Authority for Consumers & Markets

Working Paper

Using Conjoint Analysis in Merger Control

A competition practitioner's perspective

Marinus Imthorn, Ron Kemp and Ivo Nobel

Authority for Consumers & Markets

Using Conjoint Analysis in Merger Control

A competition practitioner's perspective

ACM Working Paper #2

Marinus Imthorn
Ron Kemp
Ivo Nobel

ACM Working Papers
ISSN 2352-0442

Authority for Consumers & Markets
P.O. Box 16326
2500 BH The Hague
The Netherlands

Telephone +31 70 72 22 000
Internet www.acm.nl

Authority for Consumers & Markets

Abstract

Conjoint analysis is often claimed to be a powerful tool to be used in merger assessments by competition authorities. By using conjoint analysis, one can overcome the artificial nature of hypothetical questions in stated preference surveys. This tool is extensively used by commercial companies to help them, amongst others, in their pricing decisions. Though the technique has several advantages, so far however, European competition authorities rarely use this technique in their merger assessments. In this paper, we discuss how conjoint analysis can successfully be used to estimate customer behaviour in merger cases. We introduce conjoint analysis and illustrate how it has proved useful in several merger cases conducted by ACM and its predecessor NMa. We also share the eight lessons we have learned when applying this technique.

Authority for Consumers & Markets

About the authors

Marinus Imthorn
Senior Economist at the Competition Department of ACM.
E-mail: marinus.imthorn@acm.nl

Ron Kemp
Senior Economist at the Office of the Chief Economist of ACM.
E-mail: ron.kemp@acm.nl

Ivo Nobel
Senior Economist at the Telecommunications, Transport and Postal Services Department of ACM.
E-mail: ivo.nobel@acm.nl

The authors are grateful to their colleagues for their valuable suggestions and comments during the research. The authors are fully responsible for any remaining shortcomings in this paper.

Authority for Consumers & Markets

Overview

1. Introduction

Merger control is one of the key tasks of a competition authority. The authority assesses whether a proposed merger may result in higher prices to be paid by customers due to reduced competition. This requires a careful assessment of the market power of the merging firms and the closeness of competition between them. Market power is thereby defined as the ability of firms to increase prices profitably above the competitive price for a sustained period of time (Bishop & Walker, 2010).

The indirect approach of using market shares perform poorly in markets with differentiated products where market boundaries are unclear and the 'proximity' of the products sold by the merging firms is a key determinant of the merger's effect on competition (Farrell & Shapiro, 2010). Customer demand responses are a key factor in assessing the effect of mergers in these type of markets. The reaction of customers can be used to estimate the effect of a hypothetical raise in price by (one of) the merging firms on their future profits, in a critical loss analysis for instance (Katz & Shapiro, 2003).

Competition authorities often use surveys to gather evidence on customer demand responses by asking hypothetical 'what-if' questions, in particular when reliable sales data is not available (Hurley, 2011). These traditional surveys rely on stated preferences of the buyers of a product. The hypothetical questions do not always mimic the actual purchase decisions customers make in practice. This raises questions regarding the predictive validity of the questionnaire approach; buyers might answer hypothetical questions differently from how they would act in practice (Dubow, 2003).

McFadden (2001) lists the sources of survey bias which have been noted by psychologists. These biases include amongst others those caused by the way the survey questions are asked (framing effects) and those caused by interviewees' strategic interests in a particular survey-outcome. The solution of psychologists to these problems, is to ensure that the decision made by respondents when answering a survey question is as close as possible to the decision made when actually purchasing a good.

One way to do this is by using conjoint analysis. Conjoint analysis covers a broad range of techniques and has been defined as "any decompositional method that estimates the structure of a consumer's preferences (…) given his/her overall evaluations of a set of alternatives that are prespecified in terms of levels of different attributes" (Green & Srinivasan, 1978). It has become one of the most widely used quantitative tools in marketing research. Conjoint analysis is used to assist in marketing decisions such as (i) deciding whether to match a competitor's price increase, (ii) pricing new brands and (iii) setting new prices among bundles of existing brands (Green, Krieger & Wind, 2001; Hartmann & Sattler, 2012).

Several authors have referred to conjoint analysis as a potentially powerful tool in competition cases (Baker & Rubinfeld, 1999; Hildebrand, 2006; Rubinfeld, 2008). However, actual usage of this

technique by competition authorities seems to be limited. This may, in part, be due to a perception that conjoint analysis is complex and time-consuming, where other competition authorities may be unaware of the merits of this technique.

ACM – and its predecessor NMa - has used this technique in six merger cases to date.[1] In this working paper, we will first discuss conjoint analysis and its' different forms. Next, we will explain in detail how this technique was used in the assessment of a merger between two distributors of artificial fertilizer. In section 4, we will illustrate how conjoint analysis was used in other merger cases, with various degrees of success. This working paper ends with the lessons we have learned so far.

[1] The Netherlands Competition Authority, The Netherlands Consumer Authority and the Netherlands Independent Post and Telecommunications Authority (OPTA) joined forces on April 1st 2013, creating a new regulator: the Netherlands Authority for Consumers and Markets.

2. Conjoint Analysis

2.1 How it works

The idea behind conjoint analysis is that a product or service can be decomposed into multiple characteristics, so called *attributes*. These attributes can be quantitative (such as price, dimension and weight) as well as qualitative (such as brand, functionality and reliability). Each attribute can have different *levels*. A smartphone, for example, can be decomposed into the following attributes and levels (Table 1).

Attribute	Levels
Brand	Apple Samsung Huawei
Price	400 euro 500 euro 600 euro
Weight	110 grams 120 grams 130 grams
# Megapixels Camera	6 7 9
Waterproof	Yes No

Table 1: example of an attribute list.

Based on these attributes and levels, 162 combinations or *product profiles* are possible. For example, the combination 'Apple', '500 euro', '110 grams', '7 Megapixels' and 'not waterproof' is an example of a product profile.

