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The pulse of liability of foreignness: dynamic legitimacy and experiences effects in the German car market

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Dynamic Legitimacy and Experience Effects
in the German Car Market

Ulrich Kaiser and Wolfgang Sofka

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Non-technical summary

Internationalizing business activities is a key strategy for most modern companies to achieve growth in revenues and profits. Even though legal obstacles have diminished (e.g. through, free trade, common currencies or information technology), the adverse effects from social and cultural borders remain. Foreign subsidiaries often lack roots and reputation in the host country, compared to domestic competitors. These deficits generate frictional losses when interaction with local stakeholders (e.g. customers, regulators) is crucial. They become visible in the form of more frequent mistakes, delays and risks in the foreign engagements of multinational corporations (MNC). These stumbling blocks were initially perceived as temporary effects associated with market entry. However, it turns out that overcoming this “liability of foreignness”, is more of a marathon than a sprint.

We advance the academic discussion by developing a theoretical argument of the dynamic antecedents of liability of foreignness. Along these lines we introduce a distinction between host country customer-induced elements (lack of legitimacy) and MNC-specific factors (lack of responsiveness and adaptation). We test this analytical framework empirically using data on more than 1,200 models on the German new car market.

We find that the effects of liability of foreignness cannot be simply attributed either to the demand or to the MNC side. We find an interrelation between legitimacy-induced and MNC-induced liability of foreignness. Customer acceptance (legitimacy) is a major stumbling block at the beginning but evaporates as host country customers gain more experience with both foreign and domestic brands. Once this balance with domestic competitors is achieved the frictional losses from cross-border coordination and communication (MNC induced) become more binding. We conclude by developing targeted management recommendations based on these results.

The Pulse of Liability of Foreignness

Dynamic Legitimacy and Experience Effects in the German Car Market

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Abstract

Globalization has provided many companies with new opportunities for growth and efficiency. This requires them to operate successfully across cultural and social borders. These can be stumbling blocks to internationalization and have been found to cause frequent errors and delays for multinational companies. Such liabilities of foreignness are persistent in nature. We investigate the causes behind these detrimental effects. We identify two major factors conceptually: a lack of legitimacy in the host country on the demand side and a lack of responsiveness on the side of the multinational corporation. We test these hypotheses empirically using a comprehensive sample of the German car market, which is especially suitable due to its established domestic producers and international competitors. Our results suggest that the two factors interact. For less experienced customer groups, we find that legitimacy is the dominant factor behind the effects of liability of foreignness. As customer experience increases, liability of foreignness caused by a lack of responsiveness becomes more of an issue.

Keywords: Liability of foreignness, internationalization strategy, globalization

JEL-Classification: F23, L62, M10

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1 Introduction

Internationalizing business activities is a key strategy for most modern companies to achieve growth in revenues and profits. While internationalization potentials have mostly materialized in procurement and production, internationalizing sales remains a more difficult task (Rugman and Verbeke, 2004). Even though legal obstacles have diminished (e.g. through, free trade, common currencies or information technology), the adverse effects from social and cultural borders remain. Foreign subsidiaries often lack roots and reputation in the host country, compared to domestic competitors. These deficits generate frictional losses when interaction with local stakeholders (e.g. customers, regulators) is crucial. They become visible in the form of more frequent mistakes, delays and risks in the foreign engagements of multinational corporations (MNC) (Lord and Ranft, 2000). These stumbling blocks were initially perceived as temporary effects associated with market entry. However, it turns out that overcoming this “liability of foreignness”, as termed by Zaheer (1995),¹ is more of a marathon than a sprint and that the associated performance effects are as lasting as the liabilities of size and newness as discussed by Zaheer and Mosakowski (1997).

The objective of this study is to provide more insights into the tenacious factors behind the liability of foreignness. Its results are directed at multinational management scholars and practitioners. We advance the academic discussion by developing a theoretical argument of the dynamic antecedents of liability of foreignness. Along these lines we introduce a distinction between host country customer-induced elements (lack of legitimacy) and MNC-specific factors (lack of responsiveness and adaptation). We explore the driving forces behind both streams of liability of foreignness and challenge the assumption that they will eventually converge and evaporate. Conversely, we argue that sticky layers of liability of foreignness remain which materialize as persistent stumbling blocks for foreign operations. We test this analytical framework empirically using data on more than 1,200 models on the German new car market. This setting is particularly appropriate because the automotive industry is at the forefront of globalization and Germany is a large market with well-established domestic and foreign competitors. Based on our results, practitioners can develop targeted countervailing strategies that focus either on the host customer (marketing) side or on organizational adaptation.

Our study is organized as follows. Section 2 presents the conceptual framework and briefly summarizes existing research. Section 3 maps our discussion onto analytical arguments and derives empirically testable hypotheses. Section 4 presents our empirical study and is followed by a discussion of our results in Section 5. In the final part, Section 6, we derive conclusions and recommendations.

¹ This relates to the concept of “cost of doing business abroad” (Hymer, 1976).

2 Conceptual framework

The rationale behind liability of foreignness follows the basic assumption that firms operating in their home market environment benefit from a “home turf advantage”. They know their business environment and the environment knows them. Foreign competitors find it relatively harder to fit in. They suffer from more frequent mistakes, delays and unnecessary risks (Lord and Ranft, 2000; Sofka, 2006). These stumbling blocks in internationalization make up the subject matter for an important part of the literature on multinational corporations (MNC). They are collectively described as the “liability of foreignness” (Hymer, 1976; Zaheer, 1995). The term refers to unavoidable disadvantages for firms operating outside of their home environment. By its nature, liability of foreignness is a relative concept, i.e. foreign firms face barriers that host country competitors do not. These can materialize as extra or disproportionately high costs as well as forfeited benefits (Mezias, 2002a). They are the result of a lack of local roots (e.g. higher learning costs), a perceived lack of host country legitimacy, spatial distance (e.g.. transportation, communication across large distances and different time zones) and/or legal restrictions imposed by the home country (e.g. high-tech exports) as described by Zaheer (1995).

The studies by DeYoung and Nolle (1996), Hasan and Hunter (1996), Mezias (2002b), Miller and Parkhe (2002), Schmidt and Sofka (2006), Sofka and Zimmermann (2005), Zaheer (1995), Zaheer and Mosakowski (1997), Zaheer and Zaheer (1997) identify the effects of liability of foreignness. They support the concept at various performance layers like profitability, growth, efficiency, exposure to lawsuits, absorptive capacities.

Our study attempts to take the literature a step further by trying to identify the *causes* of liability of foreignness and by providing strategies to mitigate the detrimental effects of being a foreign firm.

3 Analytical framework

The roots of liability of foreignness

Liability of foreignness is a sociological concept² with structural, relational and legitimacy dimensions (Zaheer, 2002). Differences in languages and the ways people communicate are important, but not exclusive, factors (West and Graham, 2004). Environmental pressure and opportunities in the domestic market shape skills, structures, practices and routines of companies and their staff over time. A firm's constant exposure to its environment and the interaction between the two leads to an organizational entity that functions effectively and efficiently within the specific domestic social, cultural, economic and legal environment. This process is typically an "automatic" by-product of company evolution. Foreign competitors find it difficult to acquire, substitute or imitate this knowledge because it is largely tacit and causally ambiguous (Barkema and Bell, 1996; Jensen and Szulanski, 2004). They lack local embeddedness and suffer from frictional losses in their host country engagements that materialize as lower levels of efficiency and effectiveness (Granovetter, 1985; Mezias, 2002a).

