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Effect of Price-Discount Distribution in Multi-Unit Price Promotions on Consumers' Willingness to Pay, Sales Value, and Retailers' Revenue: Evidence from Multi-Unit Auctions

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Abstract:

Using multi-unit auctions, we examined the effect of different distributions of price discount across multiple units of a relatively new product on consumers' Willingness to Pay (WTP), sales value and retailers' revenue. We found that allowing the price discount to be increasing in the number of units increases willingness to pay, sales value and retailers' revenue and that a price discount that is uniformly distributed across units also has the potential to motivate consumers to buy more units of the product. However, multi-unit price promotions that concentrate all the amount of price discount on the last unit only generate a weak positive effect on sales value.

Keywords: Multi-unit price promotions, multi-unit auctions, price discount distributions, organic milk.

JEL classification: C910, D120, M310

1. Background

Developing new products is said to be the lifeblood of companies. Due to changing consumer needs and increasing competition, companies that want to enhance their market position and grow must develop new products to improve their competitive posture or even survive. New product development often requires a lot of resources in terms of research and invested capital. Unfortunately, the success rate of new products in the market is generally low. For example, Stevens and Burley (2003) reported that the failure rate of new products is somewhere between 40% and 75%. Cooper (2001) mentioned that approximately 46% of all resources allocated to product development and commercialization by U.S. firms had been spent on products that were cancelled or failed to yield an adequate financial return. Given the high costs associated with new product development, it is imperative for firms to find ways to market their new products better to minimize the probability of failure. Numerous studies have been conducted to determine the causes of new product failure and success. A common finding is that a good product idea and quality cannot by themselves guarantee the success and many other factors such as sales promotions have to be considered (Montoya-Weiss & Calantone, 1994; Calantone *et al*., 1996). In this paper, we tackle the issue of price or sales promotions as a tool that can be used to increase sales for new products.

Sales promotions are defined as a set of activities and techniques, mostly short term, designed to attract attention to a particular product and to increase its sales (Kotler, 2000). Sales promotions have become a fundamental strategy typically employed as part of a marketing mix. Consequently, they have become a significant part of promotional budgets over the years. For example, sales promotions have been

estimated to represent 74% of the marketing budgets of US packaged goods manufacturers (Cox Direct, 1998).

There is a large body of literature on sales promotions that includes contributions that dates back from the 1970s. This body of literature is mainly composed of two broad streams of research. The first stream of research is concerned with developing and reviewing the theoretical perspectives that can help explain consumer responses to promotions. For instance, theoretical perspectives such as adaptation level theory (see Monroe, 1973, Lattin and Bucklin, 1989; Kalwani and Yim, 1992), assimilation contrast theory (see Blair and Landon, 1979; Berkowitz and Walton, 1980; Urbany *et al*., 1988; Bearden *et al*., 1984), attribution theory (see Mizerski *et al*., 1979; Neslin and Shoemaker, 1989), prospect theory (see Tversky and Kahneman, 1992; Diamond and Sanyal, 1990) and transaction utility theory (see Thaler, 1985; Grewal and Monroe, 1998; Lichtenstein *et al*., 1990) have been proposed to explain how promotions influence consumers' preferences and behavior.

The second stream of research is concerned with the empirical assessment of the effects of price promotion on sales (Guadagni & Little, 1983; Blattberg & Neslin, 1990; Narasimhan *et al*., 1996; Manning & Sprott, 2007 etc.). A number of these papers have focused on studying the ways in which sales promotions affect sales such as brand switching (Dodson *et al*., 1978; Gupta, 1988; Blattberg & Neslin, 1990), stockpiling and purchase acceleration (Wilson *et al*., 1979; Neslin *et al*., 1985; Bucklin and Gupta, 1992; Bucklin *et al*., 1998), bundling (Stremersch & Tellis, 2002; Foubert & Gijsbrechts, 2007) and consumption or quantity increase (Folkes *et al*., 1993; Ailawadi & Neslin, 1998; Bell *et al*., 1999; Nijs *et al*., 2001). Some papers focused on the

decomposition of the total effect of promotions. For example, Gupta (1988) found that more than 84% of the total sales increase is due to brand switching, 14% due to purchase acceleration and 2% is due to quantity increase. Bell *et al.* (1999) extended the work of Gupta (1988) by studying 13 product categories and found that sales increases due to brand switching, purchase acceleration, and quantity increase are about 75%, 11%, and 14%, respectively.

Although there is a large number of studies that have evaluated the effect of brand promotions, store promotion, and coupons, very few studies have examined the effect of multi-unit price promotions which involve selling more than one product for one price (e.g., "buy 5 units for $5, you save $2" etc.) on sales[1]. Nowadays, multi-unit price promotions can be beneficial to marketers for two major reasons. First, for retailers and manufacturers, it might be preferable to guarantee sales today than probabilistic future sales. An increase in the quantity of units sold on any shopping trip generates more revenue and also provides the customer a lower likelihood of running out of stock and consequently a lower likelihood of purchasing a competing product (Wansink *et al*., 1998). Second, due to increasing time constraints, many consumers are becoming increasingly concerned about optimizing shopping efficiency by purchasing multiple units of products to save several trips to the store.

To our knowledge, compared to the multitude of studies done on single-unit price promotions (e.g., buy one unit for $1, save $0.20), only few empirical works have been carried out to study the effect of multi-unit price promotions (e.g. "buy 5 units for $5, you save $2) on sales. Blattberg & Neslin (1990) found that the sales of seven brands were

[1] However, some studies have been carried out to assess the pricing of different package sizes. For example, Soman et al. (2001) examined how price bundling affects the decision to consume.

significantly higher using multi-unit price promotions than using single-unit price promotions. Across a grocery chain of 86 stores, Wansink *et al.* (1998) carried out a field experiment to study the effect of multi-unit price promotions on sales of thirteen products. They found that for nine products, multi-unit price promotions generated a 32% increase in sales volume compared to single-unit price promotions. However, they mentioned that the increase is in part due to the confusion of some consumers who believed that they need to buy multiple units to benefit from the promotion. Manning & Sprott (2007) mitigated this problem by informing participants in a hypothetical experiment that the price discount per unit is the same in both multi-unit price promotions and single-unit price promotions (i.e., "$1 for each unit" vs. "8 units for $8"). They found that multi-unit price promotions led to higher sales volume despite informing subjects about the absence of a difference in the amount of price discounts between multi-unit price promotions and single-unit price promotions. They also found that increasing the quantity specified in multi-unit price promotions (i.e., "2 units for $2" vs. "8 units for $8") has a positive effect on sales volume. Manning & Sprott (2007) explained the positive effect of multi-unit price promotions with the so called "anchoring effect". Specifically, multi-unit price promotions can stimulate consumers to think about the possibilities of using and stocking a quantity of the product higher than they usually would use and stock. These thoughts can then lead, in many cases, to purchases of higher quantities.

We attempt to contribute to the literature on multi-unit price promotions by examining the effect of the *distribution* of the amount of price discounts on sales value and change in retailers' revenue. The main objective of multi-unit price promotions is to

induce consumers to purchase more units of the product. This objective is accomplished by offering price discounts on purchases involving more than one unit (Blattberg & Neslin, 1990). Past studies have examined the effect of an increase in the amount specified in multi-unit price promotions on sales volume. The amount of discount examined in these studies is generally set equal in single and multi-unit price promotions but the form of presentation is different (e.g., for single-unit price discount "1unit for $1, Save $0.25/unit"; for multi-unit price promotions "4 units for $4, Save $1"). Since the amount of price discount per unit is the same, a rational consumer should be indifferent between the two types of promotion. However, retailers generally just mention the multi-unit price promotion, making the consumer think that s/he has to purchase all the units to benefit from the discount (Wansink *et al*. 1998). Indeed, Manning & Sprott (2007) (study1) found that 35.6% of people were confused about this issue.

