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The scope of price promotion research: An informetric study☆

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ABSTRACT

Price promotions are an essential element of a company's marketing policy because they affect sales, profits, and key intangible assets, such as brand equity. Recognizing their importance, research has accumulated an extensive and diverse amount of knowledge. This study facilitates access to the complex price promotion literature, enabling managers and researchers to more effectively capitalize on extant scientific insights. The authors apply a unique combination of quantitative bibliometric analysis and text-mining techniques to contribute a fresh, domain-neutral, and objective review of price promotion research published in 1165 journal articles from 1980 to 2013. The results provide a structured overview of the field's main research streams, their most influential works and key insights, their intellectual connections, and their temporal evolution. A discussion of the findings reveals potential for future research endeavors.

1. Introduction

Price promotion appears, at first sight, to be a simplistic marketing topic. When a product is on promotion, potential buyers typically infer that the product is available at a lower price than usual. Accordingly, Blattberg, Briesch, and Fox (1995, p. 122) define price promotions as "temporary price discounts offered to a customer." Promotions' impact, however, can be complex and far-reaching as the following example illustrates. The U.S. retailer J.C. Penney implemented an everyday low price (EDLP) strategy, which removed temporary discounts and coupons to cut costs and increase store traffic (Ofek & Avery, 2012). The strategy ultimately failed, creating a drastic drop in revenues and profits. Among the various reasons was J.C. Penney's shortcoming to account for the psychological effects of the strategic change. Over the years, the firm conditioned its shoppers to value the excitement of getting a deal. As a result, shoppers perceived the EDLP as less valuable than a large but temporary discount and avoided the retailer's stores. Although current research attests to the positive effects of EDLP strategies (e.g., Danziger, Hadar, & Morwitz, 2014), the case of J.C. Penney shows that, in reality, promotional decisions can be more complex than scientific experiments would suggest.

Ample research exists on the positive and adverse effects of price promotions. Studies reveal that promotions not only influence companies' revenues (e.g., Pauwels, Hanssens, & Siddarth, 2002) and profits (e.g., Jedidi, Mela, & Gupta, 1999) but also affect crucial intangible assets, such as brand equity (e.g., Buil, de Chernatony, & Martínez, 2013) and brand loyalty (e.g., Gedenk & Neslin, 1999). Given the variety and complexity of effects, both researchers and managers can benefit from capitalizing on existing scientific findings. One major hurdle, however, is the complex and rich body of literature, which causes difficultly for non-experts in detecting insights applicable to their specific problem.

Facilitating access to highly relevant but complex scientific knowledge is a tedious but indispensable task. Thus, the purpose of this study is to provide an overview of the major price promotion research streams, their main findings and most influential works, their intellectual connections, and their temporal evolution. To achieve this goal, the study adopts an informetric research approach. Informetrics refers to the quantitative measurement and modeling of information in any form encompassing, among others, the narrower fields of bibliometrics, scientometrics, and quantitative linguistics (Egghe & Rousseau, 1990). Compared with a classic literature review, a major advantage of bibliometrics is its use of objective quantitative techniques to avoid potential subjective biases introduced by the researcher (Ferreira, Santos, de Almeida, & Reis, 2014; Ramos-Rodríguez & Ruíz-Navarro, 2004).

Existing studies acknowledge this benefit and successfully apply bibliometric analysis to identify research streams within a scientific field (e.g.Acedo & Casillas, 2005; Nerur, Rasheed, & Natarajan, 2008). However, when characterizing the streams' themes, they typically rely on manual inspection of publications' abstracts, keywords, or full texts. The present paper further strengthens bibliometrics' main advantage by applying quantitative text mining to support a more objective interpretation of the discourses' content.