Overcoming liability of foreignness is therefore closely related to time and experience. Host country rivals necessarily have a head-start and foreign firms need to achieve time compression in their learning engagements to gain an equal footing (Barkema and Bell, 1996; Dierickx and Cool, 1989). The few longitudinal studies on the dynamic effects of liability of foreignness hint that this is typically a long journey and not a short trip, e.g. 16 years in the currency trading industry (Petersen and Pedersen, 2002; Zaheer and Mosakowski, 1997).

There is a need for a clearer understanding of the persistent elements behind liability of foreignness. Barkema and Bell (1996) suggest that all learning is incremental and therefore related to time. Our study is designed to support MNC managers who want to go beyond a "wait and see" approach and achieve time compression in overcoming liability of foreignness. Targeted strategies require more insight into learning engagements and the relevant actors. We distinguish between two interrelated perspectives which are typically illustrated as "stranger in a strange land" (Zaheer and Mosakowski, 1997): the inflexibility of host country customers that hinders them from accepting foreign companies as equals (customer learning) and/or the inability of foreign firms to learn and adapt (organizational learning). The former refers to deficits in legitimacy while the latter describes shortcomings in responsiveness. Most studies in the field assume, at least implicitly, a convergence between these two forces over time.³ We extend the existing literature by questioning this assumption. We argue that the underlying factors behind achieving legitimacy and responsiveness differ. The former requires learning engagements from the customers, the latter from the MNC. Time and experience are

² Eden and Miller (2004) argue that the economic aspects, i.e. costs of doing business abroad, should be separated from the sociological factors. Our study is not designed to disentangle the economic and sociological roots and effects.

³ See for example Petersen and Pedersen (2002), Zaheer and Mosakowski (1997).

factors behind both elements (Barkema and Bell, 1996) but this does not readily translate into eventual convergence of the two streams.

Deficits in host country legitimacy

Purchasing decisions and hence product preferences are integral to the definition of self and the expression and performance of roles (e.g. Belk, 1988). People enact roles that define their self-concept (Mehta and Belk, 1991). These roles are typically stable over time, leading to reliable product preferences (Mathur et al., 2003). It is difficult for foreign competitors to enter these established structures. Host country customers find it more difficult to judge foreign firms and the quality of their product. The marketing literature covers this lack of legitimacy of foreign products under the heading of “country of origin effects” (for a review see Bilkey and Nes, 1982). Several studies in this field find that customers use information about a product’s country of origin as a proxy for the expected product quality (see for example Diamantopoulos et al., 1995; Hsieh, 2004).⁴ Hence, host country customer preferences have been identified as permanent aspects of liability of foreignness (Petersen and Pedersen, 2002). Customers abstain from buying or demand a price/quality premium. Both would translate into relative disadvantages for foreign competitors and hence liability of foreignness.

Deficits in organizational responsiveness

From the MNC perspective achieving responsiveness to local requirements (e.g. from markets or regulations) is a major driver of internationalization (Rugman and Verbeke, 2003). This implies learning from the environment and adapting products and processes. Still, these localization efforts have to be balanced with the benefits from global integration (Doz and Prahalad, 1984; Prahalad and Doz, 1987). Put simply, an MNC subsidiary cannot simply morph into an independent host country firm. It has to apply to certain MNC practices and procedures to generate internalization advantages within the MNC (Dunning, 1981; Petersen and Pedersen, 2002). The foreign subsidiary always has to put additional resources into balancing host country integration with intra-MNC consistency when communicating, coordinating and monitoring across national and cultural borders (Mezias, 2002a, 2002b). Dow (2006) shows that transaction costs and increased uncertainty on foreign markets lead to an increased reliance on home country practices on the part of managers abroad. He concludes that organizational inertia reinforces these effects and leads to systematic under-adaptation of strategies used in the host country. Lasting effects of liability of foreignness are the result if they cannot be compensated by firm-specific advantages (Caves, 1971).

Hypotheses

Based on the previous discussion we argue that liability of foreignness does not automatically evaporate over time. The legitimacy and responsiveness issues are driven by different factors which do not necessarily converge. Figure 1 illustrates our line of reasoning. It is typically assumed that situation I occurs: host country customers get used to the foreign

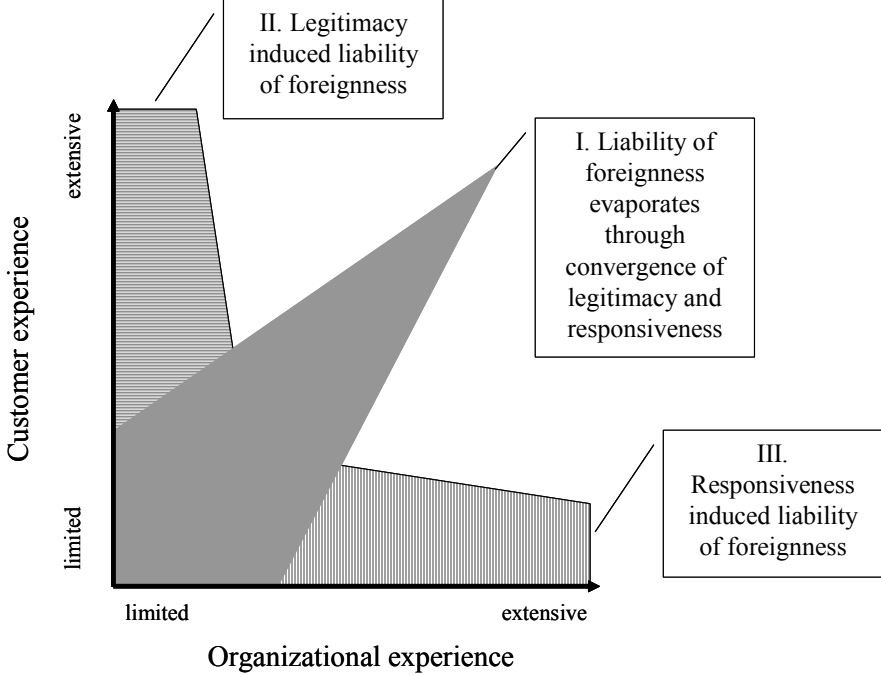
⁴ These are not necessarily negative associations, e.g. elegant Italian design or precise German engineering.

company (legitimacy) and the MNC subsidiary simultaneously streamlines its organizational approach to fit into the host country context (responsiveness). We hypothesize that two other outcomes are possible. Host country customer preferences may be so rigid in favouring domestic companies that a sticky layer of legitimacy-induced liability of foreignness remains (Situation II). Alternatively, the advantages of intra-MNC standardization may limit the subsidiary’s efforts to localize, resulting in a persistent responsiveness-induced layer of liability of foreignness (Situation III). Hence, we derive the following hypotheses:

Hypothesis I: Deficits in perceived host country legitimacy as part of customer product preferences do not evaporate over time. Sticky effects remain that constitute the persistent barriers associated with liability of foreignness.