The respondent of a survey is asked to rank or choose between a limited number of random product profiles. This is called a *choice task* and repeated several times. Conjoint analysis assumes that respondents are (implicitly) weighing up the relative value of the different levels of the different attributes. These estimates are so called *path-worth utilities* (Sawtooth, 1996). The product profile with the highest sum of path-worth utilities will be chosen by the respondent.

With this information the competition practitioner can analyse how respondents value the different attributes. Some respondents may be very loyal to a certain brand, while others may want to take high-quality pictures with the smartphone. One can also construct a pie chart with the relative importance of the different attributes for the average respondent, see Figure 1. This information can help competition practitioners in assessing the closeness of competing products based on product

characteristics.

The competition practitioner can also investigate how customers will choose between different product profiles. Conjoint models can calculate what fraction of respondents choose a certain product profile over other profiles, based on the estimations of all the individual path-worth utilities. This is called the *share of preference*. In the above example, the preference shares could be the following, based on three fictive product profiles (Table 2).

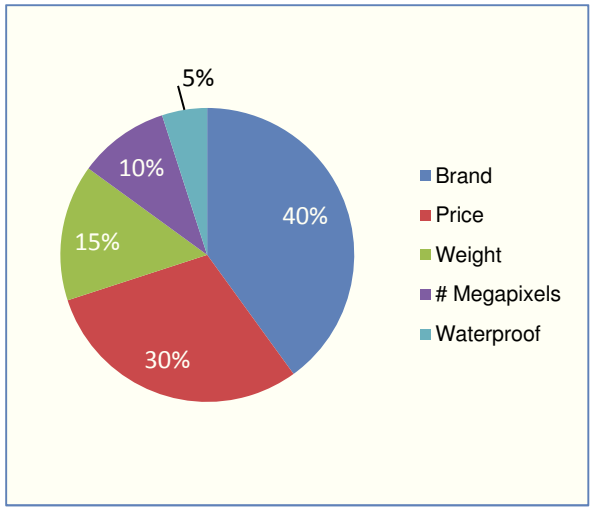

Figure 1: example of relative importance of the attributes.

Preference shares are not the same as market shares. This is because conjoint models are based on certain assumptions, such as that respondents have perfect information (Orme, 2005).[2] In general, preference shares will be more in line with actual market shares if (i) the respondent is the one who makes the purchase decision in practice, (ii) all relevant attributes are included, and (iii) the attribute levels are realistic and understood by the respondent.

Product profile	Share of preference
Apple, 500 euro, 110 grams, 7 Megapixels, not waterproof	39%
Samsung, 600 euro, 130 grams, 9 Megapixels, not waterproof	25%
Huawei, 400 euro, 120 grams, 6 Megapixels, waterproof	36%

Table 2: preference shares for three fictive product profiles

Another useful feature of conjoint analysis is the possibility to simulate the response of respondents to various changes in product profiles (see also section 3). In order to do that, one needs to construct a so called *base scenario*. A base scenario is a set of attribute levels per supplier which act as the starting point for the simulations, like in Table 2.

For example, it is possible to simulate how the preference share for Apple changes if it increases its price to 600 euro. It may be that the preference share of Apple decreases to 28% and that Samsung and Huawei gain 3%-point and 8%-point respectively. This information can help competition practitioners in estimating the *diversion ratio* or the *actual loss*.[3]

[2] The question can be posed to what degree a difference between predicted preference shares and actual market shares can be tolerated. This requires a case-by-case analysis according to us. Even if there is a big difference, the conjoint analysis will provide information on the relative importance of the different attributes that are included.
[3] The diversion ratio could be used in a pricing pressure test, like the Upward Pricing Pressure test (UPP).

2.2 Advantages of conjoint analysis over 'what-if' questions

As mentioned in section 1, the answers of respondents to hypothetical questions do not always match actual behaviour. It is well known that price sensitivity of customers is often overstated when asking about hypothetical price increases *in isolation*. A couple of years ago, for example, the NMa assessed a '2-to-1 merger' where it disposed of evidence from a survey as well as sales data. The survey showed that a large proportion of the respondents would switch to the competitor in response to a price increase or would stop buying the product altogether. However, sales data showed that each of the merging firms imposed significant price increases in the past without losing many customers.

We prefer to use conjoint analysis over hypothetical 'what-if' questions if insufficient sales data is available. Conjoint analysis has several advantages over questions based on states preferences. First, the importance of price levels are not assessed in isolation but together with other attributes. This reduces the automatic reaction of many respondents not to accept price increases. Another benefit is that conjoint analysis may reveal 'hidden' preferences regarding the purchase behaviour of the respondent is not aware of. It is also possible to analyse customer behaviour at an individual level. This may be useful when there are relatively few buyers in the relevant market. Finally, as mentioned above, it is possible to simulate how respondents will react to any type of price change.

2.3 Five methods to apply conjoint analysis

Conjoint analysis is a family of related methods. In the traditional c*onjoint value analysis* (CVA), a series of fixed product profiles are presented to respondents which they rank according to their preferences. Respondents typically rank up to twenty product profiles with up to six attributes. The choice tasks can be administrated by paper-and-pencil or via internet/computer. Telephone can also be used in relatively easy conjoint designs. Utilities can be calculated for each respondent individually with CVA.

Another method is a*daptive conjoint analysis* (ACA). The product profiles that are shown to the respondent are based on the previous answers, i.e. each choice task is adapted to the particular respondent. ACA's main advantage is its ability to measure more attributes (up to 30) than with CVA or the method described below. A disadvantage is that ACA cannot be administrated via paper-and-pencil. There is also a relatively long self-explication step that respondents need to complete before coming into the main 'pairs' choice part. Another limitation is that if price is included as an attribute its importance will be underestimated. Utilities can be calculated for each respondent individually with ACA.

