Christian-Albrechts-Universität zu Kiel

Price Promotion and Brand Loyalty: Empirical Evidence for the German Ready-to-Eat Cereal Market

Janine Empen+), **Jens-Peter Loy**+) and Christoph Weiss++)

+) Department of Agricultural Economics, University of Kiel, Germany
++) Department of Economics, Vienna University of Business and Economics, Vienna, Austria

Motivation

- Price promotions are important marketing activities for (food) retailers.
- Brand loyalty is a major requisite to foster brands' assets.
- Several theoretical papers have analyzed the relationship between price promotions and brand loyalty resulting in mixed (even contrary) outcomes.
- Few empirical studies for (European) grocery markets are available to test which model(s) might be most relevant to reflect pricing strategies in food retailing.
- Results might help to understand the price formation process and to derive some managerial implications.

Motivation: Sample Store Flyer

Strong Brands for the Lowest Price

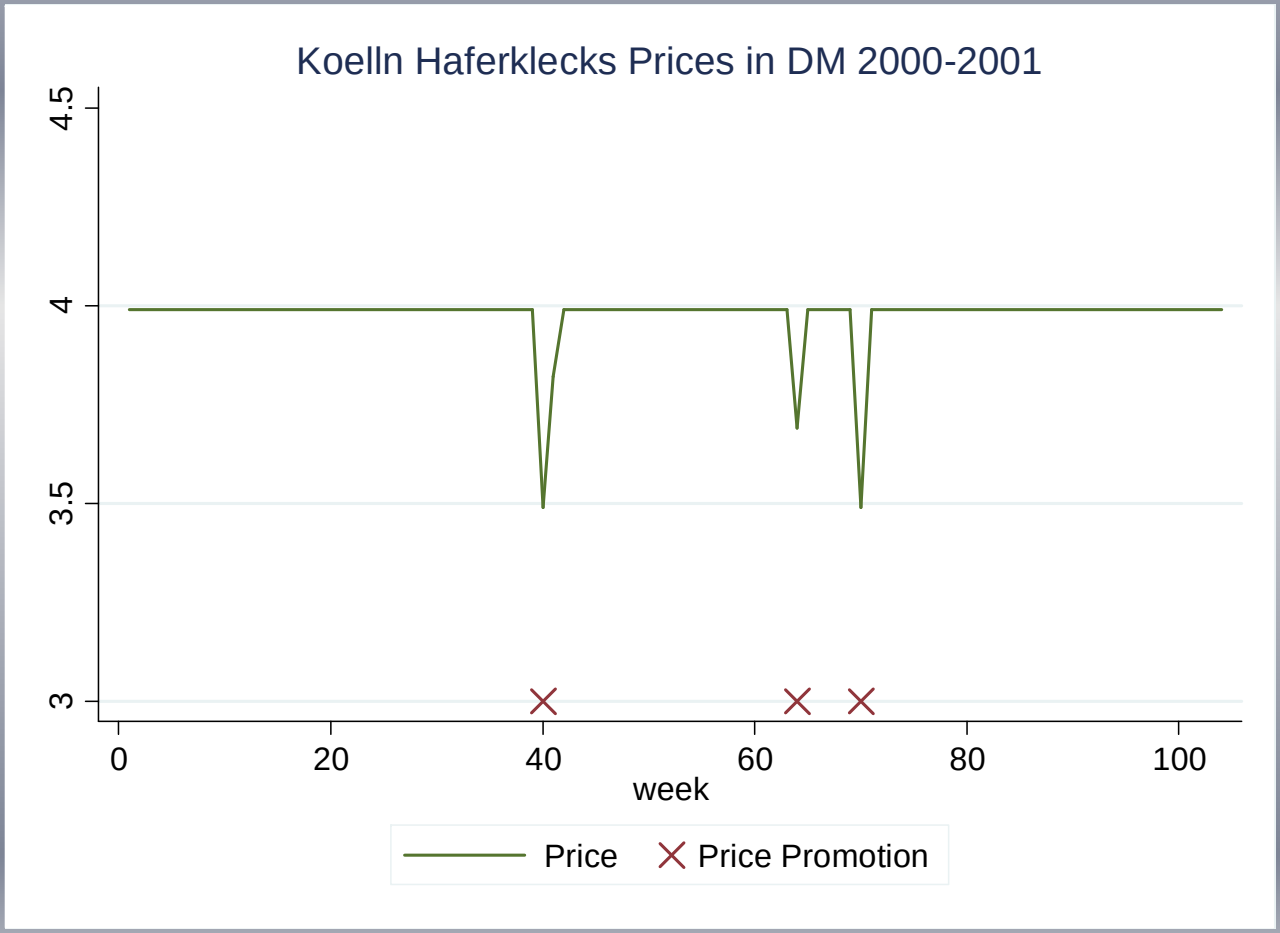
Definitions

“sale” or “sale’s price” or “promotional price”

