Effect of Price-Discount Distribution in Multi-Unit Price Promotions on Sales Value and retailers' revenue: Evidence from Multi-Unit Auctions

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1. Introduction

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).

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.

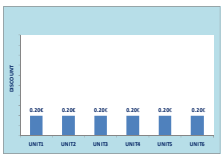
Multi-unit price promotions can be beneficial to marketers for two major reasons: 1) for retailers and manufacturers, it might be preferable to guarantee sales today than probabilistic future sales; 2) due to increasing time constraints, many consumers are becoming increasingly concerned about optimizing shopping efficiency by purchasing multiple units of products to save several trips to the store.

In contrast to previous studies, we examine the sensitiveness of sales to the distribution across units of the amount of price discount in multi-unit price promotions. We compared the effect of three types of price-discount distribution on consumers' willingness to pay (WTP), sales value and retailers' revenues: (1) the quantity of price discount is distributed equally among units; (2) the quantity of price discount is concentrated on the last purchased unit (e.g. "buy 2 units and pay only for 1"); 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).

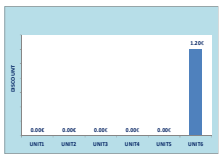
2. Experimental design

Sample: 120 subjects were randomly drawn from a list of people who are responsible for food shopping in their household. Each participant received 15€ as participation fees. Participants were then randomly assigned to four treatments. Sessions were conducted in groups of 10 subjects so each treatment consisted of three sessions.

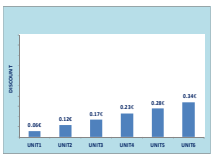
Treatments: In the first three treatments participants were offered different price-discount distributions (see figures bellow). For robustness check, we provided the subjects of the fourth treatment the three types of price promotion at the same time.



Treatment 1



Treatment 2



Treatment 3

Value-elicitation method: In our study, we conducted a non-hypothetical multi-unit Vickrey auction. 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 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' revenues.

3. Results

Table 1: Effect of price promotion on participants' WTP (Treatment 1, 2, 3)

VARIABLES	UNIT1	UNIT2	UNIT3	UNIT4	UNIT5	UNIT6
CONSTANT	1.645***	1.438***	1.373***	1.172*	1.490**	1.198*
TREATNENT 1	**0.151*** **	**0.108** **	**0.140*** **	**0.140** **	**0.146** **	**0.209*** **
TREATNENT 2	0.025	0.034	0.035	-0.016	0.116	**0.159***
TREATNENT 3	**0.157*** **	**0.216*** **	**0.165*** **	**0.171*** **	**0.199*** **	**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

Table2: Effect of price promotion on participants' WTP (Treatment 4)

VARIABLES	UNIT1	UNIT2	UNIT3	UNIT4	UNIT5	UNIT6
CONSTANT	1.522***	0.833***	0.559***	0.561***	0.592	0.578
TREATNENT 1	-0.034	0.064	0.060	**0.090***	**0.135** **	**0.124** **
TREATNENT 2	-0.036	0.020	0.013	0.048	0.083	0.073
TREATNENT 3	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 3: 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 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	**-5**
After discount	21	1.49		9	6.57	

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

Table 4: 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 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 5% (10%) level

Table 5: Effect of the three types of price discount on retailers' revenue (€)/person.

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

4. Conclusion

- The distribution of price discount in price promotions does matter.
- Increasing the amount of price discount with the number of units increases consumers' WTP, sales value and retailers' revenues.
- The 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 retailers' revenues is generally lower than the increasing price discount strategy.
- The multi-unit price promotion (e.g. buy six and pay five for six-pack products) that applies all the amount of price discount on the last unit provided only a weak effect on WTP sales value.
- A good topic for future research is the assessment of the effect of different amounts of an increasing price discount across units on consumers' WTP.