	(0.00143)
Luggage	3.36e-05
	(8.90e-05)
Vintage	-0.00667***
	(0.00248)
Availbility	-0.00565***
	(0.000732)
Diversity	0.105***
	(0.0348)
Constant	7.952***
	(0.130)
producer dummies	yes
year dummies	yes
F-statistic	171.29
p-value	0.0000
Observations	1005
R-squared	0.7503

Dependent variable: Log(price); * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors in parentheses