Choice-based conjoint analysis (CBC) is currently the most widely used method for pricing studies. CBC closely mimics the purchasing process of the customer. Respondents are shown three or more product profiles and are asked to indicate which one they would purchase.[4] The choice task is

[4] A 'none-option' can also be included in the choice task. Respondents can also be asked to (i) consider their next 10 purchases and indicate how much of each product they would buy (chip allocation) or (ii) rank the alternatives from best

repeated several times. CBC can be administrated by paper-and-pencil or via internet/computer. Telephone can also be used in relatively easy conjoint designs. CBC requires in general larger sample sizes (> 100 respondents), unless the respondents are able to answer more choice tasks. CBC calculates utilities for the sample as a whole and then relies on techniques such as Hierarchical Bayes to calculate individual utilities.

CBC has further been developed by adding an adaptive part, *adaptive choice-based conjoint analysis* (ACBC). In this method, the respondent is first asked to indicate their preferred level of each attribute, taking into account the effect on the total price. Next, the respondent is presented several product profiles around their preferred product profile and asked if they consider each one as a possibility. After several choice tasks, the previous answers are analysed if the respondent regards certain attribute levels as a 'must have.' The respondent is then directly asked if that's the case. The same applies for 'must avoid' attribute levels. Finally, the respondent is asked to choose between the product profiles they consider a possibility.[5] ACBC can only be administrated via internet/computer. However, respondent tend to regard ACBC as more interesting and engaging than CBC. This method also takes more time to design than the previous conjoint methods.

Menu-based Conjoint analysis (MBC) is the latest method in the conjoint family. In MBC, respondents are asked to select from several options in a menu. Adding an option will influence the final price. This method closely mimics the purchase situation in markets where customers customize products or services. Examples include choosing options to put on an automobile, selections from a restaurant menu and configuring an insurance policy. MBC requires more expertise to use properly than other conjoint methods. This method should therefore only be used by competition practitioners with sufficient experience and knowledge about conjoint analysis.

to worst.

[5] The respondent can also be asked how likely they would buy the product profile.

3. Application of conjoint analysis in Agrifirm / Cehave (2010a, case 6781)

In this section and the next, we discuss several merger cases in which ACM or its predecessor NMa used conjoint analysis. In these merger cases, the conjoint analysis was part of a larger data-gathering via interviews and questionnaires. As with economic techniques in general, the results derived from the conjoint analysis need to be complemented with other types of empirical evidence in order to make an informed decision about the merger in question. It is, for example, necessary to assess potential product repositioning, the threat of entry by new firms and the degree of buyer power.

3.1 Background

In October 2009, the NMa received a notification of a merger between Agrifirm and Cehave, both large cooperatives in the agricultural sector in the Netherlands. The merging firms sell a large number of products to agricultural firms (farmers, horticulturists and cattle farmers), such as mixed feed for animals and crop-protection products. The activities of the merging firms overlapped in a relatively large number of markets. In the first phase of its merger investigation, the NMa concluded that no significant impediment of effective competition was likely for any of these markets, except for one: the market for the sale of artificial fertilizers to agricultural firms. Important arguments for this conclusion were the relatively high market share (50-60%) in the northern parts of the Netherlands and the absence of large competitors in this market.

In its second phase investigation, the NMa investigated the market for fertilizers in the northern parts of the Netherlands in more detail. Research was instigated into the behaviour of several relevant market participants. Therefore, the NMa gathered information from suppliers of artificial fertilizers. Another important source of evidence was an internet survey among agricultural firms.

In the northern parts of the Netherlands, there are thousands of agricultural firms which use artificial fertilizer. In order to make representative statements of this population, the NMa conducted a large scale market survey. The NMa sent letters to almost all agricultural firms in the northern parts of the Netherlands (around 17,000) in which the firm was asked to answer an online questionnaire. Around 1,600 agricultural firms answered the questionnaire, a response rate of around 9,4%. This rate was sufficient to derive conclusions about the purchase behaviour of all agricultural firms in the northern parts of the Netherlands.

The conjoint analysis in the questionnaire served two purposes; (i) to study what the most important factors were for customers in the buying process of artificial fertilizers and (ii) to investigate the response of customers to various price changes.[6]

[6] The NMa also asked respondents directly how they would react to hypothetical price changes. These questions were asked as a back-up in case the conjoint analysis didn't provide reliable results.

3.2 Design of the choice task

The design of a proper conjoint analysis takes careful consideration. The competition practitioner needs to make several choices that cannot be adjusted after the fieldwork has started. Poor choices in the design process may lead to unreliable results. The design process of the conjoint analysis consists of the following steps;

a) Choose the appropriate conjoint method
b) Formulate the choice task
c) Determine the relevant attributes and levels

Conjoint method and choice task

The NMa tried to construct a choice task that closely mimicked the purchase situation of agricultural firms in practice. The NMa chose for CBC because agricultural firms tend to buy all their artificial fertilizer (ad hoc) from only one supplier and because the number of relevant attributes is relatively limited. The respondent was shown three different options and asked to choose the option (s)he prefers the most. The choice task was repeated 13 times in order to gather sufficient information from the respondent.

Attributes and levels

The NMa specified the following attributes and corresponding levels based on information gathered in the first phase investigation.

Attribute	Attribute levels
Supplier	Agrifirm Cehave a cooperative (not Agrifirm or Cehave) a local dealer[7]
Price per 100 kilos	27,50 euro 30 euro 32,50 euro 35 euro
Method of delivery	collected by customer delivered by supplier
Distance to supplier (*if collected*)	10 kilometre (6,2 miles) 20 kilometre (12,4 miles) 30 kilometre (18,6 miles)
Advice of a crop growing advisor	no advice free advice paid advice

[7] Alongside cooperatives, like the merging firms, there are many dealers who sell agricultural products on a relatively small scale and in a small area.