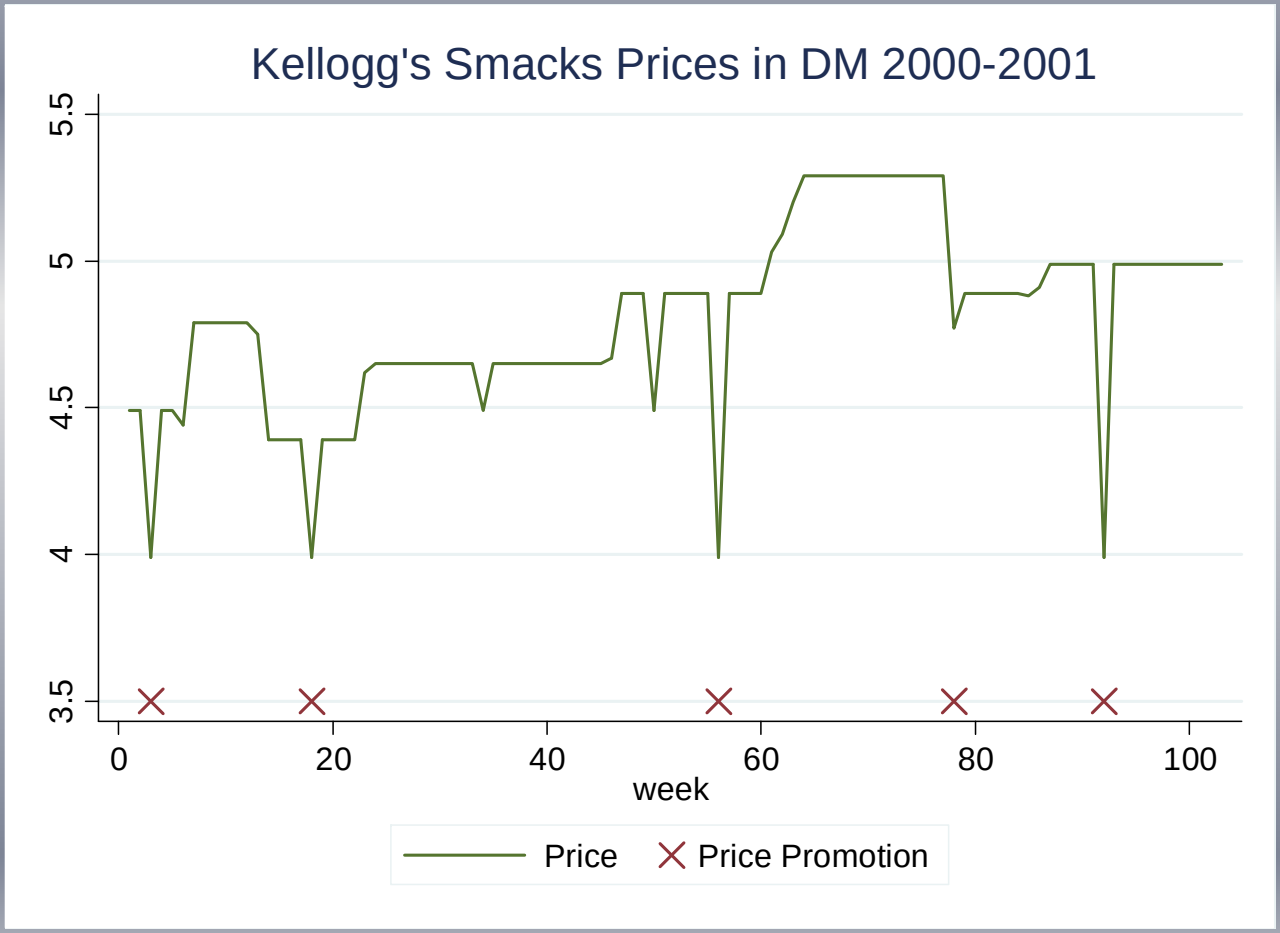
A product is said to be on sale if the **regular** price is **significantly reduced** for a **limited** time.

A sale is „... a **temporary reduction** in the price of an item that is **unrelated to cost changes**.“ (Hosken & Reiffen 2001).

Example 1:


Koelln Haferklecks Prices in DM 2000-2001
4.5
4
3.5
3
0
20
40
60
80
100
week
Price
Price Promotion

Example 2:


Kellogg's Smacks Prices in DM 2000-2001
5.5
5
4.5
4
3.5
0
20
40
60
80
100
week
Price
Price Promotion

Definitions: Measuring Sales‘ Prices

- Price is reduced by more than 5 percent (2.5, 10, 15 %).
- Price is reduced against the regular price.
- A price is regular if it is set for four consecutive weeks.
- A sale’s period does not last for more than four (3, 5) weeks.
- Following to the sale’s period the price is increased.

Definitions

Concept of "brand loyalty":

Following Jacoby und Kyner (1973: 2): "Brand loyalty is a

- biased (non random),
- behavioral response (buying),
- expressed over time,
- by some decision making unit,
- with respect to one or more alternative brands out of a set of such brands,
- and is a function of psychological (decision making, evaluative) processes."

Definitions

“level brand loyalty”:

“We define the extent of favoriteness (loyalty) by the price differential needed before the consumer will switch away to the less favored brand” (Agrawal, 1996).

A customer is loyal at a level $l_1 > 0$ to brand 1 if he/she does not switch until: $\exists_{i \neq 1} : p_i < p_1 - l_1$

“size of brand loyalty”:

The size of brand loyalty describes the number or the share of customers loyal to a brand (size of the loyal segment).

Definitions: Measuring Brand Loyalty

"level of brand loyalty":

Purchase pattern / Brand loyalty measure	Consumer 1 AABAABAABA		Consumer 2 AAAABAAAAA		Consumer 3 BBBAABABBB	
Customer loyalty	A	B	A	B	A	B
Average lengths of brand runs	1.75	1	4.5	1	1.5	2.33
Repurchase probability	50 %	0%	87.5 %	0%	50%	66.67%
Return probability after switching away	100 %	0%	100 %	0%	50%	50%

"size of brand loyalty":

The size of brand loyalty describes the number of customers loyal to a particular brand. A customer 1 is loyal to brand A if the level of loyalty is at a maximum for brand A compared with other brands.