Hypothesis II: Chronic disadvantages from liability of foreignness are the result of intra-MNC needs for consistency. Common products and practices across cultural and social borders prevent foreign subsidiaries from fully blending into the host country environment.

Figure 1: Dynamics of liability of foreignness



4 Empirical study

4.1 Evaluation scheme

Study setting

We test our analytical framework empirically on data from the German new passenger car market. We use the population of new car sales in 2003 and hence do not run into sample selection problems that usually emerge when samples are used instead of populations. Our data is at the model variant level and is hence much more detailed than other studies that use data on the model level (Verboven, 2002). While existing studies typically consider models, e.g. a BMW 525, our data further distinguishes between a BMW 525i (with fuel injection), a BMW 525d (diesel engine) or a BMW 525i touring (a station wagon with fuel injection). Table 1 clarifies the terminology followed in this analysis.

Table 1: Automotive terminology

| <i>Category</i> | <i>Example</i> |
|-----------------|---------------------------|
| Group | DaimlerChrysler Corp. |
| Brand | Mercedes |
| Line | S class |
| Model | SLK |
| Model variant | SLK 320 Kompressor 160 kw |

This evaluation platform has two major advantages for our research setting. Firstly, cars are highly differentiated products with traceable product (model) generations. Developing a new car model requires extensive time and resources (over 1 bn €) which makes economies of scale effects from foreign market sales a necessity. Secondly, the automotive industry is at the forefront of globalization (Nunnenkamp, 2000). Germany is a large, highly competitive market for automobiles with long-standing domestic producers (which are typically multinationals themselves) and established competition from almost all automotive companies in the world (Licht et al., 2005).⁵ What is more, we focus on the primary item of competition in the automotive market: the car model variant. Firms do not compete on individual car sales but through relatively standardized product lines, so-called models and their variants.

Empirical implementation

Our research setting requires a differentiation between customer and organizational learning engagements. We capture the former through customer age and the latter through the duration of a producer's market presence. On the one hand, we argue that legitimacy issues are related to customer age. That is, older customers are more likely to be aware of the amount of time that elapsed before foreign competitors entered the German market while younger customers take the current situation as a given. On the other hand, the time elapsed since an automotive

⁵ For example, Ford has operated in Germany since 1925.

manufacturer entered the German market should be a good predictor for the duration of the company's organizational learning engagement and thus the need to achieve responsiveness.

4.2 Estimation strategy

We translate this evaluation scheme into an empirical test setting by adopting a matrix structure. To capture the legitimacy dimension of our research question we estimate a system of car demand equations for young customers (below 30 years of age) and senior customers (60 years and older).⁶ Positive and significant coefficients for foreign producer dummy variables are interpreted as signs of legitimacy-induced liability of foreignness. We introduce our second dimension of liability of foreignness, lack of responsiveness, by incorporating a brand's market presence in years. Our theoretical argumentation suggests that these organizational learning engagements differ between domestic (German) and foreign manufacturers. Hence, we introduce a multiplicative interaction term between the foreign producer dummy and the duration of market presence in both equations (i.e. for junior and senior customers). This interaction term approach has two major advantages. Firstly, it separates the legitimacy deficit effects of foreign producers from the modulating/amplifying effects of organizational experience. Secondly, the latter effect represents the specific organizational learning trajectories of foreign manufacturers by separating them from domestic ones.⁷ If the coefficients of these interaction terms are positive and significant in both equations we have identified responsiveness-induced liability of foreignness.

4.3 Data

We generate a cross sectional dataset for the year 2003 based on the "New passenger car registrations by regional and contextual criteria"⁸ statistics provided by the Kraftfahrt-Bundesamt (KBA, Federal Bureau of Motor Vehicles and Drivers). The KBA approves all vehicle types in Germany. We derive new registrations by car model variants as defined by official German statistics and age groups from this data source⁹. We add historical data from

⁶ The ideal formulation of this empirical setting would include the age of each individual car buyer. Unfortunately, this information is not available to us. For a workable solution we rely on the youngest (below 30) and oldest age group (60+) which also corresponds nicely with the earliest (1950) and the most recent entrance (1994) of a foreign brand in the German market (see annex Table 4).

⁷ Interaction terms follow a straightforward rationale (Aiken and West, 1993): a regression equation of the form $Y=b_1X+b_2Z+b_0$ allows testing for linear, additive effects of X on Y and Z on Y respectively. An additional interaction term producing $Y=b_1X+b_2Z+b_3XZ+b_0$ allows additional insights. Firstly, if b_3 is significant then Y depends jointly upon X and Z. Secondly, if b_1 and/or b_2 are significant there is a separate effect of X on Y (or Z on Y) apart from the mitigating factor XZ.

⁸ „Neuzulassungen von Kraftfahrzeugen und Kraftfahrzeuganhängern nach Regional- und Sachmerkmalen.“

⁹ It should be noted that we observe the age group of the person who registers the car, not the intended driver or persons that influenced the purchasing decision decisively. One could certainly argue that parents may buy and register their children's car for financing or insurance reasons. We acknowledge this limitation. Still, in the absence of more detailed data we are confident that our registration statistics can serve as a reliable proxy.

KBA's "Directory of passenger car manufacturers and types."¹⁰ Price and more specific quality features are provided by a German car evaluation company, EurotaxSchwacke. The pricing information for new cars reflects list prices which do not incorporate any discounts, trade-ins¹¹ or throw-ins¹². These arrangements are quite common in car purchasing. Albeit in the absence of more detailed price information, we are confident that these list prices are the most reliable proxy variable available. Besides, we extend our dataset with information published by automotive intelligence provider B&D Forecast GmbH, Germany's leading automobile assistance association ADAC, the EU industrial R&D investment scoreboard report (European Commission, 2004) and the International Organization of Motor Vehicle Manufacturers (OICA).

We obtain a comprehensive snapshot of the German automotive market with a total of 1,233 different car model variants (excluding some observations due to missing values). 809 of these variants are foreign brands, 424 are German. Details of brand assignment can be found in Table 4 of the annex. Descriptive statistics as well as a brief discussion can be found in annex 7.2.

4.4 Variables

Dependent variables

We choose unit sales as our indicator of success on the German automotive market.¹³ We estimate a system of two equations, one with the number of sales to customers below 30 years of age (junior) and the other with sales to their counterparts aged 60 years and older (senior) as the dependent variable. Using sales numbers necessarily requires incorporating control variables for prices. High unit sales could be the result of discount pricing or vice versa. Hence, the causal direction is unclear (endogeneity). We will address this issue methodologically (see section 4.5).

Liability of foreignness variables

For the legitimacy-induced effects of liability of foreignness we add a dummy variable indicating whether a car model belongs to a German brand or not. With regards to the foreign status, Zaheer and Mosakowski (1997) discuss a number of suitable concepts: location of a firm's international headquarters, nationality of the majority of workers, share of foreign shareholders, nationality of the largest single shareholder or the perception of a company in a particular country. We find the latter most adequate for our specific research question. What

¹⁰ „Verzeichnis der Hersteller und Typen von Personenkraftwagen.“

¹¹ The customer receives a more generous offer for her used car from the dealership if she decides to buy a new one there.

¹² The dealership keeps the price for a particular car offer unchanged but enhances its equipment, e.g., by adding mats or service vouchers.