Table 3: attribute list of the conjoint analysis in case 6781.

As mentioned in section 2, it is important that the chosen attribute levels are realistic. For example, the maximum level of the attribute price at around 35 euro per 100 kilos would have been poorly chosen if the actual price of Agrifirm was around 45 euro per 100 kilos. In practice, the actual price of Agrifirm was around 27,50 euro per 100 kilos.[8] An example of a choice task is shown in Table 4.

Imagine you are about to buy artificial fertilizer. You have the possibility to select from the next options. Which of these options would you choose?			
Supplier	Local dealer	Agrifirm	a cooperative (not Agrifirm or Cehave)
Price per 100 kilos	30 euro	27,50 euro	32,50 euro
Method of delivery	collected by customer	collected by customer	delivered by supplier
Distance to supplier (*if collected*)	30 kilometre	10 kilometre	
Advice of a crop growing advisor	no advice	free advice	paid advice
	[ ]	[ ]	[ ]

Table 4: example of a choice task of the conjoint analysis in case 6781.

3.3 Relative importance of the attributes

Based on the answers of the respondents, the path worth utilities for all the attribute levels were calculated. Figure 2 shows the relative importance of the different attributes based on the calculated path worth utilities. The pie chart shows that the price of artificial fertilizer and the method of delivery are regarded as relatively important by the customer. The specific supplier or the advice of a crop growing advisor on the other hand are relatively unimportant factors in the buying process of the customer.

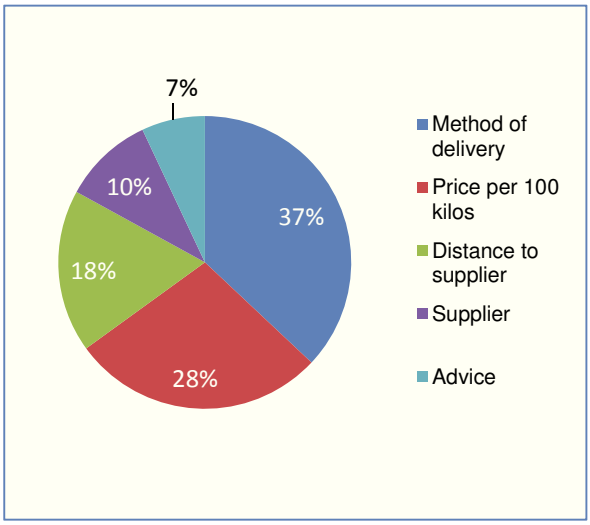

Figure 2: relative importance of the attributes.

[8] Even if the actual values are not within the range of realistic attribute levels, it is still possible to gather results from the conjoint analysis by extrapolating. However, the results are less reliable then.

3.4 Post-merger simulations

The case team specified the base scenario for the simulations when the market research in the second phase was completed. When specifying this base scenario, the case team faced a couple of problems. First, they observed that the prices of the common types of artificial fertilizer didn't differ significantly between suppliers. Second, suppliers of artificial fertilizers delivered most of their sales to the customer. Only a (decreasing) fraction of the artificial fertilizers was still collected by agricultural firms themselves.[9] Finally, most suppliers incorporate the price of advice in the price of artificial fertilizer. Therefore, based on pre-merger market conditions, the base scenario assumed that all suppliers offer the same product with regard to price, method of delivery and advise to their customers. In effect, the simulation estimated the trade-off between the attributes supplier and price (Table 5).

Supplier	Product profile
Agrifirm	27,50 euro per 100 kilos delivered by supplier free advise
Cehave	27,50 euro per 100 kilos delivered by supplier free advise
A cooperative (not Agrifirm or Cehave)	27,50 euro per 100 kilos delivered by supplier free advise
A local dealer	27,50 euro per 100 kilos delivered by supplier free advise

Table 5: base scenario of the conjoint analysis in case 6781.

The case team performed simulations similar to the SSNIP-test; how would customers react if Agrifirm and/or Cehave raised their prices with 5% or 10%? [10] For example, how will respondents react if only Agrifirm would raise its price from 27,50 euro per 100 kilos to 28,88 euro per 100 kilos (+5%)? The results are shown in Figure 3.

The column to the left (current situation) represents the shares of preference for Agrifirm and Cehave in the base scenario. Thus, pre-merger, around 57% of the respondents prefer to buy artificial fertilizer from Agrifirm or Cehave. Based on actual sales data, the market shares of the merging firms in the northern parts of the Netherlands were almost similar. The other columns show the shares of preference for various price changes by Agrifirm and/or Cehave.

[9] The NMa tested, using conjoint analysis, whether collecting and delivering artificial fertilizers constituted different relevant markets but concluded this was not the case.

[10] It is also possible to simulate responses in variations of other attributes. For example, how will customers react if Cehave decided not to deliver artificial fertilizer anymore?

The results suggest that buyers of artificial fertilizer are relatively price sensitive. A small price increase leads to a relatively large drop in the share of preference. For example, if Agrifirm raises its price by 5%, the share of preference drops from 47% to 13%. Thus, Agrifirm would lose 34%-point preference share or 72% of its customers. The estimated critical loss was substantially lower, therefore Agrifirm would not likely be able to profitably raise its price.