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This approach contributes to a fresh, domain-neutral, and objective perspective on the research landscape and extends prominent reviews on price promotion literature (Blattberg & Neslin, 1989; Blattberg et al., 1995; Neslin, 2002) that share several limitations. These reviews adopt a distinct marketing perspective, appear in marketing journals (i.e., *Marketing Letters* and *Marketing Science*) or in dedicated marketing books (i.e., *Handbook of Marketing*), and stem from established authors in the marketing discipline. Furthermore, the last prominent review appeared more than a decade ago and thus may not reflect recent developments. This paper explores both recent and past price promotion researches with a quantitative, and thus less subjective, approach without narrowing the view on a particular research domain. Thereby, this research complements the work of Leone, Robinson, Bragge, and Somervuori (2012), who perform a descriptive citation and profiling analysis within the considerably broader field of pricing. Although these authors do not provide specific insights into price promotion research, they stress the subject's relevance, as promotion ranked fourth among the most important topics in pricing. This finding underscores the need for a dedicated evaluation of price promotion research.

By examining this relevant area, the paper offers substantial benefits for both researchers and practitioners. The paper fulfills an encyclopedia function by providing a compact overview of the field's major discourses, findings, and publications. Furthermore, holding up a mirror to price promotion researchers, the paper reveals the field's major schools of thought and measures their knowledge exchange. This assessment helps identify silo mentalities, broadens the research communities' perspectives, and uncovers white spots on the research map that serve as starting points for future research avenues.

2. Methodology

The informetric approach adopted involves the following steps: we create the data basis by identifying scientific articles that represent price promotion research. Then, we briefly introduce informetric techniques to analyze the cited references and abstracts of the article database. Next, we provide a micro-view on the research landscape using co-citation analysis, factor analysis, and text mining to detect research streams, describe their representative publications and dominant topics, and summarize their main insights. Finally, we analyze the entire research system from a meta-view to examine the streams' differences, uncover their inter-relationships (using social network analysis), track their evolution over time, and offer a starting point for future research avenues.

2.1. Data basis

In accordance with proven practice in informetric analysis (e.g. Leone et al., 2012, Ramos-Rodríguez & Ruíz-Navarro, 2004), the Social Sciences Citation Index serves as the data source. We performed a three-step process involving search term definition, article extraction, and data cleaning to identify publications that represent the predominant body of literature in price promotion research from 1980 to 2013. We refer to the resulting 1165 articles as “publication sample” in the remainder of the study. The 22,405 works referenced (i.e., cited) by the publication sample constitute the intellectual basis of price promotion research and are subsequently called “reference sample.”

Web Appendix A provides details on the retrieval process and a descriptive analysis of the extracted database. Specifically, the Appendix presents the top 10 influential scientific journals per research domain, the top 20 cited authors, and the top 20 referenced publications in price promotion research.

2.2. Analysis techniques

Performing co-citation analysis on the reference sample paves the way for detecting research streams (i.e., discourses). According to Small (1973), co-citation analysis reveals publications' similarity or association by measuring the frequency with which two articles are cited together. High co-citation counts indicate that two publications are jointly relevant for a scientific discourse from the perspective of a considerable number of authors. Accordingly, co-citation analysis is a widespread and successful tool to investigate the intellectual structure of an academic field (White & Griffith, 1981). Following proven practice (White & McCain, 1998), this study uses a major output of co-citation analysis—namely, the co-citation matrix—as input for factor and network analyses.

Factor analysis is a commonly used technique to identify research streams within a scientific field (McCain, 1990; Nerur et al., 2008). A symmetric co-citation matrix containing the co-citation counts of the relevant publication set constitutes the database. Factor analysis evaluates the co-citation structure and groups frequently co-cited articles into factors. These factors represent scientific discourses (i.e., research streams) based on the premise that frequent co-citations indicate sharing of common ideas (latent elements). This method also provides numerical indicators to detect representative and influential publications within discovered discourses. Publications' factor loadings reveal how well an article fits into a specific stream—that is, how representative the article is for a scientific discourse (Nerur et al., 2008). Publications' factor scores indicate how strongly a contribution influences a stream—that is, how important the contribution is for a discourse (Teichert & Shehu, 2010). Observations in which relative sizes of loadings and scores significantly deviate are of particular interest. A publication that is, for example, not representative of a discourse but exerts a high influence can be identified as basic research work that is relevant over and above the specific research stream.