¹³ Obviously, profits per car model variant would be preferable but are generally not available.

is more, dealing with legitimacy issues and customer perceptions requires a brand perspective. All German brands will consequently serve as the comparison group (Mezias, 2002a).

We add interaction terms (i.e. the product) of the foreign status and company experience in Germany to the empirical model to capture the effects of organizational learning engagements on responsiveness that are specific to foreign firms. At the same time, the interaction terms “purge” the previously introduced legitimacy dummies from the organizational effects.

Control variables

Measuring liability of foreignness requires controlling for other liabilities (e.g. size, newness) and contextual aberrations (Mezias, 2002a). We address the former by incorporating size, advertising expenditure, the duration of market presence (company and model variant) as well as average R&D expenditures per vehicle. The latter refers primarily to differences in quality characteristics of the car. Automobiles are complex bundles of features which makes an extensive set of control variables inevitable. It is a challenge to avoid comparing apples and oranges. Naturally, some quality features that made a difference in previous studies are now considered standard equipment in a modern car (e.g. air conditioning), or even mandatory by law (e.g. catalytic converter). We focus on five major quality themes:¹⁴ basic outfit, performance, economic/ecological efficiency, safety, convenience/amenity. We derive a comprehensive list of control variables which is summarized in Table 2.

Table 2: Control variables

| <i>Other liabilities</i> | <i>Quality characteristics</i> | | | | |
|---------------------------------------|--------------------------------------|-------------------------------|--|--|----------------------------|
| | <i>Basic outfit</i> | <i>Performance</i> | <i>Economic/ecological efficiency</i> | <i>Safety</i> | <i>Convenience/amenity</i> |
| Global production volume (log) | Price (thsd. €; log) | Engine power (kilowatts; log) | Value loss 2002 (%) ¹⁵ | Airbags (no.) | Onboard computer (dummy) |
| Media expenditure (log) ¹⁶ | Medium segment (dummy) ¹⁷ | Diesel engine (dummy) | EcoTest ranking (points) ¹⁸ | Breakdown frequency 2002 (no.) ¹⁹ | Luxury interior (dummy) |

¹⁴ We base this categorization on studies in marketing (see for example Brownstone et al., 2000; Bunch et al., 1993) or hedonics (see for example Goldberg and Verboven, 2001, 2004; Verboven, 1998, 2002).

¹⁵ After four years and 60.000 km as defined by ADAC.

¹⁶ We add an additional squared variable of this term to control for a curvilinear relationship.

¹⁷ Model segmentation follows official KBA and ADAC statistics.

¹⁸ The EcoTest ranking is constructed by ADAC as a composite point score of emissions and fuel efficiency. A car model can achieve 100 points at best. Toyota achieved the highest score of 89 with its hybrid powered Prius model.

¹⁹ Breakdowns per 1,000 vehicles as collected by ADAC.

| <i>Other liabilities</i> | <i>Quality characteristics</i> | | | | |
|---|--------------------------------|--------------------|---------------------------------------|-------------------------|----------------------------|
| | <i>Basic outfit</i> | <i>Performance</i> | <i>Economic/ecological efficiency</i> | <i>Safety</i> | <i>Convenience/amenity</i> |
| Average R&D exp. per vehicle (€) | Upper segment (dummy) | | | Antiskid system (dummy) | Power windows (no.) |
| Model exposure to German market (months) | Station wagon (dummy) | | | Immobilizer (dummy) | Power steering (dummy) |
| Company exposure to German market (years) ²⁰ | | | | | |

4.5 Model and method

We apply so-called "Seemingly Unrelated Regression" (SUR) models to estimate the effect of foreignness and other model quality characteristics. The only difference between the SUR model and the more popular OLS model is that we simultaneously estimate car demand for young and old consumers and allow unobserved (by us) quality components (the error terms) to be correlated between young and old consumers. If our specification contained different variables for old and young consumers, joint estimation would also lead to efficiency gains, e.g. we would obtain smaller standard errors. Since this is not the case in our model, the only advantage of applying SUR is that we obtain a joint variance-covariance matrix for both demand equations which allows us to directly test for statistically significant differences between car demand by young and old consumers.

A second technical aspect is that we need to instrument price since it is endogenous to demand: both consumers and producers know the unobserved (to the econometrician) quality components and producers take its value into account in its pricing decision which, in turn, induces a positively correlation between car prices and unobserved model quality. This leads to a downward bias in the estimate for the parameter corresponding to price, i.e. it is estimated "too small" in absolute value.

We therefore need to instrument product price. For an instrument to be valid in this case, it must have two properties: (i) it must be highly correlated with the endogenous variable, car price, and (ii) it must be uncorrelated with unobserved car quality. Candidates for such instruments are cost-side variables that at the same time are unrelated to car demand. We use

²⁰ Companies have to apply for a general production permit at the KBA if they want to sell their product on the German market. We consider the date of this production permit a reliable proxy variable for market entry. Official post World War II statistics start at 1949. Hence, the maximum time of market exposure is 54 years. See Table 4 of the appendix for an overview.

three cost-side variables as instruments, namely (i) the natural logarithm of car height, since higher cars are likely to be more expensive than smaller cars, (ii) the sum of the squared model-level shares in total brand sales (the Herfindahl-Hirschman index of model production) since a high index indicates that a brand focuses production on a small range of products and (iii) the natural logarithm of the number of employees at the brand level which is a direct cost measure.

Since any model's price is a function of the characteristics of other cars, these characteristics are valid instruments for car price as discussed in detail by Berry et al. (1995). We follow their suggestion and use the sum of the following characteristics of other models as instruments: number of power windows, power steering, immobilizer system, automatic transmission, tinted glass windows, rotational engine speed sensor, ski bag and halogen front lights.

As shown in annex 7.3, which displays "first stage" regression results, our instruments are indeed highly correlated with the endogenous variable, product price. Most instruments are separately significant and our instruments are also highly significant. There is no evidence for correlation between the unobserved quality characteristics and the instruments, since "J-tests" for over-identifying restrictions cannot reject the validity of our instruments at any conventional significance level. The formal model specification is

$$\ln q_{ijunior} = \beta_{0junior} + \sum_{j=1}^l \beta_{jjunior} \times X_{ij} + \beta_{junior} \times D_i + \varepsilon_{ijunior}$$

$$\ln q_{isenior} = \beta_{0isenior} + \sum_{j=1}^l \beta_{jisenior} \times X_{ij} + \beta_{isenior} \times D_i + \varepsilon_{isenior}$$

$$i = 1, \dots, N$$

$$\text{cov}(\varepsilon_{ijunior}, \varepsilon_{isenior}) = \rho$$

where

$q_{ijunior}$: Quantity sold of model i to customers below 30 years

$q_{isenior}$: Quantity sold of model i to customers 60 years and older

X_{ij} : Quality characteristic j of model i

D_i : Foreign producer dummy of model i

ρ : Correlation between the error terms $\varepsilon_{ijunior}$ and $\varepsilon_{isenior}$ (to be estimated)

β : parameters to be estimated

5 Results

Our empirical analysis yields some interesting insights. Table 3 shows the results of the relevant variables for our analytical setting. We did not develop any a priori hypotheses for the control variables. Therefore, estimation results for them are explorative in nature. We find many similarities between junior and senior buyer groups and a few, but quite substantial, differences. A detailed discussion would divert the attention from the core issue of this paper, liability of foreignness. Still, the full set of coefficients as well as a brief discussion can be found in annex 7.4. This section focuses on the results that relate to liability of foreignness.

