Competition Competence Report

APPLICATION OF ECONOMETRIC METHODS IN MARKET DEFINITION

Market definition is a classical area in which such a use of econometric tools is appropriate and even requested by the European Commission's Notice on the definition of the relevant market for the purpose of Community competition law (OJ C 372), 9/12/1997. In this Notice, the European Commission determined the precise methodology how to define relevant product and geographic markets. The focus of this approach is on demand as well as on supply substitutability.

The methodology constituted by the European Commission is the so called Hypothetical Monopolist Test (HM Test). In principle, competition authorities apply the concept of the HM test. However, conclusions are rarely supported by full empirical evidence as requested in the Notice. Reasons for this lack of empirical evidence are not always clear, but lack of financial resources may explain this inaccuracy. "There is a growing concern over the lack of rigour and factual analysis by the European Commission. This has culminated in several recent successful appeals which have reiterated that competition authorities must maintain and satisfy high evidentiary standards and burden of proof."[1] On the other side, companies use empirical evidence quite frequently to support their cases. As requested by Commissioner Kroes, a more comprehensive use of empirical evidence has the potential to reduce subjective findings producing instead objective, checkable and legally valid results.

This CCR presents econometric tools that are applied for market definition purposes. Specifically, the CCR discusses the actual implementation of the HM test by means of Conjoint Analysis. It should be noted that the main issue with the application of empirical tools is a clear focus on quality and solid experiences with the tools applied. EE&MC has outstanding experiences in this respect.

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[1] Harris, Barry C. and Veljanovski, Cento G. in: Critical LOss Analysis: Ist growing Use in Comeptition Law; (2003) ECLR 213.

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Market Definition and the Hypothetical Monopolist Test

Firms are subject to three main sources of competitive constraints: demand substitutability, supply substitutability and potential competition. The methodology which the European Commission applies to measure demand and supply substitutability is the so-called Hypothetical Monopolist Test (HM Test).[2] The HM Test is an experiment, postulating a hypothetical small, non-transitory change in relative prices and evaluating the likely reaction of customers to that increase. The question to be answered is whether the parties' customers would switch to readily available substitutes or to suppliers located elsewhere in response to a small (in the range of 5% to 10%), yet permanent relative price increase in the products and areas under consideration. If substitution proves to be enough to render the price increase unprofitable because the increase in marginal revenues does not fully compensate for the loss of sales, additional products and/or geographical areas have to be included in the relevant market. This has to be done until the set of products and/or geographic areas is such that small, permanent increases in the relevant prices would be profitable.

Thus, the HM Test is a two-step procedure:

1. The shift in the amount of consumers who do not buy the product due to an increase in price has to be calculated. This analysis depends on the own-price elasticity of the product or service under consideration.
2. A calculation has to take place as to whether the price increase was profitable. This calculation depends on the margin of the product or service in question.

Implementation of the HM Test

The operationalisation of the HM test is a demanding task. To implement the HM Test, modern market research tools can be applied. As discussed above, the reaction of customers to a (hypothetical) price increase is central in the execution of the HM Test. Probably, the most widely used method in price analysis is "Conjoint Analysis" (CA). Pricing and market segmentation are typical areas where Conjoint Analysis is frequently used.

[2] Commission Notice on the definition of the relevant market fort he purpose of Community competition law (OJ C 372), 9/12/1997. The HM test is applied in Australia, Brazil, Bulgaria, Canada, EFTA, EU, Israel, The Netherlands, New Zealand, United Kingdom, United States)

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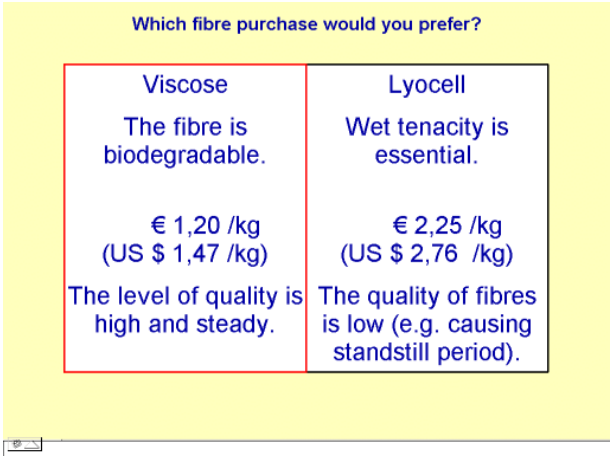
Competition analysis is another one. The components of this method are:

(1) a technique of data collection requiring a respondent to consider „trade-offs" among desirable alternatives;
(2) a computational method which derives „utilities" accounting as nearly as possible for each respondent's choice behavior;

There are many product attributes for which ideal levels in fact differ from consumer to consumer, such as saltiness of pretzels or lightness of beer. For attributes such as convenience, economy, or level of performance, however, it can be assumed that every consumer would prefer a product having as high a level of each attribute as possible. What is needed in such cases is information about consumer „trade-offs". It is relevant to determine how consumers value various levels of each attribute and the extent to which they would forego a high level of one attribute to achieve a high level of another. Conjoint Analysis is based on the premise that each consumer's choice behavior is governed by such trade-off values. An example from the fiber industry illustrates that consumers may choose between different product concepts, each of them going along with a different price.

Figure 1: Example of a choice model



The basic idea of Conjoint Analysis is to confront the customer with different product concepts characterised by varying specifications of their attributes including price. Implementing the HM Test with Conjoint Analysis reveals the attractiveness, called the "part-worths", of each attribute of the product to the respondent. The sum of the part-worths of the combined product features indicates the utility of that certain product concept to the consumer.

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The course of a Conjoint Analysis follows a well established methodology.[3] Different software packages are available to conduct a Conjoint Analysis. The software permits analysing the relationship between the prices of a product and the choice behaviour of consumers. First, a questionnaire is designed and programmed. Interview profiles are developed and face-to-face interviews are conducted with the support of laptops in the field phase. Finally, the collected interview data are analysed. During the analysis, the part-worths of each attribute of the products are evaluated. The sum of all part-worths of the attributes of a certain product determines its utility from the consumer's perspective. Finally, these utilities of different product concepts derived from the choices of the respondents are aggregated to conduct hypothetical price simulations.

The two fundamental concepts to this methodology are the concept of a utility function for individual product concepts and a preference function summarising the utilities derived from the different product concepts. These two concepts shall be discussed briefly.

Estimation of the utility functions

The first step in applying the above sketched decision model is to derive the utility functions. The utility function maps the specifications of the different product attributes onto a value called the *utility* of this particular product concept. This mapping reveals how the different attributes are valued by consumers.

Consumers choose between differing concepts of products. Conjoint Analysis estimates the part-worths of each product attribute based on the choice decisions of the respondents. Utilities are a linear combination of the part-worths of the product's attributes.

$$U_j = \alpha_j - \beta p_i + \gamma x + e_{ij},$$

where U_j denotes the consumer j's utility derived from product i, α_j is a constant basis level of utility, β is a parameter of the consumer's price sensitivity, p_i the price of product i, x a vector of other product attributes, y a vector of the part-worths of these attributes, and e_{ij}, a random component. The estimates of the utility function are deduced indirectly from the choice decisions of the respondents.

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[3] Most studies of conjoint analysis have involved a verbal description of product profiles. Due to increased computing capabilities, ongoing research has developed approaches to integrate virtual reality and conjoint analysis. See, eg., Dijkstra, J and H. J. P. Timmermans, 1997, Employing the possibilities of conjoint measurement as a decision-making tool for virtual wayfinding environments.

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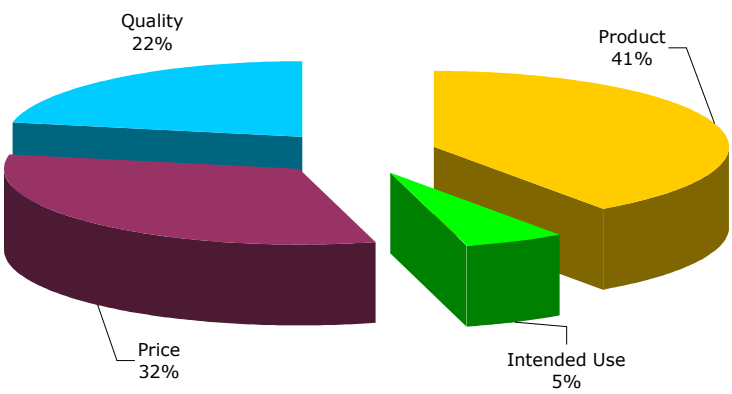
- Preference function

Based on the utilities derived from certain product concepts, the share of preferences a certain product concept receives within a given set of products can be calculated. The share of preferences of a certain product is given by the logistic distribution function with product utilities as the input variables. The utilities are rescaled such that the sum of the (anti-logs of the) utilities of all products equals 100. That is,

$$P_i = \frac{u_i}{\sum_{t \in C} u_t},$$

where P_i denotes the share of preferences of product i, $u_i = expU_i$ and C is the set of possible choices. Thus, P_i denotes the probability that product i will be chosen. From the part-worth of the attribute "price", price and cross-price elasticities are computed. These, in turn, can be applied to evaluate the competitive constraints of the products in the market on the product under consideration and to implement the HM Test to define relevant product and geographic markets. Figure 2illustrates the result of the fibre conjoint analysis.