Textual data mining, or briefly text mining, is a computer-aided technique used to gain meaningful knowledge from large text collections (Losiewicz, Oard, & Kostoff, 2000). This study uses the text-mining software Leximancer to extract important lexical terms (i.e., concepts) from the abstracts of the publication sample, to characterize the topics of research streams. Smith and Humphreys (2006) provide a detailed description of Leximancer functionalities and calculation logic. The algorithm-based identification of key ideas in discourses supports the current endeavor to provide an objective literature review based on quantitative analysis techniques.

In informetric studies, social network analysis is commonly performed on co-citation data of the reference sample to reveal linkages and hidden structures on publication and discourse levels (Otte & Rousseau, 2002). In addition to visualization, social network analysis provides numerical indicators to substantiate the characterization of networks (Barnett, Huh, Kim, & Park, 2011). We use the software UCINET to display network structures and to calculate density scores (Borgatti, Everett, & Freeman, 2002). The density indicator quantifies the degree to which information is exchanged within and between research streams. Density scores are calculated by dividing the number of existing ties by the number of all possible ties between discourses (Hanneman & Riddle, 2005). The more ties exist, the denser is the network and the more closely related are the discourses across the network (Biehl, Kim, & Wade, 2006).

3. Findings on research streams

We investigate the references and abstracts of the 1165 articles in the publication sample to obtain a detailed understanding of price promotion research streams. First, we conduct factor analysis on co-citation data to identify distinct research streams and their representative publications. Second, we describe each stream's main topics on the basis of key concepts provided in the abstracts. Finally, we join both analysis results to interpret and characterize the revealed discourses.

3.1. Representative publications

We perform factor analysis on co-citation data to identify major price promotion research streams. According to proven bibliometric practice (e.g.McCain, 1990; Small, 2006; White & McCain, 1998) we thoroughly prepared and streamlined the reference sample and identified 164 top-cited publications (i.e., factor sample) that constitute the main intellectual pillars of price promotion research. Based on these articles' co-citations, factor analysis extracted seven factors that represent the major discourses in the field (Table 1). Web Appendix B describes the data processing and factor extraction in detail.

In total, the seven streams explain 72% of variance in the data. The amount of variance explained signals a stream's importance for the conceptual foundation of a scientific field (Nerur et al., 2008). The results show that "dynamic promotional effects," "choice models," and "reference effects of price promotions" are the three most prominent discourses in price promotion research. Table 1 also displays the top 10 most representative contributions (highest factor loadings) in each stream and their influence (factor score) on the discussion. Section 3.3 presents a discussion of the seven streams' most representative and influential contributions in greater detail.

3.2. Main topics

We apply text mining to detect meaningful price promotion concepts that capture the discourses' main topics and content. Following Smith and Humphreys (2006), we used the text-mining software Leximancer to extract 417 concepts from the 1165 abstracts of the publication sample. Cleaning and streamlining narrowed the list to 218 key concepts. From the relative occurrence frequencies, we assigned key concepts to the seven research streams. Table 2 presents the top 10 most frequently occurring concepts per discourse. Web Appendix C outlines details on Leximancer's functionalities as well as the extraction, streamlining, and matching procedure.

Table 2 presents measures to evaluate a concept's importance and specificity for a discourse. A high relative occurrence count in a discourse indicates that a concept is highly important for that discourse. The relative occurrence count in the factor sample indicates the overall importance of a concept for all discourses. Dividing the first by the second measure yields the context-specificity ratio, which indicates how specific a concept is for a given discourse. The concept "equilibrium," for example, appears 7.2 times more often in the abstracts of the fifth discourse (relative occurrence = 35.3%) than in the entire abstract population (relative occurrence = 4.9%). Thus, "equilibrium" is an important and specific topic of the fifth discourse.