Table 3: Regression results for liability of foreignness variables

| <i>Variable</i> | <i>Model I</i> | | <i>Model II</i> | |
|---|---------------------|---------------------|--------------------|--------------------|
| | <i>Junior</i> | <i>Senior</i> | <i>Junior</i> | <i>Senior</i> |
| LIABILITY OF FOREIGNNESS VARIABLES | | | | |
| Brand from outside Germany (dummy) | -0.87 *** (0.17) | -0.93 *** (0.17) | -1.45 ** (0.73) | 0.68 (0.75) |
| Interaction term: company exposure and foreign status | | | 0.02 (0.01) | -0.03 * (0.01) |
| Company exposure to German market (years) | | | 0.02 (0.01) | 0.04 *** (0.01) |
| CONTROL VARIABLES | YES | | YES | |
| Observations | 1,233 | 1,233 | 1,233 | 1,233 |
| RMSE | 1.58 | 1.56 | 1.55 | 1.58 |
| R2 | 0.22 | 0.25 | 0.26 | 0.23 |
| P>0 | 0.00 | 0.00 | 0.00 | 0.00 |

*** significant at 99%, ** significant at 95%, * significant at 90%

Robust standard errors in parentheses

Full set of coefficients available in annex 7.4.

We estimate a baseline case excluding the variables that relate to learning engagements (Model I, Table 3). We find significant negative coefficients for the foreign brand dummy in both age groups, indicating that foreign engagements in Germany are generally subject to liability of foreignness. We subsequently add firms' learning engagement in Germany and its interaction term for foreign brands to the model (Model II, Table 3). This yields the core result of our study.

For young customers, the significant negative effect of the foreign brand dummy remains in Model II. The control variables for foreign firms' learning engagements are statistically both separately and jointly insignificant. This means that the foreign brands' market experience does not have a significant effect on sales to young German customers. This result implies that the disadvantages faced by foreign brands in selling to young customers mainly stem from the demand side. Foreign producers can apparently not achieve the same levels of legitimacy among young German customers that domestic brands can. The opposite is true for senior car buyers: for this age group we do not find significantly negative demand-side effects. The foreign brand dummy is statistically insignificant. Hence, legitimacy-induced liability is not an issue for this age group. Instead, the more experience and more

responsiveness a foreign brand develops in the German market, the more attractive its models become to German senior customers. The interaction term (company exposure times foreign brand dummy) is negative and statistically significant which means that the learning effect for foreign brands is smaller than for German brands. We hence identify a MNC-induced element of liability of foreignness, namely the relative shortcoming of foreign producers when it comes to adapting their products to domestic taste.

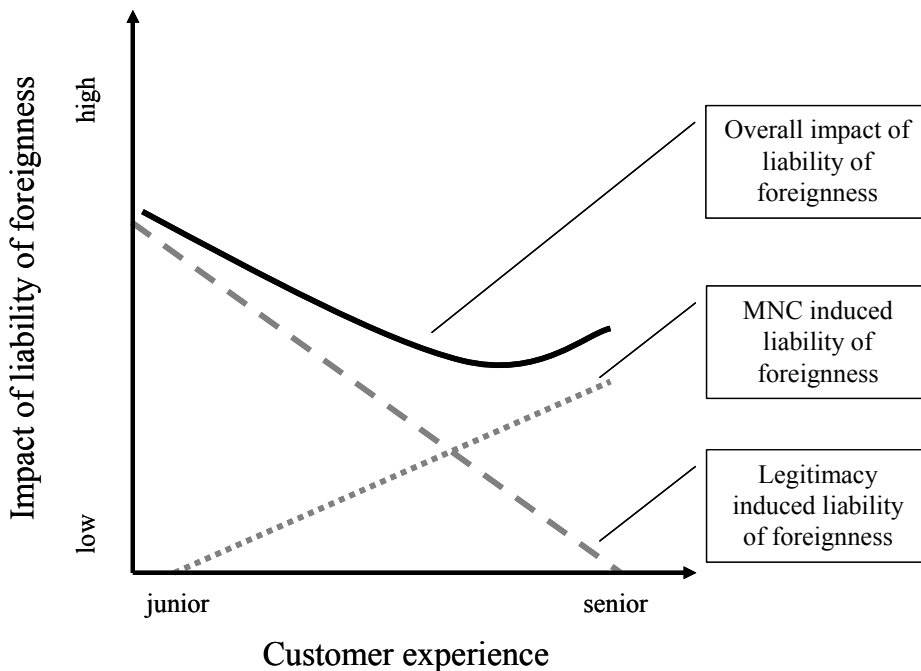
Our empirical results neither fully confirm nor reject our hypotheses. Instead, we obtain a rather differentiated picture of the dynamic effects of learning and responsiveness on the German car market. First, we find that foreign brands face an “uphill battle” among young customers. This is surprising since these buyers most likely cannot remember a market situation without foreign competition. Then again, young customers are typically first car buyers, i.e. they have no or very little direct prior experience of owning and operating a car. We suspect that their product perception is largely imprinted by second hand private and public experience, most importantly that of their on own parents. Since different car offers are already difficult to compare, brand popularity reassures buyers (Chung Koo and Jay Young, 1997) and we suggest that this effect is elevated among inexperienced, young customers. Our results for older customers indicate that this effect is waning as buyers get older. The lack of legitimacy effect diminishes as their direct experience of domestic and/or foreign car ownership increases. Eventually, prejudice against foreign products evaporates. Interestingly, Newbury et al. (2006) identify a similar experience/age effect for employment attractiveness.²¹ Older automotive consumers enter a stage of loyalty to dealers, models and brands (Lambert-Pandraud et al., 2005). Strikingly, we find that in such a situation without customer-induced liability of foreignness, the effects from MNC-induced disadvantages become visible. Domestic brands are slightly faster in adapting to market trends in this segment. We suspect that domestic and foreign producers receive equal feedback from senior customers, but foreign manufacturers have to channel these impulses through extra layers of cross-border management which makes them slower to respond.

²¹ They find that liability of foreignness in organizational attractiveness for prospective employees diminishes with age.

6 Conclusions

Our empirical results allow no simple conclusions about the antecedents of the negative effects of liability of foreignness. They cannot be simply attributed either to the demand or to the MNC side. This is probably part of the explanation why practitioners find dealing with this particular challenge so difficult (Mezias, 2002a). We suspect that there is an interrelation between legitimacy-induced and MNC-induced liability of foreignness as depicted in Figure 2. We argue that customer acceptance (legitimacy) is a major stumbling block at the beginning but evaporates as host country customers gain more experience with both foreign and domestic brands. Once this balance with domestic competitors is achieved the frictional losses from cross-border coordination and communication (MNC induced) become more binding. It is difficult for foreign subsidiaries to pick promising lead customers (Schmidt and Sofka, 2006) and select and implement innovation projects (Sofka, 2006). Therefore, the forces behind liability of foreignness shift but a persistent layer of relative disadvantage remains.