Theory

Narasimhan, 1988, in *The Journal of Business*.

Raju, Srinivasan und Lal, 1990, in *Management Science*.

Rao, 1991, in *Marketing Science*.

Agrawal, 1996, in *Marketing Science*.

Anderson and Kumar, 2007, in *Quantitative Marketing and Economics*.

Jing and Wen, 2008, in *Journal of Economics and Management Strategy*.

Kocas and Bohlmann, 2008, in *Journal of Marketing*.

Theory: Raju, Srinivasan und Lal, 1990, in Management Science.

Assumptions:

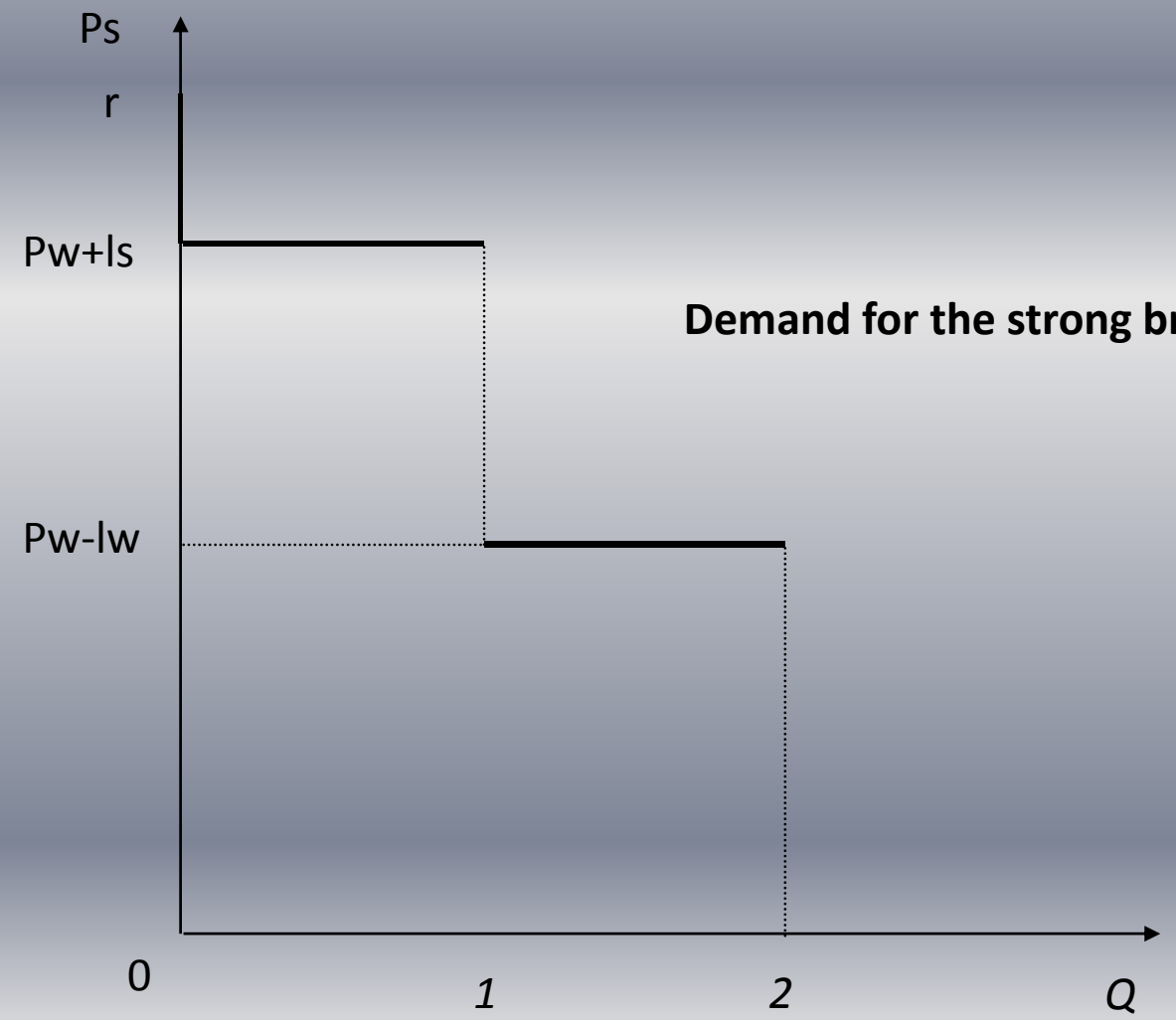
- Two manufacturers with one brand each
- Two types of consumers one loyal to brand 1 the other loyal to brand 2
- No retailer or retailers follow the pricing of the manufacturer
- l: level of brand loyalty
- w/s: weak, strong brand
- r: reservations price equal for both brands
- p: price
- Total demand is 2
- 50 % of consumers is loyal to either brand
- No transaction and production costs
- Non cooperative Nash-Equilibrium

Theory: Raju, Srinivasan und Lal, 1990, in Management Science.

$$\text{demand for the strong brand } q_s(p_s, p_w) = \begin{cases} 0 & if \quad p_w < p_s - l_s \\ 1 & if \quad p_w - l_w \le p_s \le p_w + l_s \\ 2 & if \quad p_s < p_w - l_w \end{cases}$$

$$\text{demand for the weak brand } q_w(p_s, p_w) = \begin{cases} 2 & if \quad p_w < p_s - l_s \\ 1 & if \quad p_w - l_w \le p_s \le p_w + l_s \\ 0 & if \quad p_s < p_w - l_s \end{cases}$$

Theory: Raju, Srinivasan und Lal, 1990, in Management Science.