Figure 2: Result of the fibre conjoint analysis



The fibre survey was performed within 14 days world-wide in a b-2-b market. The importance of price in the customers' decision making is 32%, the importance of the product itself 41% and quality influences the decision marking by 22%. Figure 3 illustrates the demand curve for this fibre A. The slope of the demand curve is flat, meaning that a price increase would not result in a significant decrease in demand. Customers

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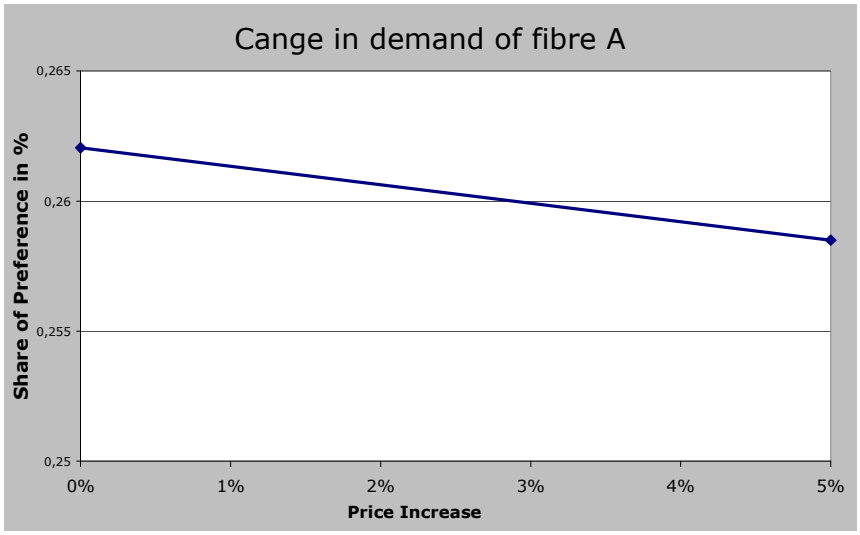
are not really price sensitive: the product/ fibre as well as the quality of the product are of greater importance. This means that it is very likely that a price increase will be profitable and the relevant product market can be determined as the market for fibre A. However, the second step of the HM test has to be exercised too in order to reach that conclusion.

Figure 3: Demand curve of fibre A



- Calculation of the profit of a hypothetical price increase

The calculation of the profit of a hypothetical price increase is the second step in the application of the HM test after the estimation/calculation of the price elasticity took place. Both, the (likely) decrease in demand as well as the change of the contribution margin in case of a hypothetical price increase, are influencing the profit/loss situation. To calculate the profits, turnover data (NOS – Net Outside Sales) as well as variable cost data (TDC – total direct costs) are required.

The contribution margin is defined as NOS minus TDC. Thus, the profit or loss of the hypothetical price increase is calculated by comparing the contribution margins before and after the price increase. If the profit is higher than the profit before the price increase, the price increase is profitable. This means that substitutability is not enough to constrain a hypothetical monopolist. Thus, the relevant product is defined in a narrow way.

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EE&MC Approach

EE&MC has broad experiences in the application of Conjoint Analysis to implement the HM Test for market definition purposes. The HM tests performed by EE&MC have been reviewed in a number of cases by national competition authorities, national courts as well as the European Commission. The reviews have been very positive for EE&MC clients. The methodology applied by EE&MC was confirmed by a supreme court to be the "standard" and in full accordance with the legal requirements of the Notice of the European Commission.

On a monthly basis, EE&MC performs about 2-3 HM tests by means of this empirical methodology. Total project time for a HM test varies between 4-6 weeks including a field phase of 1-2 weeks.

EE&MC applies the HM test on both market levels: b-2-b as well as b-2-c. Market surveys on the b-2-b level are performed by EE&MC analysts whereas b-2-c surveys are outsourced to market research bureaus like AC Nielsen, GFK, etc. The geographic scope of the surveys varies. In b-2-b markets, the scope of the analysis is usually world wide, whereas b-2-c markets are surveyed on a Member State level.

To conclude, the methodology EE&MC employs is a *state-of-the-art* econometric tool allowing a scientifically, legally well founded operationalisation of the HM Test.

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