Figure 2: Dynamic effects of legitimacy and MNC induced liability of foreignness



Building upon this central finding we derive management recommendations. First of all we advocate loyalty programs for host country customers. Our findings suggest that the cost of new customer acquisition may be relatively higher for foreign competitors since they already have issues with perceived legitimacy. Secondly, Luo et al. (2002) suggest defensive (shielding the MNC from the host market) and offensive strategies (engaging in the host market). We argue that the latter is warranted. More precisely, MNC localization engagements are most promising when they provide responsiveness for experienced customers. Third, customer recognition of “foreignness” depends to a large degree on guesses based on brand language (Samiee et al., 2005). Hence, foreign market entrants that target

young customers may opt for brands that disguise their foreign origin to mitigate legitimacy-induced effects of liability of foreignness. One could argue that Toyota's brand "Scion" that targets young American customers follows such a rationale.

Finally, our study faced some important limitations which may provide room for further research. First of all, longitudinal analyses would provide additional insights. Secondly, we conducted an industry study for empirical testing. While the automotive industry is certainly one of the most promising subjects in internationalization, the results can obviously not be readily generalized. The country affiliation of automotive brands is typically very visible and easy to assess for customers (Samiee et al., 2005). This is not true for the majority of day-to-day purchases which may for example be evaluated with lower levels of motivation (Gurhan-Canli and Maheswaran, 2000). What is more, we focus on a German perspective. Comparable results for one or more other markets would certainly enhance our understanding.

7 Annex

7.1 Brands

The involvement of General Motors and Ford in Germany runs deep and dates back to the pre World War II era. General Motors has controlled Opel, the company that was founded 1862 by the German engineer Adam Opel, since 1929. The German branch of Ford was established in 1925. Both companies have extensive production facilities in Germany. Hence, one could certainly argue that these companies should be considered German (i.e. domestic) instead of foreign. Still, we fear that by doing so, we would severely neglect the internalization activities and subsequently the liabilities of foreignness of two of the largest car producers in the world.

Table 4: Brand origins; year of first production permit in parentheses

| <i>German brands</i> | <i>Foreign brands</i> | | | |
|---------------------------|-----------------------|------------------------|----------------------|------------------|
| <i>(comparison group)</i> | <i>Rest of Europe</i> | <i>Japanese brands</i> | <i>Korean brands</i> | <i>US brands</i> |
| Audi (1950) | Citroen (1954) | Honda (1968) | Daewoo (1994) | Chrysler (1970) |
| Mercedes (1949) | Fiat (1950) | Mazda (1973) | Hyundai (1991) | Ford (1949) |
| BMW (1949) | MG Rover (1966) | Nissan (1974) | Kia (1993) | Opel (GM) (1949) |
| Smart (1997) | Peugeot (1963) | Suzuki (1981) | | |
| Volkswagen (1949) | Renault (1952) | Toyota (1972) | | |
| | Saab (1974) | | | |
| | Seat (1970) | | | |
| | Skoda (1958) | | | |
| | Volvo (1967) | | | |

7.2 Descriptive statistics

We conduct a prima facie comparison of German and domestic brands to outline major trends in the data. A detailed list of descriptive statistics can be found in Table 5. First of all we find that German models outsell their foreign competitors among both junior and senior buyers. The gap is, however, larger among senior customers.

With respect to quality features, foreign brands appear to be more concentrated at the entry level of the market. This becomes especially apparent in the midsize segment. Almost half of the German model variants target this sub-market compared to only roughly 30 percent of foreign model variants. Obviously this segmentation has repercussions in other car features. Foreign variants have less power than German ones (120 vs. 89 kilowatts average engine power) and come with fewer safety features (e.g. 70 % of German models have antiskid systems, compared to 41% among foreign brands), but are fairly equal in terms of efficiency and convenience (with the exception of luxury interior). These quality differences feed back to prices: foreign models are on average cheaper than German ones.

Given this data structure, a prima facie comparison cannot convincingly answer our research question. A multivariate analysis is warranted.

Table 5: Means of model variables (standard errors in parentheses)

| <i>Variable</i> | <i>Domestic brands</i> | <i>Foreign brands</i> |
|--|--------------------------------|--------------------------------|
| No of observations | 424 | 809 |
| <i>DEPENDENT VARIABLES</i> | | |
| Unit sales to customers under 30 years old | 117.95 (326.57) | 80.11 (176.95) |
| Unit sales to customers 60 years old and above | 433.38 (1,005.65) | 243.80 (504.53) |
| <i>CONTROL VARIABLES</i> | | |
| <i>Other Liabilities</i> | | |
| Company exposure to German market (years) | 51.98 (9.12) | 40.35 (12.71) |
| Model exposure to German market (months) | 22.66 (11.24) | 22.55 (11.24) |
| Global production volume | 3,280,995.00 (1,664,049.00) | 3,337,865.00 (1,433,655.00) |
| Media expenditure (mn €) | 39.98 (16.29) | 32.15 (19.82) |
| Avg. R&D expenditure per vehicle | 16.57 (20.45) | 58.94 (135.70) |
| <i>Quality Characteristics</i> | | |
| <i>Basic Outfit</i> | | |
| Price (tsd. €) | 33.83 (16.51) | 22.74 (9.01) |
| Medium segment (dummy) | 0.49 (0.50) | 0.29 (0.46) |
| Upper segment (dummy) | 0.19 (0.40) | 0.21 (0.41) |
| Station wagon (dummy) | 0.21 (0.41) | 0.14 (0.34) |
| Height (cm) | 1,486.22 (119.40) | 1,528.10 (138.89) |
| <i>Performance</i> | | |
| Engine power (kilowatts) | 119.31 (52.26) | 88.64 (30.16) |
| Diesel engine (dummy) | 0.35 (0.48) | 0.30 (0.46) |
| <i>Economic/ecological efficiency</i> | | |
| Value loss 2002 (%) | 45.69 (1.00) | 53.09 (3.04) |
| EcoTest ranking (points) | 63.82 (2.90) | 61.01 (7.88) |
| <i>Safety</i> | | |
| Airbags (no.) | 5.17 (1.48) | 4.76 (1.65) |
| Alarm system (dummy) | 0.22 | 0.13 |

| <i>Variable</i> | <i>Domestic brands</i> | <i>Foreign brands</i> |
|--------------------------------|------------------------|-----------------------|
| | (0.41) | (0.34) |
| Antiskid system (dummy) | 0.70 | 0.41 |
| | (0.46) | (0.49) |
| Immobilizer (dummy) | 0.99 | 0.94 |
| | (0.11) | (0.23) |
| Breakdown frequency 2002 (no.) | 18.46 | 27.37 |
| | (2.42) | (13.02) |
| <i>Convenience/amenity</i> | | |
| Onboard computer (dummy) | 0.56 | 0.61 |
| | (0.50) | (0.49) |
| Luxury interior (dummy) | 0.62 | 0.38 |
| | (0.49) | (0.48) |
| Power windows (no.) | 3.30 | 3.14 |
| | (1.01) | (1.11) |
| Power steering (dummy) | 0.95 | 0.98 |
| | (0.22) | (0.14) |