In contrast to previous studies on multi-unit price promotions, we decided to keep the number of units constant but vary the distribution across units of the amount of price discount to identify the price-discount distribution that yields the highest increase in sales and retailers' revenues. Specifically, we compared the effect of three types of price-discount distribution: (1) the quantity of price discount is distributed equally among units (i.e. "single-unit price promotions"); (2) the quantity of price discount is concentrated on the last purchased unit (i.e. like in the price promotion "buy n units and pay only for (n-1) units"); and (3) the amount of price discount is increasing in the number of units (i.e. the price discount on the second purchased unit is higher than price discount on the first unit and so on).

2. Hypothesis

As mentioned above, offering buyers a discount equally distributed among various units has been found to positively affect retailers' sales (Manning & Sprott, 2007). The positive effect of single-unit price promotion is partly attributed to its advantage of offering buyers a discount on every acquired unit (i.e. buyers of any number of units can benefit from the single-unit price promotion). Therefore, we are expecting to see a positive effect of single-unit price promotion on consumers' WTP and sales of food products.

Hypothesis 1*: offering buyers a discount equally distributed among units (i.e. single-unit price promotion) can increase consumers' WTP and sales of food products.*

The second type of price-discount distribution is currently used by retailers offering buyers to purchase N units of the same product and to just pay the price of N-1 units (i.e. get the last unit for free). For example, the promotion technique of "buy-one-get-one-free" has been found to persuade consumers to increase their purchases and benefit retailers by increasing their sales and speeding up the stock clearance (Sinha and Smith, 2000; Li *et al*., 2007). In our case, the "buy N units and pay the price of N-1 units" discount can motivate, especially, the buyers of, e.g., (n-1)/(n-2)/(n-3) units to buy n units and get the last one for free[2]. As a result we expect that offering consumers the last acquired unit for free can increase their WTP as well as retailers' sales.

[2] However, it is important to mention that the quantity of discount specified in the promotion can significantly influence the effect of the price discount. For example, the "buy 6 and pay for 5" discount allows a buyer of six units to save one sixth of the price he/she has to pay for the six units in the absence of promotion. Nonetheless, if the discount is "buy 2 and pay for 1", a buyer of six units can save 50% of the price he/she has to pay for the six units (i.e. same as buy 6 and pay for 3). Although it would be interesting to assess the effect of varying the quantity of discount (e.g. "buy 6 pay for 5" vs. "buy 6 pay for 4" vs. "buy 6 pay for 3" etc.), this is beyond the scope of our study and consequently, we opted to only use the "buy 6 pay for 5" promotion where all the discount is applied to the last unit.

Hypothesis 2*: offering buyers of N units to pay the price of N-1 units can increase consumers' WTP and sales of food products.*

While multi-unit price promotions that use an increasing amount of price discount is not currently used in retail stores, this type of price promotion is consistent with consumer demand theory for any normal good. For instance, it is well known, theoretically and empirically, that consumer WTP for a normal good is decreasing in quantity (i.e., the price decreases when the quantity increases; hence, a consumer is willing to pay more for the n^{th} unit than for the $(n+1)^{th}$ unit). Therefore, a retail price that does not increase with the quantity is likely to not do much to change real consumer preferences. To provide an incentive for consumers to purchase more units, we propose in this paper a multi-unit price promotion strategy that provides consumers an increasing price discount on each additional purchased unit. The price discount is lowest on the first unit and reaches the maximum on the last unit. Consequently, we expect that - buyers will be attracted by the increasing benefit they can get from purchasing additional units of the product.

Hypothesis 3*: offering buyers an increasing price discount on each additional purchased unit can increase consumers' WTP and sales of food products.*

To assess the effect of the distribution of the amount of price discounts, we used a relatively new value elicitation method, the so called multi-unit auctions. In the next section, we describe how a multi-unit auction works. Specifically, we first explain why we used a non-hypothetical experiment rather than real market data (e.g., scanner data). We then discuss why the use of multi-unit auction is more appropriate in our study than single-unit auction. In the third section, we present our experimental design.

We then discuss the results in the fourth section and then draw some concluding remarks in the last section of the paper.

3. Multi-unit auction

Among the three studies done on multi-unit price promotions, Blattberg & Neslin (1990) and Wansink *et al.* (1998) carried out field experiments using scanner data from stores to assess the effect of multi-unit price promotions on sales volume. Scanner data constitutes a very useful data source due to its prominent advantages. They are characterized by a high number of observations and the accuracy of collected values (prices, sales etc.) that can lead users to obtain good estimations and reliable results. However, access to scanner data is not easy, not to mention the generally prohibitive cost of its acquisition. In addition, scanner data sets may not always include information about customers' socio-economic and demographic characteristics. They are also not useful when examining new products that are being developed or are not in the market yet. Due to these disadvantages, a number of researchers have used hypothetical and non-hypothetical experiments rather than scanner data, to evaluate promotion effects. For example, in contrast to Blattberg & Neslin (1990) and Wansink *et al.* (1998), Manning & Sprott (2007) carried out hypothetical experiments to study the effect of multi-unit price promotions. In hypothetical experiments, however, participants tend to overestimate their values since they have no incentive to behave truthfully (Lusk & Shogren, 2007).

Due to the skepticism surrounding the validity of values obtained from hypothetical experiments, economists and marketing researchers have turned to experimental approaches that involve the exchange of real goods and real money

(Hoffman *et al*., 1993; Fox *et al*., 2002; Dickinson & Bailey, 2002; Shaw *et al*., 2006; Kassardjian *et al*., 2005; Rousu *et al*., 2005; Alfnes, 2007; Akaichi *et al*., 2012 etc.). Among these experimental methods, perhaps none has been more popular than experimental auctions that provide people the incentive to submit bids equal to their value for the good. In these auctions, the participant may incur real costs if he or she deviates from their true values (Lusk & Hudson, 2004). The use of experimental auction in marketing and agricultural economics, however, has mostly been limited to single-unit auctions (e.g. second price auction (Vickrey), random nth price auction, BDM auction (Becker *et al.* (1964) etc.). In single-unit auctions, participants are generally asked to report their willingness to pay (WTP) only for a single unit of the auctioned product. To assess the effect of multi-unit price promotions, however, consumers' WTP for multiple units of the same product is required. Hence, our paper stands out by being the first that uses non-hypothetical multi-unit auctions to assess the effect of multi-unit price promotions on consumers' willingness to pay and sales value for a food product. Unlike single-unit auctions, multi-unit auctions allow participants to bid on *multiple units* of the same product. Multi-unit auctions require that a participant who is declared a winner pays the clearing price and purchases the quantity s/he revealed to be willing to buy. Therefore, in contrast to the methods used up to now to study the effect of multi-unit price promotions, multi-unit auctions allow us to assess the effect of multi-unit price promotions on sales volue and valuation of new food products that are being developed or are not in the market yet (or have not been in the market that long yet).

In our experiment, we used an incentive compatible multi-unit auction mechanism, the so called multi-unit Vickrey auction. Multi-unit Vickrey auction is a generalization of

the second price auction. Each participant is asked to bid on multiple units of the same product and the winner pays an amount corresponding to the sum of the bids (excluding his or her own bids) that are displaced by his or her successful bids (Krishna 2010). For a better understanding of the auction mechanism, consider three bidders and three identical units of the same product to be auctioned. Each bidder reports a bid of three values (i.e. one value for each unit). Let's say that bidder 1's bid is (14, 9, 3), bidder 2's bid is (12, 7, 2) and bidder 3 bids (10, 5, 0). If we rank the nine values, we obtain (14, 12, 10, 9, 7, 5, 3, 2, 0). The pricing rule dictates that the owner(s) of the three highest bids is (are) declared the winner(s). In this particular example, the owners of the bids 14, 12 and 10 (i.e. bidder 3, bidder 1 and bidder 2) are the winners.

The price that each winner has to pay (i.e. clearing price) is determined as follows. First, the common set of rejected values (i.e. the values that do not make their owners winners of the auctioned product) is determined. In our example the common set of rejected values is {9, 7, 5, 3, 2, 0}. Second, for each winner an individual set of rejected values, consisting of the common set of rejected values without the winner's own values, is determined. In our particular example, the individual set of rejected values for bidder 1, bidder 2 and bidder 3 are {7, 5, 2, 0}, {9, 5, 3, 0} and {9, 7, 3, 2}, respectively. Third, if the winner wins one unit, he/she pays a price equal to the first highest value in his/her individual set of rejected values. If the winner wins two units, he/she pays a price equal to the sum of the first and the second highest value in his/her individual set of rejected values and so on. In our particular example, bidder 1, bidder 2 and bidder 3 each pays a price equal to 7, 9 and 9, respectively.