Demand for the strong brand

Theory: Raju, Srinivasan und Lal, 1990, in Management Science.

„Pure Strategy“ If $l_w \geq r/2$ and $l_s \geq r/2$ $\Rightarrow p_s = p_w = r$

„Mixed Strategy“ If $l_w < r/2$ or $l_s < r/2$ $\Rightarrow$ no pure price equilibrium

e.g.

$l_w < r/2$ and $l_s \geq 4/5\left(r - l_w/2\right)$

$\Rightarrow l_s \geq 4/5\left(r - l_w/2\right) > 4/5\left(r - r/4\right) = 3/5\,r > r/2$

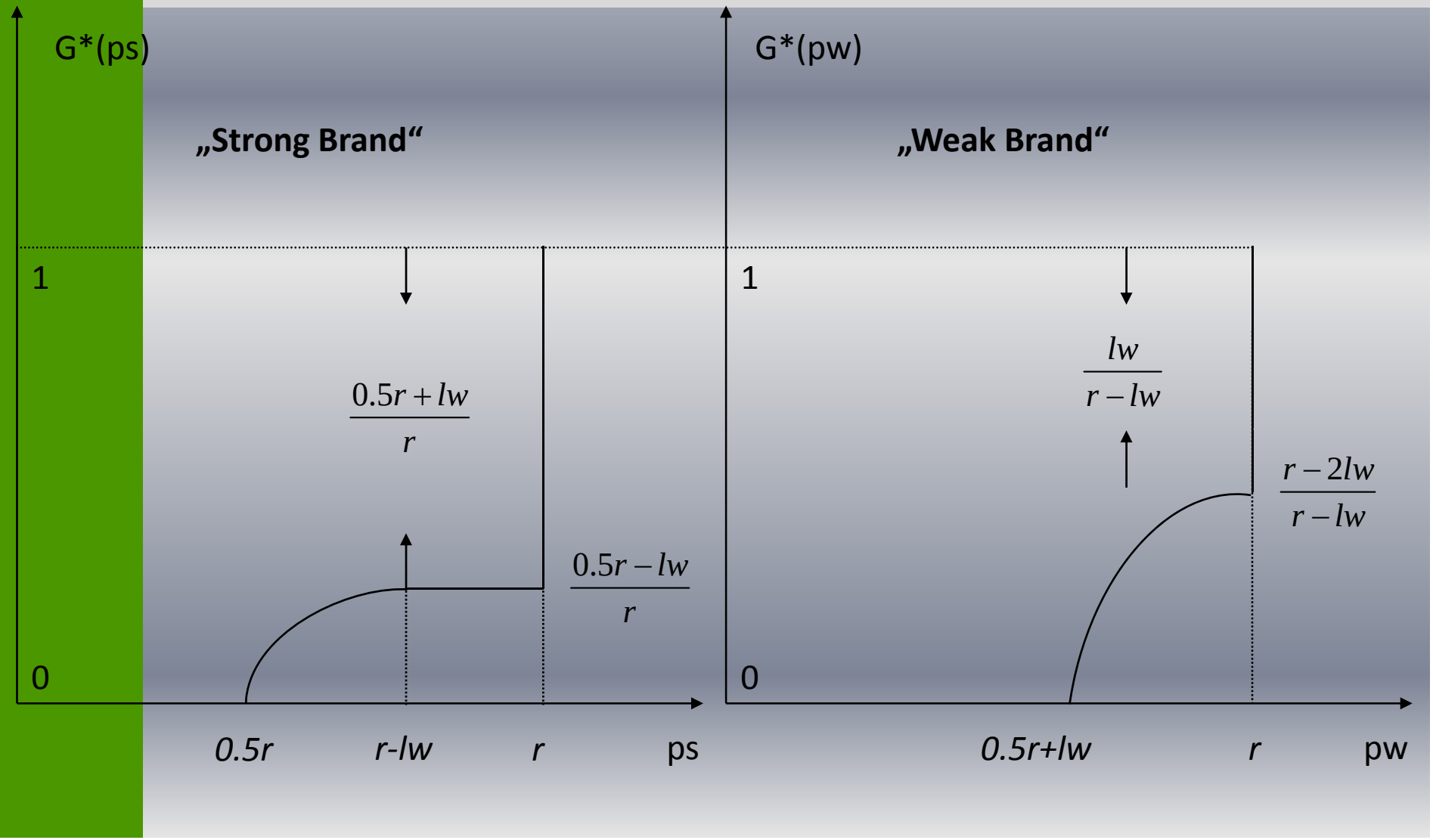
Theory: Raju, Srinivasan und Lal, 1990, in Management Science.

Cumulative price distribution for the „Strong Brand“

$$G_s^*(p_s) = \begin{cases} 1 & if \quad p_s = r \\ \dfrac{(0.5r - l_w)}{r} & if \quad p_s \in [r - l_w, r) \\ \dfrac{(p_s - 0.5r)}{(p_s + l_w)} & if \quad p_s \in [0.5r, r - l_w) \\ 0 & if \quad p_s \in [0, 0.5r) \end{cases}$$

Christian-Albrechts-Universität zu Kiel

Theory: Raju, Srinivasan und Lal, 1990, in Management Science.