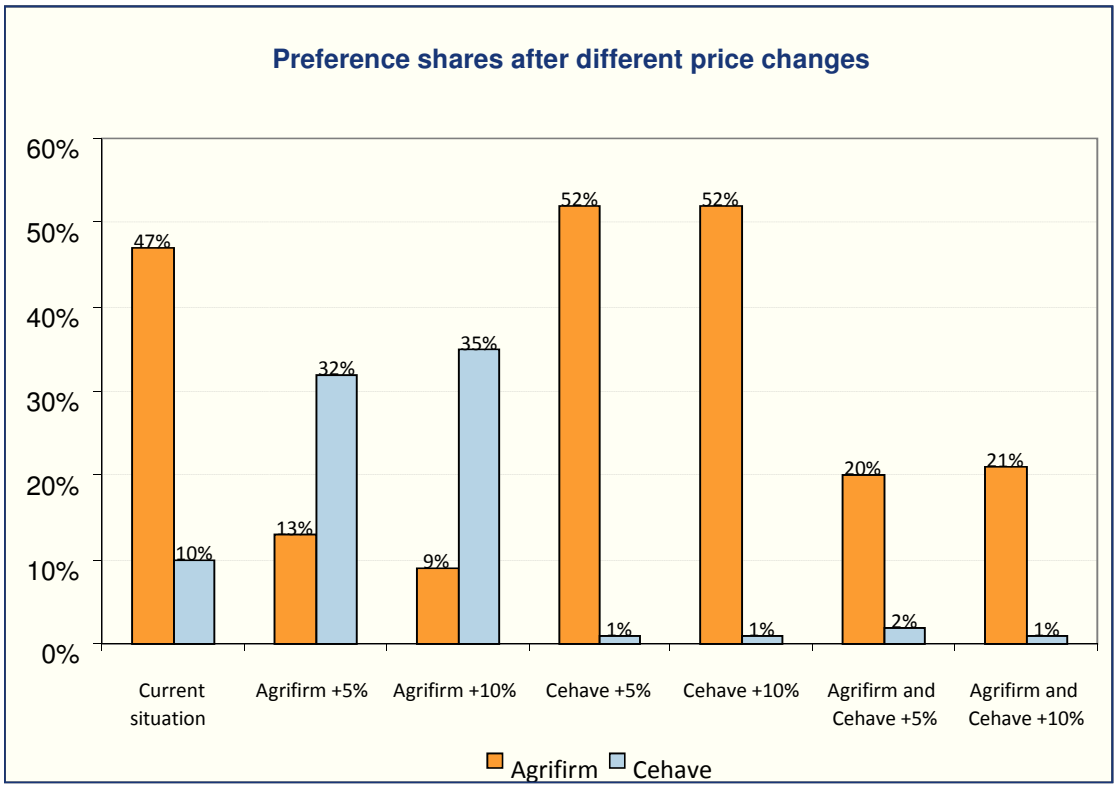

Figure 3: results of the simulations of the conjoint analysis in case 6781.

The results also give insight in the diversion ratios. For example, Cehave would gain 22% of the 34% that Agrifirm lost. This corresponds to a diversion ratio of 65%. The diversion ratio to Agrifirm if Cehave raises its price is 56%. This suggests that Agrifirm and Cehave are relatively close competitors. Finally, the columns on the right show that the actual loss when both merging firms will raise their prices is relatively high.

3.5 Conjoint analysis important source of evidence to clear the merger

The results of the conjoint analysis, in particular the performed simulations, were an important source of evidence in the second phase decision that the merging firms could not profitably raise their prices by 5-10% after the merger. In consideration of this factor, combined with other indications that customers are relatively price sensitive and the fact that alternative suppliers had sufficient residual capacity, the NMa approved the merger without restrictions.

4. Other merger cases with conjoint analysis

4.1 Ziekenhuis Hilversum - Ziekenhuis Gooi-Noord (2005, case 3897)

Ziekenhuis Hilversum and Ziekenhuis Gooi-Noord are both general hospitals, providing clinical and non-clinical care, in the North of the Netherlands. In its first phase merger decision in 2005, the NMa concluded that both hospitals had a very strong position in this region. In order to assess whether hospitals in the immediate environment could exercise an adequate disciplining effect on the firms' behaviour, it was necessary to study the patients' willingness to travel for care. In the second phase, the NMa used several techniques to determine the extent to which patients would be willing to visit other hospitals than the merging firms after a certain change in the services offered.

One of these techniques was a conjoint analysis (CVA), to establish what patients' responses would be to a hypothetical deterioration in the quality of the healthcare provided. As the costs of the treatments are covered by the compulsory insurance, quality is one of the competition parameters hospitals can use to attract more patients. The hypothetical hospitals were modelled on the basis of the following five attributes.

Attribute	Attribute levels
Traveling time to the hospital	10 minutes to 120 minutes (in intervals of 5 minutes)
Amount of waiting for treatment	1 month to 18 months (in intervals of months)
Reputation of the specialist in the hospital	No reputation Good reputation
Referred to this hospital by the family doctor	Yes No
Amount of attention given to the patient	No attention Attention

Table 6: attribute list in case 3897.

The results revealed that respondents considered quality indicators such as the reputation of the specialist more important than travelling time. This was in contrast with results of a study on the revealed preferences which clearly shows that patients prefer hospitals close by. As the market for hospital care was in transition from a fully regulated sector to a market with managed competition, it was decided to put relatively more weight on the conjoint results. This resulted in relatively large geographical markets. Ultimately, the merger was unconditionally cleared.

4.2 Bloemenveiling Aalsmeer – FloraHolland (2007, case 5901)

In 2007, the two largest flower auctions in the Netherlands (and also worldwide) decided to merge. FloraHolland and Bloemenveiling Aalsmeer offer growers and buyers a marketplace on which to trade ornamental horticultural products. To facilitate these sales, the auctions also offer services, for

instance, in the areas of logistics, financial services, information and quality control. In the second phase, the NMa carried out market research to study whether sales through alternative channels were a substitute for the sale of ornamental horticultural products through the auctions. In a survey growers and buyers were asked how they would respond to a hypothetical price increase of 5%. The survey also included a conjoint analysis (CBC).

A complicating factor in this case was that flower auctions are two-sided markets: the auction is more attractive for buyers if there is more supply and the action is more attractive for suppliers if there are more buyers. In other words, the price and supply from flower growers (sellers) is dependent on the demand of buyers and vice versa. To study both sides of the two-sided market, a separate conjoint analysis was performed for each side of the market.