In multi-unit auction, a participant can win more than one unit. For example, suppose that bidder 3 provided a bid equal to (15, 13, 8) so the ranking of values is now (15, 14, 13, 12, 9, 8, 7, 3, 2). Hence, bidder 1 wins one unit, bidder 2 does not win any unit and bidder 3 wins two units. The individual set of rejected values for bidder 1 and bidder 3 are {12, 8, 7, 2} and {12, 9, 7, 3, 2}, respectively. So, bidder 1 pays 12 and bidder 3 pays 12 for the first unit and 9 for the second unit. Since the price that the winner has to pay is not based on the winner's bid but on the bids of the other participants, bidding truthfully is a dominant strategy in the multi-unit Vickrey auction (Engelbrecht-Wiggans & Kahn, 1998).

In our study, we auctioned six units of a new product in two rounds. In the first round participants report their WTP for each auctioned unit. We then provided the participants the price-promotion information and then asked them to again reveal their WTP for each of the six units. From the participants' WTP before and after price discount promotion, we determine the quantity that can be sold, the value of sales before and after promotion, and retailers' revenue from offering the corresponding discount. Using statistical and econometrics tools, we then assess if the price discounts increase or decrease WTP, sales value and retailers' revenue and determine which of the price discount strategies yields the highest positive effect. Detailed information about the multi-unit experimental auction used in our study is presented in the experimental design section.

4. Experimental design

We conducted our experiment in Barcelona (Spain). Before going through the experimental design, it is important to describe the product we used in our experiment especially in terms of packaging and its novelty. Since the implementation of the multi-unit experimental auction requires the number of auctioned units to be fixed beforehand, we used a six-pack product (i.e. a package of six identical units of organic milk) for at least two reasons. First, we surveyed 80 consumers of milk and we asked them about the quantity of milk they are used to purchasing every week. We found that 56% of the surveyed subjects mentioned to buy a pack of six units of milk (each unit is equivalent to one liter). We also asked participants in our experiment the same question. The results showed that 66% of the participants buy a pack of six units of milk every week. Second, "six-pack" is the packaging form popularly used in Spain for products such as soda, juice, water, beer, and milk, which are products that consumers are used to buying in multiple units in the same shopping trip. While a "six-pack" consists of 6 identical units of the same product together in a bundle, *consumers in retail stores are not forced to buy the entire bundle – that is they can purchase less than 6 units by just opening the package and take the number of units they want to buy*. This handling flexibility makes the product available to all consumer types (regular and occasional buyers)[3] and also enables retailers and manufacturers to perform different types of multi-unit price promotions for the products.

In our experiment we used a six-pack of organic milk. Each unit contains one liter of organic milk. Organic milk is a relatively new product in Spain. The novelty of the product and hence the absence of promotions make the use of scanner data to examine

[3] Otherwise, only consumers who need to buy the entire bundle will be able to purchase the product and, as a result, sellers can incur losses by ignoring buyers of few units.

the effect of multi-unit price promotions infeasible. Finally, it is important to note that Spanish milk is Ultra Pasteurized (using UHT method) which extends its shelf life and allows the milk to be stored unrefrigerated because of the longer lasting sterilization effect. Hence, milk buyers have the flexibility to store the products. Since we are interested in studying the effect of price promotions on consumer behavior for new food products, the novelty of the product was the fundamental criterion we used in selecting the product(s) that will be used in the experiment. Milk, water, beer, soda, and juice are products that are typically offered in six-pack bundles in Barcelona's retail stores. Among the many attributes that are generally used to differentiate new products from their conventional counterparts, the organic attribute is currently one of the most prominent that is being used by food producers. Since milk is a unique six-pack product that can be sold in both conventional and organic forms, we chose organic milk as the new product to use in our experiment.

In our experiment, we recruited a random sample of consumers in Barcelona metropolitan area. 120 subjects were randomly drawn from a list of people who are consumers of milk and responsible for food shopping in their household. These subjects were then randomly assigned to four treatments. Sessions were conducted in groups of 10 subjects so each treatment consisted of three sessions. In the first treatment[4], subjects were offered a single-unit price promotion that consists of a discount of 0.20€ on each purchased unit. In the second treatment, participants were told that if they buy six units of organic milk, they will only pay for five units. The participants in the third

[4] In each treatment, participants received the information on price discounts in the second round of the auction. In all treatments, we also informed participants that the amount of the corresponding discount will be deducted from the price that the winner (s) has (have) to pay. We did not provide the participants any information on the characteristics of organic milk.

treatment were offered a promotion consisting of an increasing price discount that starts from 0.06€ on the first unit to a maximum of 0.34€ discount on the sixth unit (i.e., 0.06€ on the first unit, 0.12€ on the second unit, 0.17€ on the third unit, 0.23€ on the fourth unit, 0.28€ on the fifth unit and 0.34€ on the sixth unit). For robustness check, we provided the subjects of the fourth treatment the three types of price promotion at the same time. Since our objective in this paper is to examine the effect of different distributions of price discount and not the amount of price discount, we kept the total amount of price discounts across the units in the three types of price promotions constant. The experiment was performed in a room equipped with computers. We used the z-tree software (Fischbacher, 2007) to collect bids and to determine the winner and the clearing price.

The experiment was performed in four steps. In step 1, each subject sat in a table separated from the rest to minimize any possible interactions and allow anonymous bidding. After taking a seat, each subject was provided an identification number, 15€ as a compensation for his/her participation and a questionnaire on various aspects related to organic products, in general, and organic milk, in particular. To avoid brand effects, we covered all the milk items with white paper. We then asked participants to complete the questionnaire.

In step 2, once the questionnaire was completed, the actual experiment began. One of the main determinants of success in experimental auctions is a good understanding by the participants of the functioning and the incentive compatibility of the auction mechanism. To achieve this goal, we gave each participant a printed material that included a detailed explanation of how the auction works and some

examples to illustrate the auction. After reading and discussing the instructions, participants were given an oral explanation supported by some examples on the board. During the explanation, participants were totally free to ask questions to dissipate any doubts about the process. Given the importance of this step, we informed participants that it is very important that they fully understand the auction mechanism. We also demonstrated to them how they can lose money if they deviate from their true valuations. We moved to the next step only after being sure that all participants fully understood how the auction mechanism worked. Before conducting the actual auction, we also carried out a training session, auctioning six identical items of organic milk but informed participants that no actual economic exchange will take place at the end of the training session. In this session, we asked participants to bid the amount they are willing to pay for each unit of organic milk[5]. Once all participants reported their bids through the computer, the identification number of winner(s) and the price he/she (they) has (have) to pay (i.e. clearing price) was determined. Subjects were again encouraged to ask questions after the training session to make sure that they understand the auction mechanism and procedures.

In step 3, once the participants became familiar with the procedure, we announced the start of the real auction of organic milk. We informed them that two rounds of auction will be performed and that one of these will be chosen as the binding round after the auctions. The winner(s) in the binding round will be appointed as the winner(s) of the auction. The products will be given to the winner(s) who will then have to pay the

[5] Similar to the real market, we informed participants that they are not forced to buy the six units of organic milk. For example, if someone wants to buy just two units, s/he should bid positive bids for the first and the second unit and zero for the rest of the units.

corresponding market-clearing price. In each round, the subjects had to submit, again through the computer, how much he or she was willing to pay for each of the six units of organic milk. Once all participants finished reporting their bids, the software determined whether the participant was the winner or not and the price that he/she had to pay for each unit won[6].