Theory: Raju, Srinivasan und Lal, 1990, in Management Science.

Results:

- The weak brand promotes more frequently.
- The strong brand on average promotes more deeply.
- An increase in the level of loyalty reduces the frequency of sales.
- The frequency of sales increases with the number of brands.
- Sales might by synchronized.

Theory: Agrawal, 1996, in Marketing Science.

Agrawal (1996) introduces a retailer that decides prices:

Results:

- The strong brand is promoted more frequently.
- The weak brand on average is promoted more deeply.
- Sales may not be synchronized.

Theory: Anderson and Kumar, 2007, in Quantitative Marketing and Economics.

Anderson and Kumar (2007) introduce dynamic loyal consumers (besides static loyal consumers and switchers). Conversion of switchers into loyals (2 period model). The conversion rate is higher for the strong firm.

Results:

- The strong firm promotes more frequently.
- The strong firm promotes more deeply.

Theory: Kocas and Bohlmann, 2008, in Journal of Marketing.

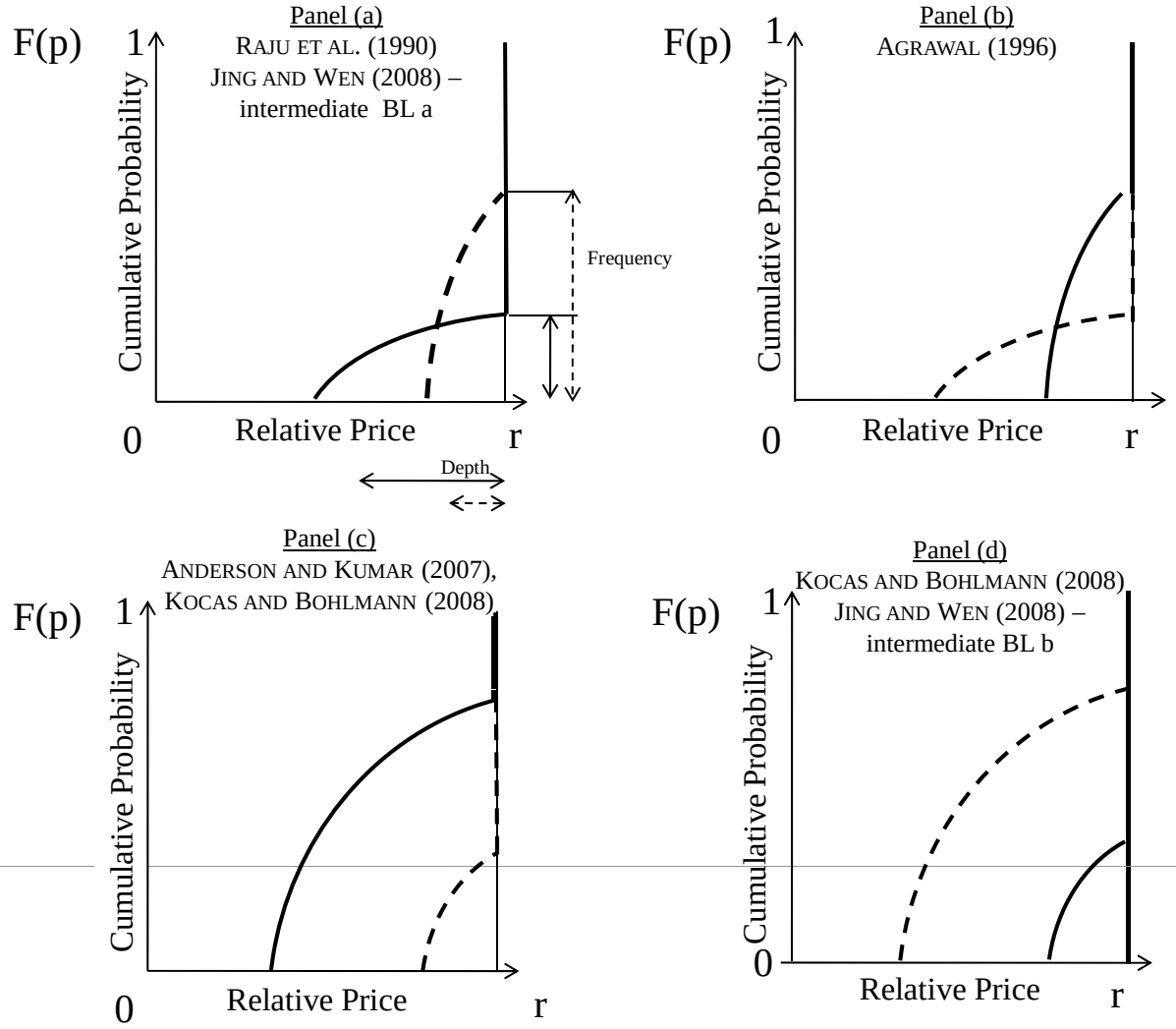
Kocas and Bohlmann (2008) introduce switchers that compare prices for a subset of firms. The switcher to loyal ratio (SLR) determine the incentives for promotion.

Results:

- If the strong firm has a low SLR it promotes less frequently,
- and the strong firm promotes less deeply.