7.3 First stage regression results

Table 6: First stage OLS; baseline case: excluding learning engagements (dependent variable: price)

| <i>Variable</i> | <i>Coef.</i> | <i>Std. err.</i> |
|--|--------------|------------------|
| <i>INDEPENDENT VARIABLES</i> | | |
| Foreign status | -0.07*** | 0.02 |
| Global production volume (log) | -0.09*** | 0.01 |
| Media expenditure (mn €; log) | 0.06 | 0.10 |
| Media expenditure squared term (mn €; log) | 0.00 | 0.01 |
| Average R&D expenditure per vehicle (€) | 0.00*** | 0.00 |
| Medium segment (dummy) | 0.10*** | 0.01 |
| Upper segment (dummy) | 0.21*** | 0.02 |
| Station wagon (dummy) | 0.02* | 0.01 |
| Height (cm; log) | | |
| Engine power (kilowatts; log) | 0.67*** | 0.02 |
| Value loss 2002 (%) | 0.00 | 0.00 |
| Diesel engine (dummy) | 0.13*** | 0.01 |
| EcoTest ranking (points) | 0.00 | 0.00 |
| Airbags (no.) | 0.01*** | 0.00 |
| Antiskid system (dummy) | 0.01 | 0.01 |
| Immobilizer (dummy) | 0.07 | 0.08 |
| Breakdown frequency 2002 (no.) | 0.00*** | 0.00 |
| Onboard computer (dummy) | 0.01 | 0.01 |
| Luxury interior (dummy) | 0.07*** | 0.01 |
| Power windows (no.) | 0.15*** | 0.02 |
| Power steering (dummy) | -0.25*** | 0.05 |
| <i>INSTRUMENT VARIABLES</i> | | |
| Herfindahl-Hirschman index of model production (log) | -0.15*** | 0.04 |
| Employees at brand level (no.; log) | 0.07*** | 0.01 |
| Height (sum of all other models) | 0.04 | 0.07 |
| Halogen front lights (sum of all other models) | 0.01 | 0.01 |

| <i>Variable</i> | <i>Coef.</i> | <i>Std. err.</i> |
|---|--------------|------------------|
| Ski bag (sum of all other models) | 0.00 | 0.02 |
| Rotational speed sensor (sum of all other models) | -0.04** | 0.02 |
| Immobilizer (sum of all other models) | 0.04 | 0.09 |
| Power windows (sum of all other models) | 0.13*** | 0.02 |
| Power steering (sum of all other models) | -0.11 | 0.08 |
| Color glass windows (sum of all other models) | 0.02 | 0.04 |
| Automatic transmission (sum of all other models) | -0.17*** | 0.02 |
| Constant | -0.51 | 0.69 |
| Observations | 1,404 | |
| RMSE | 0.14 | |
| R2 | 0.89 | |
| P>0 | 0.00 | |
| Test for instrument variables equaling zero can be rejected (F(11/ 1371) = 18.77; Prob > F = 0.00) | | |

Table 7: First stage OLS: Including learning engagements (dependent variable: price)

| <i>Variable</i> | <i>Coef.</i> | <i>Std. err.</i> |
|---|--------------|----------------------|
| <i>INDEPENDENT VARIABLES</i> | | |
| Foreign status | 0.58*** | (0.19) |
| Interaction term: company exposure and foreign status | -0.01*** | (0.00) |
| Company exposure to German market (years) | 0.01*** | (0.00) |
| Model exposure to German market (months) | 0.00* | (0.00) |
| Global production volume (log) | -0.12*** | (0.02) |
| Media expenditure (mn €; log) | 0.00 | (0.11) |
| Media expenditure squared term (mn €; log) | 0.00 | (0.01) |
| Average R&D expenditure per vehicle (€) | 0.00*** | (0.00) |
| Medium segment (dummy) | 0.10*** | (0.01) |
| Upper segment (dummy) | 0.21*** | (0.02) |
| Station wagon (dummy) | 0.02** | (0.01) |
| Engine power (kilowatts; log) | 0.67*** | (0.02) |
| Value loss 2002 (%) | 0.00 | (0.00) |
| Diesel engine (dummy) | 0.13*** | (0.01) |
| EcoTest ranking (points) | 0.00** | (0.00) |
| Airbags (no.) | 0.01*** | (0.00) |
| Antiskid system (dummy) | 0.02 | (0.01) |
| Immobilizer (dummy) | -0.01 | (0.09) |
| Breakdown frequency 2002 (no.) | 0.00*** | (0.00) |
| Onboard computer (dummy) | 0.00 | (0.01) |
| Luxury interior (dummy) | 0.07*** | (0.01) |
| Power windows (no.) | 0.12*** | (0.02) |
| Power steering (dummy) | -0.65*** | (0.12) |
| <i>INSTRUMENT VARIABLES</i> | | |
| Herfindahl-Hirschman index of model production (log) | -0.24*** | (0.06) |
| Employees at brand level (no.; log) | 0.09*** | (0.02) |
| Height (sum of all other models) | 0.05 | (0.07) |
| Halogen front lights (sum of all other models) | 0.01 | (0.01) |
| Ski bag (sum of all other models) | 0.00 | (0.02) |
| Rotational speed sensor (sum of all other models) | -0.04** | (0.02) |
| Immobilizer (sum of all other models) | -0.03 | (0.09) |
| Power windows (sum of all other models) | 0.10*** | (0.02) |
| Power steering (sum of all other models) | -0.50*** | (0.14) |
| Color glass windows (sum of all other models) | 0.02 | (0.04) |
| Automatic transmission (sum of all other models) | -0.17*** | (0.02) |
| Constant | 0.02 | (0.74) |
| Observations | 1,404 | |
| RMSE | 0.14 | |
| R2 | 0.89 | |
| P>0 | 0.00 | |
| Test for instrument variables equaling zero can be rejected (F(11/ 1369) = 18.47; Prob > F = 0.00) | | |

7.4 Regression results

This section focuses on the estimation results for the control variables. We have no a priori hypothesis on their outcomes so all discussions are explorative in nature. An analysis of the variables related to the core topic of this paper, liability of foreignness, can be found in section 5.

Table 8 shows the complete results (Table 9 outlines a baseline case without learning engagement variables). With regards to other liabilities junior and senior customers appear similar. Both prefer newer car models over older ones, indicating that the former may fit better with their needs. Large global production volumes have a negative impact. Apparently, a trade-off exists between large global volumes and responsiveness to local demand (Prahalad and Doz, 1987). Advertising increases sales up to a certain point, after which extra money spent on marketing no longer produces results (an inverse u-shaped relationship). Finally, expenditure on R&D should indicate technologically advanced car models which translates into higher sales.

With regards to the basic outfit of the car, we identify negative price elasticities of demand in both age groups, as expected. Young customers are substantially more price elastic than senior customers. Customers in both age groups prefer upper segment cars. Senior customers are also more attracted to the medium segment while they dislike station wagon models. We suspect that their usage patterns no longer require as much space as, for example, those of young families. Young customers opt for engine power and diesel engines while these are not attractive for senior customers given that we already control for model segments (i.e. middle, upper class). Again, this is largely in line with the expected more conservative driving patterns of senior customers. Value stability is only an important quality feature for young customers while senior customers opt for safer cars with more airbags. Both age groups prefer reliable cars with low breakdown frequencies. Additionally, an immobilizer system makes a car model more attractive for junior customers. With regards to convenience features, there are no differences between young and old customers. Both consider cars more attractive if they have onboard computer systems and power windows.