In step 4, we provided the participants information about the price promotion after the first round. Those in treatment 1 were offered the single unit price promotion; those in treatment 2 were offered the "buy six and pay for five" promotion; and subjects in treatment 3 were offered the increasing price-discount promotion. Subjects in treatment 4 were simultaneously offered the three price promotions. We then asked participants to again report their willingness to pay for each of the six units of organic milk. Since participants in the fourth treatment were simultaneously offered three types of price promotion that were ordered randomly for each subject, they have to report three values for each unit (i.e. one under the single-unit price promotion, one under the "buy six and pay for five" promotion and another value taking into account the increasing price-discount promotion).

As explained to the subjects in step 3, at the end of the auction, one round was chosen randomly to determine the binding round. The winner(s) in the binding round was (were) appointed as the winner(s) of the auction. Once the results were announced, the experiment ended by handing the product to the winner(s) who had to pay the corresponding market-clearing price. If the binding round is the second one, the corresponding discount is applied and the winner pays a price decreased by the amount

[6] However, the clearing price was not revealed to participants to avoid any affiliation effect (Corrigan & Rousu, 2006) and for clean assessment of price promotion effect.

of the discount. For example, in the case of single unit price promotion, the price for each unit won is discounted by 0.20€. In the “buy 6 pay for 5” treatment, winner of six units pays the corresponding price for the first five units and gets the sixth one for free. In the increasing price-discount promotion treatment, the winner of three units, for example, pays for the first, the second and the third unit at a price discounted by 0.06€, 0.12€ and 0.17€, respectively. As previously mentioned, in the fourth treatment we obtained values for each type of price promotion. For each type of price promotion, the winner(s) and the clearing price are determined. If the second round is chosen as the binding round, the auctioneer chooses randomly one of the three types of price promotion as the binding price discount and the corresponding discount is applied to the price that winner(s) has (have) to pay.

5. Results

Although there is theoretical and empirical evidence on the need for price discounts and promotions for products generally sold in multiple quantities (Blattberg & Neslin, 1990; Wansink *et al*., 1998; and Manning & Sprott, 2007), many retailers continue to offer a majority of these types of products without any discounts (i.e. the price is independent of the quantity bought). Manning & Sprott (2007) went through the data of the top twenty grocery firms in terms of US market share and found that 27% of the products are promoted using multi-unit price promotions with price discount. They also reported that in addition to single unit-price promotions, the most common way to promote products sold in multiple units is to offer two units of the same product for a single price. Although these two price promotion approaches have been shown to have a significant effect on sales value, another approach is to use price promotions that

might adjust better to consumer preferences. Both single unit-price promotions and multi-unit price promotions studied by Manning and Sprott (2007); Blattberg & Neslin (1990) and Wansink *et al*. (1998) offer the same price discount per unit. However, the decreasing shape of demand curve suggests that a consumer is more interested in buying the first unit than the last ones. Therefore, to increase his/her interest on the last units, it may be appropriate to apply more price discount on these last units than on the first ones. In this paper we examine the effect of three price promotion approaches that share the same total amount of price discount but differ in terms of the distribution of these discounts across units.

We assessed the effect of price-discount distribution on participants' WTP, sales value and retailers' revenues. To examine the effect on participants' WTP, we estimated a random effect Tobit model. The effect of the different types of price discount is assessed by including three dummy variables. Each dummy variable takes the value 1 if the corresponding price promotion is offered to participants; and 0 otherwise[7]. As in previous studies, we also evaluate the effect of price-promotions on sales value. Unlike previous studies, however, we calculated the value of sales from participants' WTP. We first estimated the average market price of organic milk and ended up with a price of 1.16 € for a single unit[8]. If subject's WTP for a unit is higher than 1.16€, we then considered it as a sold unit. Otherwise, the sales value is equal to zero. For example, suppose that a participant reported the following WTP: 1.90€ for the first unit, 1.63€ for

[7] Since participants received price promotion only in the second round, all the dummy variables take 0 for all the observations corresponding to the first round.

[8] There was an attempt by a supermarket of high quality foods in Barcelona to introduce its own brand of organic milk with a market price of 1.04€/unit. Also the manufacturer who provided the organic milk used in our experiment had the intention to sell his product at a price of 1.28€/unit. Since the auctioned units of organic milk used in our experiment were covered (therefore, consumer cannot determine if the product is a retailer or private brand), we estimated the market price as the average of the prices of the two mentioned brands (i.e. 1.16 = (1.04+1.28)/2).

the second unit, 1.20€ for the third unit and 0€ for the fourth, fifth and the sixth unit. Hence, considering the estimated market price, this participant can buy 3 units at 1.16€ each since his/her WTP for the first three units is higher than 1.16€. In this case the sales value is then equal to 3.48€ (i.e. 1.16€ x 3). To test the statistical significance of the effect of price-promotions on sales value, we used a paired t-test.

A positive effect of price-discount promotion on participants' WTP and sales value does not always imply that the effect benefits retailers. For example, a participant may increase his/her WTP by an amount at most equal to the quantity of price discount. As a result, sales value increases but the change in retailers' revenue (i.e. the difference between the sales value before the promotion and the sales value after the promotion decreased equivalent to the amount of the price-discount) will be equal to zero or negative. Hence, retailers can benefit from a particular promotion if the sales value after the promotion surpasses the sales value before the promotion plus the promotion cost.

To determine retailers' revenue, we first calculated sales value before and after promotion using the 1.16€ as the estimated market price. We then subtracted the amount of the price discount from the sales value after promotion. Retailers' revenue is determined by the difference between sales value after the promotion, decreased by the price-discount amount, and the sales value before the promotion. Retailers' revenue is then calculated for each participant. For robustness check, we also calculated retailers' revenue using the estimated market prices of 1.04€ and 1.28€. To illustrate, here is an example of how retailers' revenue is calculated in the treatment where participants received the single-unit price promotion. We have seen in the previous numeric

example that if a participant reported 1.90€ for the first unit, 1.63€ for the second unit, 1.20€ for the third unit and 0€ for the fourth, fifth and the sixth unit, he/she can buy 3 units at 1.16€ each. The sales value from selling three units to this particular participant is 3.48€ (i.e. 1.16€ x 3). Suppose that this participant reported the following values after receiving the single-unit price promotion: 2.00€ for the first unit, 1.85€ for the second unit, 1.50€ for the third unit, 1.18€ for the fourth unit and 0€ for the fifth and the sixth unit. Therefore, he/she can buy 4 units at 0.96€ (i.e. 1.16€ - 0.20€) each and the sales value after promotion is 3.84€ (i.e. 0.96€ x 4). In this particular example, retailers' revenue is 0.36€ (i.e. 0.36 = 3.84 - 3.48). After deriving the retailers' revenue from each participant's WTP, we then test the statistical significance of the revenue values using the paired t-test.

Before examining the effect of the distribution of price discounts in multi-unit price promotions on WTP, sales value and retailers' revenue, we use the data obtained from our multi-unit auction experiment to show the need to apply price discounts on products generally sold in multiple units. Figure 1 exhibits the mean of participants' WTP for each of the six auctioned units of organic milk. As expected, we found that subjects' WTP is decreasing in the number of units ranging from 1.29€ for the first unit to 0.66€ for the sixth unit. However, in real market, the price of the majority of food products sold in multiple units is independent of the quantity purchased (e.g. a buyer of three units of milk pays the same price for the first, the second and the third unit). Our finding shows that it is in the benefit of retailers and manufacturers to apply price discounts on products that consumers are used to buying in multiple units. As mentioned in the introduction, a large number of studies have shown that retailers and manufacturers can

lose the opportunity to garner more sales if they fail to adjust their prices to consumer preferences by making them independent of the purchased quantity.

After showing the importance of price discount as a possible tool for retailers and manufacturers to adjust their product prices to consumer preferences, we dedicate the following section to the assessment of the effect of different price promotions, which differ in terms of price discount distribution, first on participants' WTP, second on sales value of the product and third on change in retailers' revenue. In the three exercises, between-subjects (i.e., treatments 1, 2, 3) and within-subjects (i.e., treatment 4) analyses are performed[9]. To examine the sensitivity of participants' WTP to the price discount distributions and to take into account the panel nature of our data, we estimated a random effects Tobit model for each one of the six auctioned units.