Attribute	Attribute levels
Sales channel	Bloemenveiling Aalsmeer FloraHolland Other Dutch auctioneers Foreign auctioneer Internet auction Direct Sales
Method of transaction (*if sold by auction*)	Clock Basic package Brokering
Transaction costs	No transaction costs 2,5% of the average price of product sold 5,0% of the average price of product sold 7,5% of the average price of product sold 10,0% of the average price of product sold
Certainty of payment (*if grower*) **Certainty of quality (*if buyer*)**	Not certain Certain
Change in average price of the product sold	-5,0%, -2,5%, 0%, +2,5% or +5,0%

Table 7: attribute list in case 5901.

Almost 2,000 growers and more than 700 buyers participated in the survey. However, the results from the conjoint analysis were not reliable due to a possible interpretation error on the part of the respondents. The share of preference of “other Dutch auctioneers” greatly exceeded the actual market share. It may not have been clear to the respondents that “other Dutch auctioneers " was not intended to include the merging firms, Bloemenveiling Aalsmeer and FloraHolland. This design error meant that the alternative “other Dutch auctioneers” was over-represented in the preference scores. Therefore, the results of the conjoint-analysis were not used in the decision-making process. Nevertheless, based on other evidence – including the what-if question - the merger was unconditionally cleared in 2007.

4.3 Nordic Capital – Handicare (2010b, case 6900)

The NMa's quantitative research in the merger between Nordic Capital (owner of Permobil) and Handicare also involved a conjoint analysis. Both Permobil and Handicare are producers of powered wheelchairs (PWCs) and active in the Netherlands, with a combined market share of 80-90%. The competitors are large multinational firms, such as US-based Invacare and Sunrise, but with very low market shares in the Netherlands. Producers of PWCs sell their products to multiple dealers. The dealers tender for contracts of Dutch municipalities to supply PWCs to their inhabitants, under the Social Support Act. The PWC dealers-market is very concentrated and the seven largest dealers have around 80% of the downstream market. A major part of the NMa's investigation focused on the possible countervailing buying power of these dealers vis-à-vis producers. An important issue was whether dealers would switch to other producers if the merging firms decided to increase prices after the merger.

The NMa conducted an online survey among the PWC dealers (39 in total) in the Netherlands. The survey included a CBC with four attributes, see Table 8.

Attribute	Attribute levels
Producer	Handicare Permobil Invacare Sunrise Small producer
Delivery time	10 days 20 days 30 days
List price of a basic model	6,200 euro 7,200 euro 8,200 euro 9,200 euro
Discount on the list price	30% 40% 50% 60%

Table 8: attribute list in case 6900.

As was the fact in the flower auction merger, the preferences shares of the main producers were very different than the actual market shares. The preference shares of Invacare and Sunrise were a lot higher. Furthermore, it turned out to be quite difficult to construct a base scenario for simulation purposes. The market for PWCs is highly differentiated – a basic model can have a lot of extra features - and producers offer tailored discounts to dealers. However, the conjoint analysis did offer insights in the relative importance of the attributes. The list price and discount were regarded as

much more important than the delivery time or specific producer. Based on other evidence, the merger was cleared with remedies in 2010.

4.4 Continental Bakeries – A.A. ter Beek (2012, case 7321)

In the assessment of the merger between bakery producers Continental Bakeries (CB) and A.A. ter Beek (AA) the NMa employed a conjoint analysis for the purpose of market delineation. CB and AA are active in the production and sale of - among others - typical bread replacement products such as rusk and breakfast cake. CB is a large producer of private label rusk, private label breakfast cake and branded breakfast cake. AA - most commonly known by its brand name *Bolletje* - is the leading rusk brand in the Netherlands, but also active in the production of branded and private label breakfast cake and rusk.

In the merger investigation, an important part of the analysis focused on (i) whether the production and sale of rusk and breakfast cake are separate product markets; and (ii) if there are separate markets for private label and branded products. A survey focused on the preferences of consumers for buying different branded and private label bread replacers included a conjoint task. The 1,042 respondents were asked to choose between six product profiles (CBC) that varied on the basis of four attributes: type of product, flavour, price and brand.

Attribute	Attribute levels
Type of bread replacement product	Rusk
	Breakfast cake
	Knäckebrod
	Light biscuit
	Rice cake
Flavour	Natural
	Wholegrain
Price	Five levels depending on the type of product
Brand	Top brand
	Low cost brand
	Private label

Table 9: attribute list in case 7321.

The results gave some insights into the preferences of consumers, but were eventually not decisive in the final decision. The choice task was formulated, based on the assumption that bread replacement products form a single relevant market. However, during the market investigation it became already clear that rusk and breakfast cake constitute separate product markets. The focus of the investigation had shifted towards the distinction between private label and brand for each of these two products. This change in focus occurred too late to be taken into account in the conjoint study.

4.5 SENS – SNS (2015, case 15.0783.24)

In the assessment of the merger between Stichting Exploitatie Nederlandse Staatsloterij (SENS) and Stichting Nationale Sporttotalisator (SNS) ACM employed a conjoint analysis for the purpose of determining consumer preferences. SENS and SNS are active in the provision of games of chance. SENS has an exclusive license for the organization of the state lottery. SNS has two exclusive licenses, one for instant lotteries and one for sports betting and bingo games.

In the merger investigation, an important part of the analysis focused on whether the different games of chances are separate product markets. A survey focused on the preferences of consumers for games of chance included a conjoint task (ACBC). The 2,000 respondents were asked to build their own ideal lot, based on all available attributes. Secondly, respondents preferences for the attribute levels were tested based on valuing variations on their ideal lot. Finally, the respondent were tasked with choosing between acceptable options.

Because of the choice to use an ACBC, the attributes and attribute levels differ between the main brands. Not all attributes were applicable to all brands and the level of the attributes also differs between brands (see Table 10).