The term “ ρ ” measures the correlation between the unobserved car quality characteristics. It is estimated at 0.78 which indicates that those unobserved components are valued similarly by both young and senior customers.

Table 8: Estimation results: Including learning engagements

| <i>Variable</i> | <i>Junior</i> | | <i>Senior</i> | |
|---|---------------|------------------|---------------|------------------|
| | <i>Coef.</i> | <i>Std. err.</i> | <i>Coef.</i> | <i>Std. err.</i> |
| <i>LIABILITY OF FOREIGNNESS VARIABLES</i> | | | | |
| Brand from outside Germany (dummy) | -1.45** | (0.73) | 0.68 | (0.75) |
| Interaction term: company exposure and foreign status | 0.02 | (0.01) | -0.03* | (0.01) |
| <i>CONTROL VARIABLES</i> | | | | |
| <i>Other Liabilities</i> | | | | |
| Company exposure to German market (years) | 0.02 | (0.01) | 0.04*** | (0.01) |
| Model exposure to German market (months) | -0.03*** | (0.00) | -0.04*** | (0.00) |
| Global production volume (log) | -0.18* | (0.10) | -0.31*** | (0.11) |

| <i>Variable</i> | <i>Junior</i> | | <i>Senior</i> | |
|--|---------------|------------------|---------------|------------------|
| | <i>Coef.</i> | <i>Std. err.</i> | <i>Coef.</i> | <i>Std. err.</i> |
| Media expenditure (mn €; log) | 2.81** | (1.37) | 3.71*** | (1.40) |
| Media expenditure squared term (mn €; log) | -0.15** | (0.07) | -0.18** | (0.07) |
| Average R&D expenditure per vehicle (€) | 0.00* | (0.00) | 0.00** | (0.00) |
| Quality Characteristics | | | | |
| Basic Outfit | | | | |
| Price (instrumented variable) | -4.57*** | (0.81) | -1.61* | (0.82) |
| Medium segment (dummy) | -0.13 | (0.16) | 0.69*** | (0.16) |
| Upper segment (dummy) | 0.77*** | (0.24) | 0.82*** | (0.24) |
| Station wagon (dummy) | 0.16 | (0.13) | -0.26** | (0.13) |
| Performance | | | | |
| Engine power (kilowatts; log) | 1.74*** | (0.61) | -1.32** | (0.62) |
| Diesel engine (dummy) | 0.67*** | (0.14) | -0.76*** | (0.15) |
| Economic/ecological efficiency | | | | |
| Value loss 2002 (%) | -0.07** | (0.03) | 0.02 | (0.03) |
| EcoTest ranking (points) | 0.00 | (0.01) | 0.01 | (0.01) |
| Safety | | | | |
| Airbags (no.) | 0.04 | (0.04) | 0.10*** | (0.04) |
| Breakdown frequency 2002 (no.) | -0.02** | (0.01) | -0.02*** | (0.01) |
| Antiskid system (dummy) | 0.05 | (0.11) | 0.12 | (0.11) |
| Immobilizer (dummy) | 0.80*** | (0.25) | 0.30 | (0.25) |
| Convenience/amenity | | | | |
| Onboard computer (dummy) | 0.30*** | (0.11) | 0.23** | (0.11) |
| Luxury interior (dummy) | -0.09 | (0.12) | 0.06 | (0.13) |
| Power windows (no.) | 0.10* | (0.06) | 0.22*** | (0.06) |
| Power steering (dummy) | 0.15 | (0.45) | 0.13 | (0.46) |
| Constant | 1.81 | (7.61) | -2.67 | (7.76) |
| P | | | 0.78*** | |
| Observations | | 1,233 | | 1,233 |
| RMSE | | 1.55 | | 1.58 |
| R2 | | 0.26 | | 0.23 |
| P>0 | | 0.00 | | 0.00 |

Table 9: Estimation results baseline case: Excluding learning engagements

| <i>Variable</i> | <i>Junior</i> | | <i>Senior</i> | |
|--|---------------|------------------|---------------|------------------|
| | <i>Coef.</i> | <i>Std. err.</i> | <i>Coef.</i> | <i>Std. err.</i> |
| LIABILITY OF FOREIGNNESS VARIABLES | | | | |
| Brand from outside Germany | -0.87*** | (0.17) | -0.93*** | (0.17) |
| CONTROL VARIABLES | | | | |
| Other Liabilities | | | | |
| Model exposure to German market (months) | -0.04*** | (0.00) | -0.03*** | (0.00) |
| Global production volume (log) | -0.29*** | (0.11) | -0.17* | (0.10) |
| Media expenditure (mn €; log) | 4.65*** | (1.36) | 4.50*** | (1.34) |
| Media expenditure squared term (mn €; log) | -0.22*** | (0.07) | -0.22*** | (0.07) |
| Average R&D expenditure per vehicle (€) | 0.00*** | (0.00) | 0.00 | (0.00) |
| Quality Characteristics | | | | |

| <i>Variable</i> | <i>Junior</i> | | <i>Senior</i> | |
|--|---------------|------------------|---------------|------------------|
| | <i>Coef.</i> | <i>Std. err.</i> | <i>Coef.</i> | <i>Std. err.</i> |
| <i>Basic Outfit</i> | | | | |
| Price (instrumented variable) | -1.77** | (0.83) | -4.22*** | (0.82) |
| Medium segment (dummy) | 0.71*** | (0.16) | -0.23 | (0.16) |
| Upper segment (dummy) | 0.79*** | (0.23) | 0.52** | (0.23) |
| Station wagon (dummy) | -0.25* | (0.13) | 0.12 | (0.13) |
| <i>Performance</i> | | | | |
| Engine power (kilowatts; log) | -1.09* | (0.63) | 1.49** | (0.62) |
| Diesel engine (dummy) | -0.70*** | (0.15) | 0.64*** | (0.15) |
| <i>Economic/ecological efficiency</i> | | | | |
| Value loss 2002 (%) | 0.03 | (0.03) | -0.06** | (0.03) |
| EcoTest ranking (points) | 0.01 | (0.01) | 0.01 | (0.01) |
| <i>Safety</i> | | | | |
| Airbags (no.) | 0.11*** | (0.04) | 0.05 | (0.04) |
| Breakdown frequency 2002 (no.) | -0.01** | (0.01) | 0.00 | (0.01) |
| Antiskid system (dummy) | 0.10 | (0.11) | 0.10 | (0.11) |
| Immobilizer (dummy) | 0.31 | (0.26) | 0.80*** | (0.25) |
| <i>Convenience/amenity</i> | | | | |
| Onboard computer (dummy) | 0.20* | (0.11) | 0.24** | (0.11) |
| Luxury interior (dummy) | 0.10 | (0.13) | -0.08 | (0.13) |
| Power windows (no.) | 0.20*** | (0.06) | 0.07 | (0.06) |
| Power steering (dummy) | 0.81** | (0.36) | 0.12 | (0.35) |
| <hr/> | | | | |
| Constant | -8.56 | (7.44) | -8.65 | (7.31) |
| <hr/> | | | | |
| P | | | 0.78 *** | |
| Observations | 1,233 | | 1,233 | |
| RMSE | 1.58 | | 1.56 | |
| R2 | 0.22 | | 0.25 | |
| P>0 | 0.00 | | 0.00 | |

8 References

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