Formally, the random effect Tobit model is expressed as follows:

$$y_{irj} = \begin{cases} y^*_{irj} & si \quad y^*_{irj} > 0 \\ 0 & si \quad y^*_{irj} \leq 0 \end{cases}$$

$$y^*_{irj} = x_{irj}\beta_j + u_{ij} + \varepsilon_{irj} \qquad \forall i = 1,...N;\ r = 1,2;\ and\ j = 1,...,6$$

where: *j* indexes the six units auctioned in the experiment (that is, this equation is estimated six separate times, once for each of the unit of organic milk under analysis); *i* indexes cross-section units such that *i* = 1, 2, . . . , N (N is the number of participants); and *r* indexes the number of rounds (time series units) such that *r* = 1, 2. The matrix X_{irj} is of dimension (2N x K) and contains data on the observable explanatory variables of

[9] In treatment 1, the price promotion is single-unit price promotion. In treatment 2, the price promotion is "buy six and pay five". In treatment 3, the price promotion consists in an increasing price discount. Participants in treatment 4 received the three types of price promotion

the model for the six auctioned units *j*. Y_{irj} is the amount consumer *i* is willing to pay for a unit *j* of organic milk. $\beta_j = \left(\beta_{j,1}...\beta_{j,k_j}\right)' \in R^{k_j}$ are vectors of parameters to estimate. The effects of relevant unobservable variables and time-invariant factors are captured by the vector u_{ij}. The stochastic disturbances of the model for the six auctioned units are captured by the vector ε_{irj}.

The dependent variables are BID_j, where j = 1 to 6 indexes the WTP for the jth auctioned unit. Table 1 exhibits the independent variables we used in our models and the summary statistics. Since inventory effects can be an important issue that could potentially influence WTP, we asked our subjects questions related to the number of units (similar unit we used in our experiment) of milk they normally buy every week (QUANTITY), frequency of buying organic foods (FREQ_OF), and size of their household (HOUSEHOLD). These questions tend to provide less measurement errors than questions that directly ask people the amount of inventory they have at home (Raphael, 1987; Coughlin, 1990; Koriat, 1993). In addition to these variables, we also include a number of demographic factors as control variables in the models.

Results reported in Table 2 show the effect (between-subjects) of the three approaches of price promotions on participants' WTP. The model that deals with the effect of single-unit price promotion shows that offering subjects a 0.20€ off on each unit bought increases subjects' WTP for all units. Specifically, results indicate that this promotion type increases WTP by a range of 10.8 cents on the second unit to 20.9 cents on the sixth unit, *ceteris paribus*. As for the second model (treatment 2 model), results suggest that informing participants that buyers of six units will only pay the price

of five units significantly increases the WTP only for the sixth unit by 15.9 cents at the 0.10 level. Unlike the second model, results from the third model show that offering participants an increasing price discount in the number of units significantly increases the WTP for all six units of the product at the 0.01 level. The increase in WTP ranges from 15.7 cents on the first to 21.6 cents on the second unit. The average marginal effect across units of the increasing price discount promotion is about 18.6 cents compared to 14.9 cents for the single-unit price promotion. Therefore, the results generally indicate that the effect on WTP of the increasing price discount weakly surpasses the effect of single-unit price promotion. In addition to the effect of price promotion, results in Table 2 show that participant's socio-economic and demographic characteristics influence their WTP for organic milk. For instance, habitual buyers of organic food reported a higher WTP for organic milk. In addition, elderly and highly educated participants are willing to pay a lower price for organic milk than their counterparts.

To test the robustness of the results in the between-subjects analysis, we also conducted a within-subjects analysis using data from treatment 4 where the three types of price promotion strategies were simultaneously offered to the participants. The WTP values from this treatment will reflect the relative utilities that each promotion type provides the subjects. Table 3 exhibits results from the estimation of the random effect Tobit model[10]. Interestingly, results indicate that single-unit price promotion increases WTP only for the last three units, ranging from 9 cents on the fourth unit to 13.5 cents on the fifth unit, *ceteris paribus*. The "buy six and pay for five" strategy does not

[10] This was possible, since participants in the fourth treatment and in the second round bid their WTP for each unit under the three price promotion scenarios: single-unit price promotion, buy six and pay five and increasing price discount.

significantly increase WTP in any of the units. In contrast, the increasing price discount strategy increases WTP of all units except the first one. Marginal effects range from 10.6 cents on the third unit to 14.8 cents on the fifth unit.

Hence, our results generally suggest that the distribution of price discount in price promotions matters. We found that price promotion increases consumers' WTP more when the distribution of the amount of price discount is increasing with the number of units than when it is uniform. However, when the amount of price discount is concentrated on the last unit as commonly practiced by some retailers, the response of consumers in terms of WTP is generally not statistically significant.

As previously mentioned, there is a probability that participants increase their WTP by the amount of the offered discount. To check whether participants used this strategic behavior, we compared the increase in participants' WTP after being offered the discount to the amount of the actual offered discount for each purchased unit of organic milk. The t-test for independent samples was the statistical test used to test the significance of the differences between participants' WTP and the amount of the actual discount. Tables 4 and 5 report the results from the between and the within-sample analysis, respectively. In the analysis, we considered only the participants who responded positively to the offered discount. The results showed that, in general, participants who received the "buy six and pay for five" discount or the increasing discount did not increase their WTP by the amount of the discount. However, participants who were offered the single-unit price promotion increased their WTP by an amount, generally, not significantly different from the offered discount (i.e. 0.20€). This might be explained by the fact that it is relatively easier for participants to identify the

strategic behavior in the single-unit price promotion than in the other two forms of price promotion[11].

As in previous studies, we also evaluate the effect of price-promotions on sales value. Results on the effect of the three price promotion approaches are reported in Table 6. In the between-subjects analysis involving treatments 1, 2, and 3, we found that the single-unit price promotion and the increasing price-discount promotion increase sales value by 25% and 24%, respectively. The "buy six and pay for five" promotion only increases sales value by 3%. Results from the within-subjects analysis, involving treatment 4, paint a little different picture. While the single-unit price promotion and "buy six and pay for five" promotion generally increases sales value by 20% and 15%, respectively, the increasing price-discount promotion augments sales value by 52%. Hence, the increasing price-discount promotion strategy seems to provide the most positive effect in terms of WTP and sales value while the "buy N, pay N-1" promotion strategy that is regularly utilized by retailers seems to provide the least positive effect.

In our multi-unit experimental auction, we only auctioned a maximum of 6 units and, hence, participants were not allowed to buy more than 6 units. As a result, it is very unlikely that buyers of 6 units would be positively affected by price promotion, since they can't increase their demand. For a cleaner analysis, we divided our sample into two

[11] It is important to note that even in cases when participants behave strategically and increase their WTP by the amount of the discount; this would not necessarily result in zero retailers' revenues. For instance, let's suppose that i^{th} participant's bids are as follows 1.80, 1.30, 1.00, 0.80, 0 and 0 for the first unit, the second unit, the third unit, the fourth unit, the fifth unit and the sixth unit, respectively. Suppose that the market price is 1.16. So, before offering the discount, retailer's sales are equal to (1.16 X 2). Let's suppose that after offering the discount (e.g. 0.20€ discount on each purchased unit) i^{th} participant increased this/her bid for each unit by 0.20€ resulting in the following bids 2.00, 1.50, 1.20, 1.00, 0.20 and 0.20 for the first unit, the second unit, the third unit, the fourth unit, the fifth unit and the sixth unit, respectively. Retailers' sales are now equal to (1.16 X 3). As a result, the retailer's revenue after the promotion is positive and equal to 0.56€ (i.e. (1.16 X 3) – (1.16 X 2) – (0.20 X 3)).

subsamples: (1) buyers of six units and (21% of the whole sample) (2) buyers of less than six units (79%f the whole sample). We then tested the effect of the three price promotion approaches on sales value in both subsamples, and again conducted the within and between-subjects analyses. Table 7 exhibits the between-subjects analysis while Table 8 shows the within-subjects analysis of the effect of three types of promotion strategies on sales value. We found that the effect of the increasing price-discount promotion is significantly larger than the effect of the other two price promotions when considering only the buyers of less than 6 units. Specifically, the increase in sales value was about 204% in the between-subjects analysis and 87% in the within-subjects analysis. We also found that the increase in sales value generated by single-unit price promotion is equal to 58%, compared to 6% by the "buy six and pay for five" promotion in the between-subjects analysis for buyers of less than 6 units. Also, in treatment 4 where all price promotion approaches were simultaneously presented, the increase in sales value generated by the single-unit price promotion is higher than the increase provided by "buy six and pay for five" promotion (i.e. 39% vs. 31% ; see table 8). As expected, the different types of price promotions did not generate positive effects on sales value for the buyers of six units since they were not allowed to buy more than six units.