The results of this conjoint analysis revealed significant differences between preference shares and actual market shares. Therefore, ACM was not convinced of the reliability and usefulness of the results of the conjoint. ACM did not use the results in the assessment of the merger but did remark in their decision that, nevertheless, the results points in the same direction as other data-examination techniques used by the ACM in this case.

Autoriteit
Consument & Markt

Attribute	Alternative Specific attributes		Attribute levels							
Brand			Staatsloterij (SL)	Miljoenenspel (MS)	Lotto	Postcodeloterij (PL)	Vriendenloterij (VL)	Bankgiroloterij (BL)	Eurojackpot (EJ)	Oudejaars-trekking (OJ)
Price	For SL	Price1	€ 14,50	€ 15,00	€ 15,50	€ 16,00	€ 16,50	€ 17,00		
	For Lotto & EJ	Price2	€ 1,90	€ 2,00	€ 2,10	€ 2,20	€ 2,30			
	For PL, BL & VL	Price3	€ 12,00	€ 12,50	€ 13,00	€ 13,50	€ 14,00	€ 14,50		
	For MS	Price4	€ 4,75	€ 5,00	€ 5,25	€ 5,50	€ 5,75	€ 6,00		
	For OJ	Price5	€ 29,00	€ 30,00	€ 31,00	€ 32,00	€ 33,00	€ 34,00		
Type of lottery ticket	For SL		Whole ticket	1/5 ticket						
	For OJ		Whole ticket	1/2 ticket						
	For SL, MS, Lotto & EJ		Subscription	Separate ticket						
Main Price	For SL, MS & PL	Main Price1	€ 800.000	€ 900.000	€ 1 million	€ 1,1 million	€ 1,2 million			
	For BL	Main Price2	€ 40.000	€ 45.000	€ 50.000	€ 55.000	€ 60.000			
	For OJ	Main Price3	€ 20 million	€ 25 million	€ 30 million	€ 35 million	€ 40 million			
Jackpot	For SL & Lotto	Jackpot1	€ 7,5 million	€ 10 million	€ 15 million	€ 20 million	€ 25 million	€ 30 million		
	For EJ	Jackpot2	€ 20 million	€ 30 million	€ 45 million	€ 60 million	€ 75 million	€ 90 million		
	For PL	Jackpot3	€ 40 million	€ 45 million	€ 50 million	€ 55 million	€ 60 million			
	For VL	Jackpot4	15 cars	20 cars	25 cars					
Price payout ratio	GDL	Price payout ratio1	27,5%	29%	30%	31%	32,5%			
	SL, MS & OJ	Price payout ratio2	60%	62,5%	65%	67,5%	70%	72,5%		
	Lotto & EJ	Price payout ratio3	47,5%	49%	50%	51%	52,5%			

Table 10: attribute list in case 15.0783.24

5. Lessons learned

Conducting empirical research is a constant learning experience, and applying conjoint analysis is no exception to this. In this section, we outline lessons we have learned using conjoint analysis in the above-mentioned merger cases.

5.1 Constructing a good conjoint analysis starts in the first phase investigation

The conjoint design can be complex and laborious. Therefore, it is important to think already about the conjoint design during the first phase investigation. It is crucial to understand the real-life choices of customers. In the first phase investigation the buyers' selection criteria should be identified, as well as what the decision looks like (purchase of one product at a time, or the use of several suppliers, with one or two preferred suppliers supplying most of the products, etc.). This information can also be used to specify the base scenario. All these issues will influence the design of the conjoint analysis.

5.2 Involve the merging firms in the conjoint design

The merging firms know their markets well and can help to develop a high quality conjoint design, by explaining, for example, the buyers' selection criteria and whether there are different customer segments. Preferably, their contribution should be supported with previous market studies conducted before the merger. Involving the merging firms in the design phase can also help to secure their commitment to the results of the conjoint analysis. This is particularly the case where the merging firms are unfamiliar with the technique. Involvement at the design stage can deliver a quicker acceptance of the results. They can also provide information necessary to construct the base scenario. Furthermore, the merging firms can often provide client lists, i.e. the potential respondents for the questionnaire, including preferably the name of a contact person. This makes it easier to target the right respondent and improves the response rate.

5.3 Be transparent about the choices in the design process

Several decisions have to be made during the design phase of the conjoint analysis. Maintaining an accurate record of the different choices made, contributes to the verifiability of the results. For example, competition practitioners should keep track of the different attributes considered and why certain attributes were not part of the final choice task, how the data was analysed and which econometric techniques were used to generate the results. This allows the merging firms to replicate and verify the results. This step is crucial, especially when the merging firms are not familiar with the conjoint technique.

5.4 Choose the most appropriate conjoint method

Conjoint analysis is a relatively flexible technique that can be used for different purchasing settings. The conjoint design can be adapted to the purchasing situation in practice. Most of the time, the respondent is asked to select the product profile (s)he prefers most. In these cases (A)CBC, ACA or MBC can be used. If customers do not buy only one product, but rather products in different

quantities (for instance 80% of a raw material from one supplier and 20% from another) one can use a summated score scale. The respondents do not have to select one product but, for example, have to allocate 100 points over the different alternatives.[11]

5.5 Test, test, test

As in all survey research, testing the conjoint design is of utmost importance. The test should be conducted with a sample of the actual respondents. During this phase, it becomes clear whether the respondents understand the conjoint tasks and whether the conjoint design represents a realistic buying situation.

5.6 Ask what-if questions as a fall-back option

The conjoint analysis will not always provide reliable results. Solely relying on the conjoint analysis can bear great risks since in merger cases it is often not possible to conduct a second survey. Therefore, it is important to have several what-if questions (such as, 'If Brand A was no longer available, what would you buy' or 'what would you buy if the price of Product B rose by 5%') as a fall-back option in the survey.