Theory: Summary

---- Weak Brand
— Strong Brand



Christian-Albrechts-Universität zu Kiel

Data: The Products

Data: German market for breakfast cereals

Retail Scanner Data: MaDaKom GmbH

- 200 stores
- Prices, volumes, and promotions by EAN
- Store characteristics and Key Accounts
- Weekly data for 2000 and 2001

Consumer Scanner Data: GfK

- 14,000 households that report daily on grocery shopping
- Prices, volumes, promotions by EAN
- Household charactersitics (age and size of households etc.)
- Reporting period 2000 and 2001

Data: Matching and Data Manipulations

Matching of data:

- Based on EAN (129 products)

Data reduction:

- Brands with a significant market share (> 1 %)
- Brands bought by a significant number of housholds (> 20)
- Retail scanner time series with few missing obs. (< 20 %)

Finally, 1729 time series for 23 sub-brands which belong to 4 corporate brands in 108 stores are available. For these frequency and depth of price promotions are calculated. 6841 households regularly consume breakfast cereals. 1300 to 2100 are loyal to one out of the 23 brands brands. With these we derive the brand loyalty measures (level and size).

Data: Descriptive Statistics

Corporate Brand	Sub-Brand	Retail Scanner Panel		Consumer Scanner Panel	
		All Brands	Selected	All Brands	Selected*
Kellogg's	Frosties	10.55 %	12.25%	5.02 %	13.73%
Kellogg's	Smacks	10.39 %	12.06%	4.24 %	11.60%
Kellogg's	Cornflakes	8.96 %	10.40%	3.21 %	8.78%
Kellogg's	Chocos	7.44 %	8.64%	2.19 %	5.99%
Kellogg's	Choco Krispies	6.30 %	7.31%	2.62 %	7.17%
Subtotal Kellogg's		**65.97%**	**76.57%**	**26.76%**	**73.20%**
Nestlé	Nesquick	3.45 %	4.01%	1.94 %	5.31%
Nestlé	Cini Minis	3.42 %	3.97%	2.00 %	5.47%
Nestlé	Clusters Mandel	2.47 %	2.87%	1.19 %	3.26%
Subtotal Néstlé		**13.54%**	**15.73%**	**6.53%**	**17.87%**
Dr. Oetker	Knusper Schokos	2.37 %	2.75%	1.25 %	3.42%
Dr. Oetker	Knusper Honeys	2.24 %	2.60%	0.88 %	2.41%
Subtotal Dr. Oetker		**4.61%**	**5.35%**	**2.13%**	**5.83%**
Koelln	Knusp. Haferklecks	2.02 %	2.35%	1.13 %	3.09%
Other brands		14.16 %	---	63.43 %	13.73%