Our findings on the sensitiveness of WTP and sales value to price promotions clearly suggest that consumers respond positively to price discounts. We found that the sensitiveness of sales to price promotion depends on the distribution of the amount of price discount across the units. In fact, our results showed that the most effective discount distribution strategy among those we examined is to allow the amount of price

discount to increase through the number of units. For robustness check, we also calculated change in retailers' revenue using three levels of estimated market price 1.04€, 1.16€ and 1.28€. The results displayed in Table 9 show that only the increasing price discount strategy generated positive benefits in both between and within treatments and for all the estimated market prices. For example, considering 1.16€ as the estimated market price to determine sales value, we found that the increasing price discount generated revenues of 0.10€ per person in the between subjects treatments and 0.42€ per person in the within subjects treatment. The results are mixed in the single-unit promotion and the "buy 6 pay for 5" promotion. For example, the single-unit promotion strategy yields positive revenue values in the between subjects treatments but negative revenue values in the within subject treatment. Although, the effect of the increasing price discount on retailers' revenue is economically significant, our result showed that this effect is statistically insignificant.

6. Concluding remarks

Increasing time constraints are pushing consumers to optimize their shopping efficiency by acquiring more quantity of the same product. To take advantage of this change in consumer behavior, retailers and manufacturers are increasingly using multi-unit price promotions that involve a price discount for multiple units of a product. Previous studies found that multi-unit price promotions generate significantly higher sales value relative to single-unit price promotions even if both price-promotion approaches offer an equivalent price discount per unit. In this paper, we examined an issue of emerging interest to researchers, retailers and manufacturers - that is the distribution of price discount across units of a good. Specifically, we assessed the effect

of three price-discount distributions (uniform price discount distribution, increasing price discount distribution and price discount concentrated on the last unit) on WTP, sales value and retailer's revenue for a relatively new product. We focused on examining this issue on a new product due to the historically and well documented low success rate of new product introductions and hence, the importance of finding appropriate marketing strategies that can increase likelihood of a successful product launch. In addition to contributing to a better understanding of consumer behavior toward multi-unit price promotion, we also show how multi-unit auctions can be used as a non-hypothetical experimental tool to study the effect of marketing strategies on consumer behavior for multiple units of a new food product.

Our results generally suggest that increasing price discount with the number of units increases WTP, sales value, and revenue. We also found that uniform price discount promotion has the potential to motivate consumers to buy more units of the same product but its effect on WTP, sales value, and change in revenues is generally lower than the increasing price discount strategy. The multi-unit price promotion (e.g. buy six and pay for five for six-pack products) that applies all the amount of price discount on the last unit provided only a weak effect on sales value. These results can have significant implications for retailers. Considering that the "buy N, pay N-1" strategy is often utilized by retailers (Laroche *et al*., 2003; Raghubir, 2004), our findings generally imply that these retailers would be better off to use an increasing price discount strategy in their multi-unit price promotions for new products. In this study, however, we only examined one type of increasing discount strategy. A good topic for future research is the assessment of the effect of different amounts of increasing

discount across units on consumers' WTP for a product. As mentioned in the introduction, Gupta (1988) and Bell *et al.* (1999) found that the increase in total sales is generally due to brand switching, purchase acceleration and quantity increase. This paper provided insights on how consumers' WTP and sales are affected by the distribution of price discount across multiple units of a new food product. For a better generalization of the results reported in this paper, assessing the effect of price-discount distributions on brand switching and purchase acceleration could also be an interesting topic for future studies.

References

Ailawadi, K., & Neslin, S. (1998). The Effect of Promotion on Consumption: Buying More and Consuming it Faster. Journal of Marketing Research, 35, 390–398.

Akaichi, F., Gil, J.M., & Nayga, Jr. R.M. (2012). Assessing Consumers' Willingness to Pay for Different Units of Organic Milk: Evidence From Multi-unit Auctions. Canadian Journal of Agricultural Economics, 60, 469-494

Alfnes, F. (2007). Willingness to Pay Versus Expected Consumption Value in Vickrey Auctions for New Experience Goods. American Journal of Agricultural Economics, 89, 921-931.

Bearden, W. O., Lichtenstein, D. R. & Teel, J. E. (1984). Comparison Price, Coupon and Brand Effects on Consumer Reactions to Retail Newspaper Advertisements. Journal of Retailing, 60, 11-35

Becker, G.M., DeGroot, M. H., & Marschak, J. (1964). Measuring Utility by a Single-Response Sequential Method. Behavioural science, 226-232.

Bell, D., Chiang, J., & Padmanabhan, V. (1999). The Decomposition of Promotional Response. Marketing Science, 18, 504-526.

Berkowitz, E.N. & Walton, J. R. (1980). Contextual Influences on Consumer Price Responses: An Experimental Analysis. Journal of Marketing Research, 17, 349-359.

Blair, E. A. & Landon, Jr. E. L. (1981). The Effects of Reference Prices in Retail Advertisements. Journal of Marketing, 45, 61-69.

Blattberg, R., & Neslin, S. (1990). Sales Promotion: Concepts, Methods, and Strategies, 1st ed Prentice Hall, New Jersey.

Bucklin, R., & Gupta, S. (1992). Brand Choice, Purchase Incidence and Segmentation: An Integrated Approach. Journal of Marketing Research, 29, 201-215.

Bucklin, R., Gupta, S., & Siddarth, S. (1998). Determining Segmentation in Sales Response Across Consumer Purchase Behaviors. Journal of Marketing Research, 35, 189-197.

Calantone, R., Schmidt, J., & Song, X. (1996). Controllable factors of new product success: a cross national comparison. Marketing Science, 15, 341-358.

Cooper, R. (2001). Winning at New Products: Accelerating the Process from Idea to Launch. 3rd ed. Perseus Publishing, Cambridge..

Corrigan, J.R., &Rousu, M.C. (2006). Posted prices and bid affiliation: evidence from experimental auctions. American Journal of Agricultural Economics, 88, 1078–1090.

Coughlin, S. (1990). Recall bias in epidemiologic studies. Journal of Clinical Epidemiology, 43, 1431-1432.

Cox Direct. (1998). 20th Annual Survey of promotional Practices, Largo, Filadelfia..

Diamond, W.D., & Sanyal, A. (1990). The Effect of Framing on Choice of Supermarket Coupons. Advances in Consumer Research.17, 494-500

Dickinson, D.L., & Baily, D. (2002). Meat Traceability: Are U.S. consumers willing to pay for it? Journal of agricultural and resource economics, 27, 348-364.

Dodson, J., Alice, T., & Brian, S. (1978). Impact of Deals and Deal Retraction on Brand Switching. Journal of Marketing Research, 15, 72–81.

Engelbrecht-Wiggans, R., & Kahn, C.M. (1998). Multi-Unit Auctions with Uniform Prices. Economic Theory, 12, 227-58.

Fischbacher, U. (2007). Z-Tree: Zurich Toolbox for Ready-made Economic Experiments. Experimental Economics, 10, 171-78.

Folkes, V., Martin, I., & Gupta, K. (1993). When to say when: Effects of supply on usage. Journal of Consumer Research, 20, 467-477.

Foubert, B., & Gijsbrechts, E. (2007). Shopper Response to Bundle Promotions for Packaged Goods. Journal of Marketing Research, 44, 647-662.