5.7 Strive for an equal number of levels per attribute

There is some empirical evidence that differences in the number of levels per attribute influences the importance that respondents place on the attributes (Wittink et. al, 1992). Attributes with more levels are supposed to be given more importance. Therefore, it is recommended to have an equal number of levels across all attributes in the conjoint design, whenever possible. Competition authorities may be inclined to include a lot of price levels in conjoint design in order to get a better estimation of the price elasticity. This may, however, come at a cost, as it means that respondents appear to become more price sensitive.

5.8 Conjoint analysis is applicable in various markets

Conjoint analysis can be used for various settings. In our studies so far, we have used conjoint analysis for products as well as for services, both for business-to-business, and for business-to-consumer markets. The most important criterion is that it must be possible to mimic the actual purchasing decision of the customer. The number of respondents can range from very small (22) to very large (more than 1,500). Both surveys provided reliable results.

11 Sawtooth Software provides an interactive advisor to help users in choosing the best conjoint method. See http://www.sawtoothsoftware.com/products/conjoint-choice-analysis/conjoint-analysis-software/80-products/658-interactive-advisor.

6. Conclusion

Conjoint analysis can be a useful tool for competition authorities, if used correctly. By simulating how customers might react to changes in current products (either in terms of price or other attributes), conjoint analysis allows competition authorities to analyse products profiles that vary across multiple attributes. In this way, it mimics as closely as possible the real-life choices of consumers or other buyers when purchasing products. By more accurately reflecting actual purchasing decisions, conjoint analysis can significantly add insight to more conventional hypothetical questioning.

In three of the six merger cases illustrated in this article, (parts of) the results of the conjoint analysis were used in the final decision. The lessons learned contribute to more accurate model-building. Conjoint analysis can improve the decision-making, when it is used in a properly constructed questionnaire.

7. References

ACM (2015), Case 15.0783.24/SENS – SNS, 7 December 2015.

Baker, J.B., & D.L. Rubinfeld (1999). Empirical Methods in Antitrust Litigation: Review and Critique, *American Law and Economics Review*, 1(1), p. 386-435.

Bishop, S., & M. Walker (2010). *The Economics of EC Competition Law: Concepts, Application and Measurement* (3rd Edition ed.), Sweet & Maxwell.

Choi, S.C., & W.S. Desarbo (1993), Game theoretic derivations of competitive strategies in conjoint analysis, *Marketing Letters*, 4(4), p. 337-348.

Choi, S.C., & Desarbo, W.S. (1994), A conjoint-based product designing procedure incorporating price competition, *Journal of Innovation Management*, 11, p. 451-459.

Dubow, B. (2003), Understanding consumers: the value of stated preferences in antitrust proceedings, *European Competition Law Review*, 24(3), p. 141-147.

Farrell, J. & Shapiro, C. (2010). Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition, *The B.E. Journal of Theoretical Economics*, 10(1), p. 1-41.

Green, P.E., & Srinivasan, V. (1978), Conjoint Analysis in Consumer Research: Issues and Outlook, *Journal of Consumer Research*, 103.

Green, P.E., Krieger, A.M. & Wind, Y. (2001). Thirty Years of Conjoint Analysis: Reflections and Prospects, *Marketing Research and Modeling: Progress and Prospects*, Volume 14 of the series International Series in Quantitative Marketing, p. 117-139

Hartmann, A. & Sattler, H. (2002). Commercial use of conjoint analysis in Germany, Austria and Switzerland, *Research papers on marketing and retailing*, University of Hamburg.

Hildebrand, D. (2006), Using conjoint-analysis for market definition: Application of modern market research tools to implement the hypothetical monopolist test, *World Competition*, 29(2), p. 315-336.

Hurley, S. (2011), The Use of Surveys in Merger and Competition Analysis, *Journal of Competition Law & Economics*, 7(1), p. 45-68.

Katz, M. & Shapiro, C. (2003), Critical loss: Let's tell the whole story, *Antitrust*, 17, p. 49-56.

Miller, K.M., R. Hofstetter, H. Krohmer & Z.J. Zhang (2011), How should consumers' willingness to pay be measured? An empirical comparison of state-of-the-art approaches, *Journal of Marketing Research*, 48, p. 172-184.

NMa (2005), Case 3897/Ziekenhuis Hilversum - Ziekenhuis Gooi-Noord, 8 June 2005.

NMa (2007), Case 5901/Bloemenveiling Aalsmeer – FloraHolland, 21 August 2007.

NMa (2010a), Case 6781/Agrifirm – Cehave, 6 May 2010.

NMa (2010b), Case 6900/Nordic Capital – Handicare, 10 December 2010.

NMa (2012), Case 7321/Continental Bakeries – A.A. ter Beek, 14 December 2012.

McFadden, D. (2001), Economic Choices, *The American Economic Review*, 373, Nobel Lecture.

Orme, B.K. (2005), *Getting Started with Conjoint Analysis* (2nd Edition), Research Publishers, p. 26.

Orme, B.K. (2009), Which Conjoint Method Should I Use?, *Sawtooth Software research paper series*.

Rubinfeld, D.L. (2008), Quantitative Methods in Antitrust, in *Issues in Competition Law and Policy* 723 (ABA Section of Antitrust Law 2008).

Sawtooth Software (1996), Understanding Conjoint Analysis in 15 Minutes, *Sawtooth Software research paper series.*

Sawtooth Software (2009), The CBC/HB system for hierarchical Bayes estimation version 5.0 technical paper, Sequim, USA.

Teichert, T. & E. Shehu (2010), Investigating research streams of conjoint analysis: A bibliometric study, *BuR Business Research*, 3 (1), 49-68.

Wittink, D., J. Huber, P. Zandan & R.M. Johnson (1992), The number of levels effect in conjoint: Where does it come from an can it be eliminated?, *Sawtooth Software research paper series*.