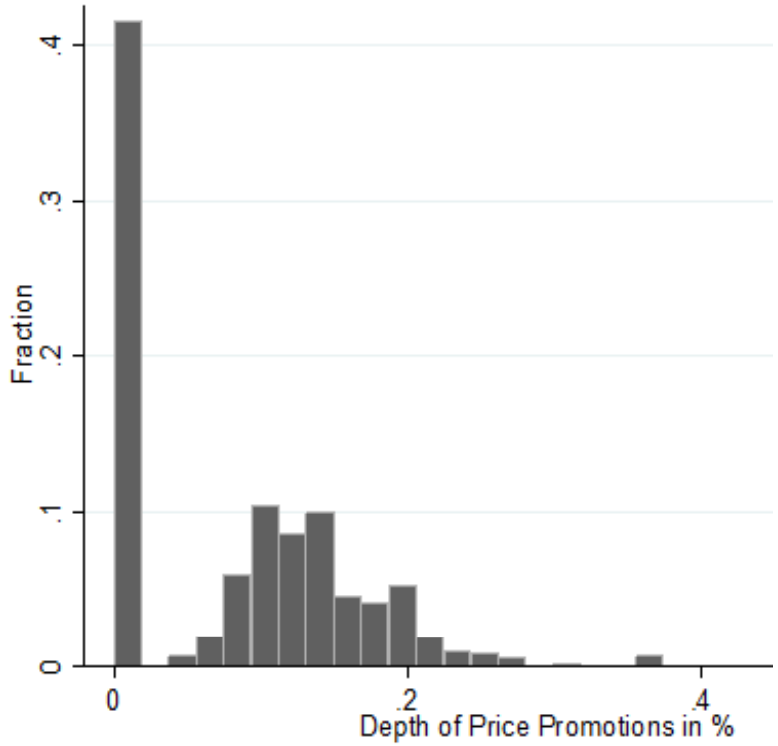
Data: Descriptive Statistics

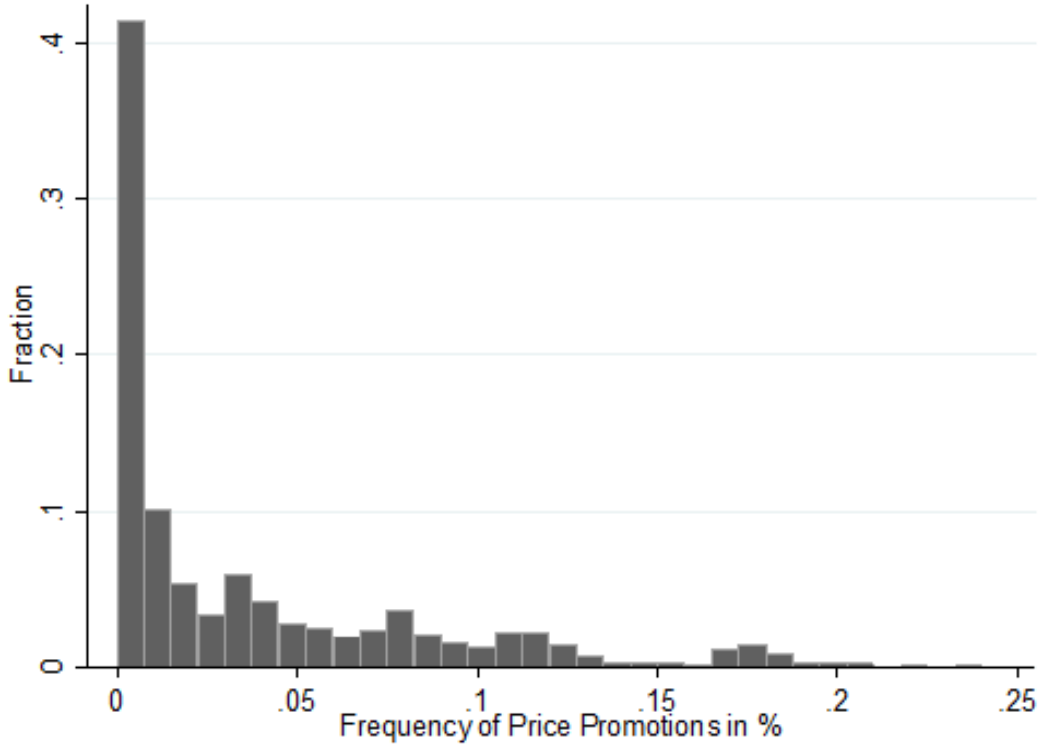
	Mean	St. Dev.	Min	Max
Dependent Variables				
Depth of Price Promotions	0.09	0.08	0	0.6
Breadth of Price Promotions	0.04	0.05	0	0.24
Independent Variables				
1. Brand Runs				
Degree of Loyalty	4.73	1.11	2.58	7.87
Segment Size	131.94	107.6	12	336
2. Repurchase Probability				
Degree of Loyalty	0.52	0.06	0.26	0.63
Segment Size	125.18	92.32	8	299
3. Return Probability				
Degree of Loyalty	0.70	0.05	0.61	0.83
Segment Size	78.52	57.63	5	189

Data: Descriptive Statistics (Correlations of BL Measures)

		Segment Size				Degree of Loyalty		
		Brand Runs	Repurchase Probability	Return Probability	Market Share	Brand Runs	Repurchase Probability	Return Probability
Segment Size	Bran Runs	1.00						
	Repurchase Probability	0.99	1.00					
	Return Probability	0.99	0.99	1.00				
	Market Share	0.96	0.94	0.95	1.00			
Degree of Loyalty	Brand Runs	0.33	0.35	0.33	0.26	1.00		
	Repurchase Probability	0.34	0.37	0.33	0.24	0.78	1.00	
	Return Probability	-0.14	-0.17	-0.18	-0.23	0.38	0.41	1.00