Fox, J. A., Hayes, D., & Shogren, J. (2002). Consumer Preferences for Food Irradiation: How Favorable and Unfavorable Descriptions Affect Preferences for Irradiated Pork in Experimental Auction. Journal of Risk and Uncertainty, 24, 75-95.

Grewal, D. & Monroe, K. B. (1998). The Effect of Price Comparison Advertising on Buyers' Perception of Acquisition Value, Transaction Value and Behavioral Intentions. Journal of Marketing, 62 , 46-60.

Guadagni, P., & Little, J. (1983). A Logit Model of Brand Choice Calibrated on Scanner Data. Marketing Science, 2, 203-238.

Gupta, S. (1988). Impact of sales promotions on when, what and how much to buy." Journal of Marketing Research, 25, 342-355.

Hoffman, E., Dale, J.M., Dipankar, C., Ray, A.F., & Glen, D.W. (1993). Using Laboratory Experimental Auctions in Marketing Research: A Case Study of New Packaging for Fresh Beef. Marketing Science, 12: 318 - 338.

Kalwani, M.U. and Yim, C.H. (1992). Consumer Price and Promotion Expectations. Journal of Marketing Research, 29, 90-100.

Kassardjian, E., Gamble, J., Gunson, A., & Jaeger, S.R. (2005). "A new approach to elicit consumers' willingness to purchase genetically modified food apples." British Food Journal. 107, 541-555.

Koriat, A. (1993). How do we know that we know? The accessibility model of the feeling of knowing. Psychological Review, 100, 609-39.

Kotler, P. (2000). Marketing Management. New Jersey: Prentice Hall.

Krishna, V. (2002). Auction Theory. California: Academic Press San Diego,

Laroche, M., Pons, F., Zgolli, N., Cervellon, M., & Kim, C. (2003). A mode of consumer response to two retail sales promotion techniques. Journal of Business Research, 56, 513-522.

Lattin, M. J. & Bucklin, R. E. (1989). Reference Effects of Price and Promotion on Brand Choice Behavior. Journal of Marketing Research, 26, 299-310.

Li, S., Sun, Y., and Wang, Y. (2007). 50% Off or Buy One Get One Free? Frame Preference as a Function of Consumable Nature in Dairy Products. The Journal of Social Psychology, 147(4), 413-421.

Lichtenstein, D. R, Netemeyer, R. G. & Burton S. (1991). Using a Theoretical Perspective to Measure the Psychological Construct of Coupon Proneness. Advances in Consumer Research, 18, 501-507.

Lusk, J. & Shogren, J. (2007). Experimental Auctions. Cambridge University Press.

Lusk, J., & Hudson, D. (2004c). Willingness-to-Pay Estimates and their Relevance to Agribusiness Decision Making. Review of Agricultural Economics, 26, 152-169.

Manning, K., & Sprott, D. (2007). Multiple Unit Price Promotions and their Effects on Quantity Purchase Intentions. Journal of Retailing, 83, 411-421.

Mizerski, R. W., Golden, L. L. & Kernan, J. B. (1979). The Attribution Process in Consumer Decision Making. Journal of Consumer Research, 6, 123-140.

Monroe, K. B. (1973). Buyers' Subjective Perceptions of Price. Journal of Marketing Research, 10, 70-80.

Montoya-Weiss, M., & Calantone, R. (1994). Determinants of New Product Performance, A Review and Meta-Analysis. Journal of Product Innovation Management, 11, 397-417.

Narasimhan, C., Neslin, S., & Sen, S. (1996). Promotion elasticities and category characteristics. Journal of Marketing, 60, 17-30.

Neslin, S. A., & Shoemaker, R. W. (1989). An Alternative Explanation for Lower Repeat Rates after Promotion Purchases. Journal of Marketing Research, 26, 205-213.

Neslin, S., Henderson, A., & Quelch, J. (1985). Consumer Promotions and the Acceleration of Product Purchases. Marketing Science, 4, 147-165.

Nijs, V., Dekimpe, M., Steenkamp, J-B., & Hanssen, D. (2001). The Category-Demand Effect of Price Promotions", Marketing Science, 20, 1-22.

Raghubir, P. (2004). Coupons in context: discounting prices or decreasing profits? Journal of Retailing, 80, 1-12.

Raphael, K. (1987). Recall bias: a proposal for assessment and control. International Journal of Epidemiology, 16, 167–170.

Rousu, M., Monchuk, D.C., Shogren, J.F., & Kosa, K.M. (2005). Consumer Willingness to pay for "second generation" genetically engineered products and the role of marketing information. Journal of Agricultural and Applied Economics, 37, 647-657.

Shaw, W.D., Nayga, R.M., & Silva, A. (2006). Health benefits and uncertainty: an experimental analysis of the effect of risk presentation on auction bids for a healthful product. Economics Bulletin, 4, 1-8.

Sinha, I., and Smith, M. F. (2000). Consumers' Perceptions of Promotional Framing Price. Psychology and Marketing, 17, 257–275.

Soman, D., & John, T. (2001). Transaction Decoupling: How Price Bundling Affects the Decision to Consume. Journal of Marketing Research, 38, 30-44.

Stevens, G., & Burley, J. (2003). Piloting the Rocket of Radical Innovation. Research Technology Management, 46, 16–26.

Stremersch, S. & Tellis, G.J. (2002). Strategic Bundling of Products and Prices: A New Synthesis For Marketing. Journal of Marketing, 66, 55-72.

Thaler, R. (1985). Mental Accounting and Consumer Choice. Marketing Science, 4, 199-214.

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. Journal of Risk and uncertainty, 5, 297-323.

Urbany, J. E, Bearden, W. O. & Weilbaker, D. C. (1988). The Effect of Plausible and Exaggerated Reference Prices on Consumer Perceptions and Price Search. Journal of Consumer Research, 15, 95-111.

Wansink, B., Kent, R. & Hoch, S. (1998). An Anchoring and Adjustment Model of Purchase Quantity Decisions." Journal of Marketing Research, 35, 71–81

Wilson, R., Newman, L. & Paksoy, C. (1979). On the Validity of Research Methods in Consumer Dealing Activity: An Analysis of timing Issues. In Educators' Conference proceedings, eds. N. Beckwith, N., Houston, M., Mittelstaedt, R., Monroe, k., & Ward, S.: 41-46, Chicago: American Marketing Association.

Table1: The independent variables used in the estimation

Independent Variables	Name	Description
Single-unit price promotion	SINGLE	Dummy variable that takes the value 1 if participant is offered a single-unit price promotion; and 0 otherwise.
"Buy six and pay for five" price promotion	SIXFIVE	Dummy variable that takes the value 1 if participant received a "buy six pay five" price promotion; and 0 otherwise.
Increasing price promotion	INCREASE	Dummy variable that takes the value 1 if participant received an increasing price promotion; and 0 otherwise.
Quantity of milk purchased per week	QUANTITY	Dummy variable that takes the value 1 if the quantity of conventional milk purchased each week is lower or equal to six units; and 0 otherwise
Frequency of buying organic food	FREQ_OF	Dummy variable that takes the value 1 if the participant is regular or occasional buyer of organic foods; and 0 otherwise
Household size	HOUSEHOLD	Dummy variable that takes the value 1 if participants lives in a household composed of more than 2 members; and 0 otherwise
Gender of participant	GENDER	Dummy variable that takes the value 1 if the participant is male; and 0 otherwise
Age of participant	AGE	Continuous variable: the age of participant
Education level	EDUCATION	Dummy variable that takes the value 1 if the participant has a high education level (university); and 0 otherwise.
Subjects who have children	CHILDREN	Dummy variable that takes the value 1 if the participant has children; and 0 otherwise
Income level	INCOME	Dummy variable that takes the value 1 if the participant's income is more than 2500€/month; and 0 otherwise

Table 2: Between-subjects effect of price promotion on participants' WTP

VARIABLES	UNIT1	UNIT2	UNIT3	UNIT4	UNIT5	UNIT6
CONSTANT	1.645***	1.438***	1.373***	1.172*	1.490**	1.198*
SINGLE	**0.151*** **	**0.108** **	**0.140*** **	**0.140** **	**0.144** **	**0.209*** **
SIXFIVE	0.025	0.034	0.035	-0.016	0.116	**0.159***
INCREASE	**0.157*** **	**0.216*** **	**0.165*** **	**0.171*** **	**0.193*** **	**0.211*** **
QUANTITY	0.076	0.006	0.042	0.100	0.021	0.068
FREQ_OF	0.304**	0.398**	0.313*	0.446*	0.402	0.349
HOUSEHOLD	-0.053	-0.019	-0.086	-0.084	-0.017	0.028
GENDER	0.151	0.313*	0.167	0.193	0.083	0.077
AGE	-0.010*	-0.014*	-0.011	-0.016	-0.028**	-0.024**
EDUCATION	-0.272**	-0.256*	-0.346**	-0.518**	-0.448*	-0.366
CHILDREN	0.019	-0.182	-0.003	0.091	0.114	0.121
INCOME	-0.068	0.111	0.020	0.103	0.100	0.127
Loglikelihood	-68.94	-99.14	-113.51	-126.12	-132.21	-142.35
Wald chi2	45.69	43.97	26.08	25.93	21.03	25.44
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00
Number of obs	90	90	90	90	90	90

*** (**) (*) Statistically significant at 1% (5%) (10%) level

Table3: Within-subjects effect of price promotion on participants' WTP

VARIABLES	UNIT1	UNIT2	UNIT3	UNIT4	UNIT5	UNIT6
CONSTANT	1.522***	0.833***	0.559***	0.561***	0.592	0.578
SINGLE	-0.034	0.064	0.060	**0.090***	**0.135****	**0.124****
SIXFIVE	-0.036	0.020	0.013	0.048	0.083	0.073
INCREASE	0.013	**0.116****	**0.106****	**0.125*****	**0.148*****	**0.121****
QUANTITY	-0.085	-0.289***	-0.138	-0.195*	-0.223**	-0.184*
FREQ_OF	-0.090	-0.010	0.021	0.094	0.068	0.106
HOUSEHOLD	-0.378***	-0.489***	-0.467***	-0.508***	-0.538***	-0.510***
GENDER	0.024	0.239***	0.214***	0.246***	0.244***	0.206***
AGE	0.001	0.012***	0.013***	0.010***	0.009***	0.007***
EDUCATION	0.198**	0.234**	0.222**	0.226**	0.209**	0.225**
CHILDREN	-0.097	-0.044	0.050	0.057	0.047	0.023
INCOME	-0.169**	0.093	0.166	0.168	0.109	0.089
Loglikelihood	-35.60	-65.64	-43.91	-59.91	-76.18	-73.51
Wald chi2	33.04	67.45	79.59	72.47	72.99	66.95
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00
Number of obs	90	90	90	90	90	90

*** (**) (*) Statistically significant at 1% (5%) (10%) level

Table 4: Effect of the three types of price discount on WTP: between-subject analysis

	Buy six and pay for five				Single-unit price promotion				Increasing price discount			
	N. of par-ticipants	Disco-unt	WTP increase	p-value	N. of par-ticipants	Disco-unt	WTP increase	p-value	N. of par-ticipants	Disco-unt	WTP increase	p-value
UNIT1	10	0.00	0.14	**0.00**	21	0.20	0.20	0.95	19	0.06	0.26	**0.00**
UNIT2	20	0.00	0.39	**0.00**	23	0.20	0.42	**0.02**	24	0.12	0.35	**0.00**
UNIT3	9	0.00	0.20	**0.02**	14	0.20	0.23	0.65	14	0.17	0.29	0.20
UNIT4	8	0.00	0.21	**0.03**	12	0.20	0.26	0.40	14	0.23	0.29	0.50
UNIT5	10	0.00	0.27	**0.01**	13	0.20	0.23	0.71	13	0.28	0.33	0.65
UNIT6	10	1.20	0.32	**0.00**	13	0.20	0.34	0.30	14	0.34	0.33	0.91

Table 5: Effect of the three types of price discount on WTP: Within-subject analysis

	Buy six and pay for five				Single-unit price promotion				Increasing price discount			
	N. of par-ticipants	Disco-unt	WTP increase	p-value	N. of par-ticipants	Disco-unt	WTP increase	p-value	N. of par-ticipants	Disco-unt	WTP increase	p-value
UNIT1	10	0.00	0.27	**0.00**	11	0.20	0.22	0.75	12	0.06	0.29	**0.01**
UNIT2	15	0.00	0.29	**0.00**	16	0.20	0.34	**0.07**	16	0.12	0.43	**0.00**
UNIT3	11	0.00	0.24	**0.00**	13	0.20	0.23	0.55	14	0.17	0.31	**0.03**
UNIT4	11	0.00	0.24	**0.01**	12	0.20	0.28	0.22	12	0.23	0.37	**0.09**
UNIT5	13	0.00	0.30	**0.00**	12	0.20	0.39	**0.02**	14	0.28	0.37	0.20
UNIT6	13	1.20	0.28	**0.00**	13	0.20	0.35	**0.07**	15	0.34	0.32	0.71

Table 6: Effect of the three types of price discount on sales value (€)/person: Whole Sample

	Single-unit price promotion					
	Treatment 1			**Treatment 4**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	30	2.82	**25*** **	30	1.35	**20**
After discount	30	3.52		30	1.62	
	Buy six and pay for five					
	Treatment 2			**Treatment 4**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	30	2.90	**3**	30	1.35	**15**
After discount	30	2.98		30	1.55	
	Increasing price discount					
	Treatment 3			**Treatment 4**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	30	2.44	**24***	30	1.35	**52**
After discount	30	3.02		30	2.05	

*** (**) (*) Statistically significant at 1% (5%) (10%) level

Table 7: Between-subjects Effect of the three types of price discount on sales value (€)/person (Treatment 1, 2, 3)

	Single-unit price promotions (Treatment 1)					
	Buyers of less than six units			**Buyers of six units**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	23	1.56	**58*** **	7	6.96	**0**
After discount	23	2.47		7	6.96	
	Buy six and pay for five (Treatment 2)					
	Buyers of less than six units			**Buyers of six units**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	23	1.66	**6**	7	6.96	**0**
After discount	23	1.76		7	6.96	
	Increasing price discount (Treatment 3)					
	Buyers of less than six units			**Buyers of six units**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	21	0.49	**204** **	9	6.96	**-6**
After discount	21	1.49		9	6.57	

*** (**) (*) Statistically significant at 1% (5%) (10%) level

Table 8: Within-subjects Effect of the three types of price discount on sales value (€)/person (Treatment 4)

	Single-unit price promotions					
	Buyers of less than six units			**Buyers of six units**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	28	0.95	**39**	2	6.96	**-17**
After discount	28	1.32		2	5.80	
	Buy six and pay for five					
	Buyers of less than six units			**Buyers of six units**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	28	0.95	**31**	2	6.96	**-17**
After discount	28	1.24		2	5.80	
	Increasing price discount					
	Buyers of less than six units			**Buyers of six units**		
	Observations	Sales by person	Effect in %	Observations	Sales by person	Effect in %
Before discount	28	0.95	**87****	2	6.96	**-17**
After discount	28	1.78		2	5.80	

*** (**) (*) Statistically significant at 1% (5%) (10%) level

Table 9: Effect of the three types of price discount on retailers' revenue (€)/person.

	Market Price = 1.16€		
	Buy six and pay for five	Single-unit price promotions	Increasing price discount
Between subject effect	-0.46***	0.09	**0.10**
Within subject effect	0.11	-0.01	**0.42**
	Market Price = 1.04€		
	Buy six and pay for five	Single-unit price promotions	Increasing price discount
Between subject effect	-0.04	-0.14	**0.03**
Within subject effect	-0.38	-0.51	**0.06**
	Market Price = 1.28€		
	Buy six and pay for five	Single-unit price promotions	Increasing price discount
Between subject effect	-0.46***	0.05	**0.50***
Within subject effect	0.00	-0.27	**0.18**

*** (**) (*) Statistically significant at 1% (5%) (10%) level

Figure 1: Mean of participants' WTP (whole sample, first round)