Data: Descriptive Statistics



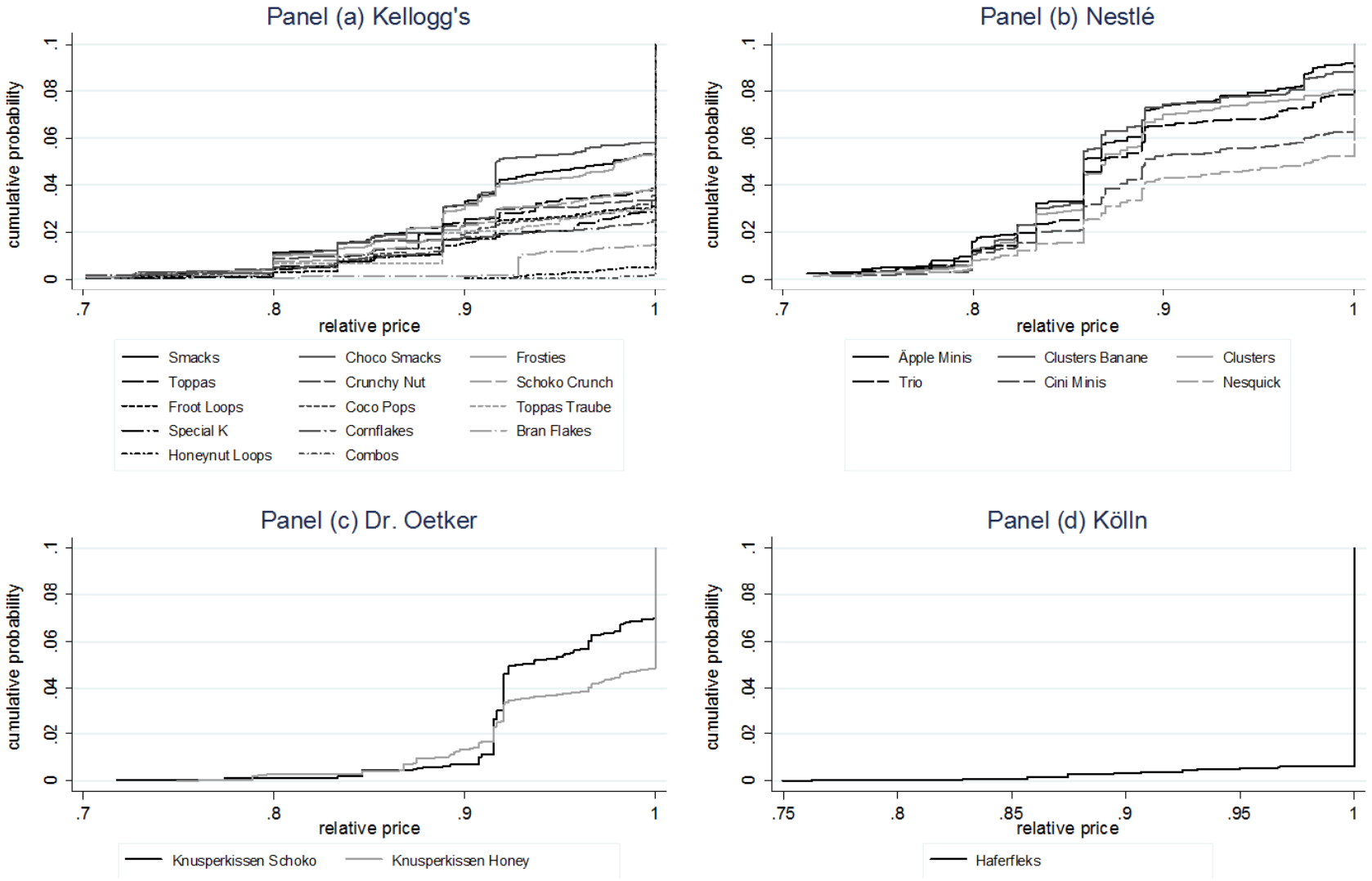


Christian-Albrechts-Universität zu Kiel

Data: Descriptive Statistics

Christian-Albrechts-Universität zu Kiel

Data: Descriptive Statistics: Frequency and depth of sales' prices



Results: Frequency of Price Promotions

	Frequency of Price Promotions (1)	(2)	(3)
Constant	0.084*** (4.92)	0.245*** (4.90)	0.232*** (4.28)
Degree of Brand Loyalty			
Average Length of Brand Run	-0.011** (-2.97)		
Repurchase Probability		-0.394*** (-4.28)	
Return Probability			-0.299*** (-3.86)
Segment Size *1000	0.275*** (4.06)	0.559*** (4.91)	1.263*** (5.41)
Retail Chain Dummies			
Markant	-0.009 (-1.95)	-0.010* (-1.99)	-0.006 (-0.90)
Metro	0.028*** (6.87)	0.027*** (6.11)	0.028*** (5.05)
Rewe	-0.077*** (-12.3)	-0.077*** (-11.7)	-0.077*** (-9.95)
Tengelmann	-0.051*** (-8.29)	-0.051*** (-7.78)	-0.054*** (-6.83)
Others	-0.033*** (-4.29)	-0.036*** (-4.40)	-0.047*** (-4.24)
Discounter Dummy	-0.084*** (-7.66)	-0.097*** (-7.97)	-0.122*** (-6.12)
Manufacturer Dummies			
Kellogg's	-0.053*** (-5.46)	-0.101*** (-5.78)	-0.116*** (-4.27)
Koelln	-0.087*** (-7.79)	-0.113*** (-8.44)	-0.115*** (-7.07)
Nestlé	0.013 (1.83)	-0.028* (-2.11)	-0.025 (-1.75)
LL [LL(β=0)]	-11203.49 [669.33]	-6030.16 [669.33]	-4581.84 [669.33]
Wald Test of Exogeneity	0.106	0.000	0.000
N	1,729	1,729	1,729

Results: Depth of Price Promotions

	Depth of Price Promotions		
	(4)	(5)	(6)
Constant	0.147***(4.25)	0.473***(4.61)	0.429***(4.20)
Degree of Brand Loyalty			
Average Length of Brand Run	-0.022**(-2.80)		
Repurchase Probability		-0.786***(-4.17)	
Return Probability			-0.555***(-3.80)
Segment Size *1000	0.743***(5.41)	1.310***(5.63)	2.370***(3.36)
Retail Chain Dummies			
Markant	-0.017 (-1.74)	-0.019 (-1.78)	-0.013 (-1.00)
Metro	0.001 (0.14)	-0.001 (-0.13)	0.001 (0.09)
Rewe	-0.174***(-13.9)	-0.174***(-13.0)	-0.175***(-11.8)
Tengelmann	-0.041***(-3.44)	-0.041**(-3.15)	-0.048**(-3.21)
Others	-0.022 (-1.42)	-0.029 (-1.72)	-0.044* (-2.14)
Discounter Dummy	-0.211***(-10.1)	-0.235***(-9.93)	-0.265***(-7.11)
Manufacturer Dummies			
Kellogg's	-0.083***(-4.19)	-0.173***(-4.85)	-0.172***(-3.37)
Koelln	-0.116***(-5.27)	-0.171***(-6.31)	-0.159***(-5.23)
Nestlé	-0.029* (1.99)	-0.055*(-2.03)	-0.040 (-1.46)
LL [LL(β=0)]	-11959.83[20.44]	-6828.57 [20.44]	-5327.54 [20.44]
Wald Test of Exogeneity	0.000	0.000	0.000
N	1,729	1,729	1,729

Summary and Conclusions:

- In theory brand loyalty has a significant impact on the design of the promotional strategy.
- We find strong empirical support for a negative impact of the 'level of brand loyalty' on the frequency and depth price promotions.
- Stronger corporate brands tend to be promoted less frequently by smaller discounts.
- We also find a smaller and positive impact of the 'size of loyalty' in particular for the market leader Kellogg's which promotes its popular brands more frequent and deeply.
- This result supports the theoretical model presented by Koçaş and Bohlmann (2008) indicating that the market leader has a lower SLR.