3.3. Key characteristics

Combining factor analytic and text-mining results (Tables 1 and 2), we now characterize and interpret each discourse's content. Key concepts derived from text mining indicate each stream's main research topic. The most representative and influential contributions identified by factor analysis serve as reference points to detect each stream's key insights, dominant theoretical background, and typical research methodology and data.

Concepts such as "promotions," "long-term," and "effectiveness" (Table 2) illustrate the essential ideas of the first research stream on "dynamic promotional effects": price promotions are considered strategic marketing investments, and thus measuring their long-term impact and effectiveness is of major concern for decision makers. Dekimpe, Hanssens, and Silva-Risso (1998) contribute the most representative work (factor loading [FL] = 0.92) to this discourse (Table 1). Their major finding is that price promotions' positive short-term effect on sales does not persist in the long run. The most influential publication, however, is Mela, Gupta, and Lehmann's (1997) article (factor score [FS] = 3.58), which finds that in the long run, price promotions increase price sensitivity. In terms of representativeness, this early work is only ranked 20th (FL = 0.82), which suggests that it established the discourse's basic intellectual pillars but became less representative for current research endeavors. Publications in this research stream share common theories and methodologies: based on classic economic theory (utility maximization), the dominant methodology in this research stream primarily relies on multivariate regression models using scanner data.

Table 1
Top 10 most representative publications per discourse based on factor loadings.

1: Dynamic promotional effects			2: Choice models			3: Reference effects of price promotions			4: Couponing			5: Equilibrium pricing strategies			6: Retail promotions			7: Repeat-purchase probability			Summary
(Variance explained: 19%)			(Variance explained: 13%)			(Variance explained: 11%)			(Variance explained: 9%)			(Variance explained: 8%)			(Variance explained: 7%)			(Variance explained: 5%)			Total variance explained by 7 factors: 72%.
Publication[1]	FL	FS	Publication[1]	FL	FS	Publication[1]	FL	FS	Publication[1]	FL	FS	Publication[1]	FL	FS	Publication[1]	FL	FS	Publication[1]	FL	FS	
Dekimpe, MG (1998), ECTR	0.92	2.00	Bucklin, RE (1992), JMR	0.82	2.04	Helson, H (1964), Bk	0.87	1.94	Lichtenstein, DR (1990), JM	0.87	3.36	Rao, RC (1991), MS	0.89	3.30	Walters, RG (1988), JMR	0.85	3.63	Davis, S (1992), JMR	0.67	2,14	
Dekimpe, MG (1999), JMR	0.92	2.25	Bucklin, RE (1991), MS	0.82	1.61	Monroe, KB (1990), Bk	0.86	1.00	Shimp, TA (1984), JCR	0.87	2.73	Lal, R (1990), MS	0.88	2.87	Walters, RG (1991), JM	0.79	2.76	Kahn, BE (1990), JMR	0.65	1,96	
Pauwels, KH (2002), JMR	0.91	3.48	Ben-Akiva, M (1985), Bk	0.81	1.46	Rajendran, KN (1994), JM	0.86	1.85	Bawa, K (1987), JM	0.86	2.91	Narasimhan, CS (1988), JB	0.83	4.42	Mulhern, FJ (1991), JM	0.77	2.55	Shoemaker, RW (1977), JAR	0.64	2,10	
Srinivasan, S (2000), IJRM	0.90	1.24	Chiang, JW (1991), MS	0.81	2.73	Kalwani, MU (1990), JMR	0.85	2.74	Lichtenstein, DR (1995), JCR	0.86	1.96	Varian, HR (1980), AER	0.83	4.20	Hoch, SJ (1995), JMR	0.77	3.14	Neslin, SA (1989), JMR	0.63	3,37	
Nijs, VR (2001), MS	0.90	3.24	Jain, DC (1991), MS	0.80	0.71	Kalwani, MU (1992), JMR	0.85	3.04	Reibenstein, DJ (1982), JM	0.77	1.74	Raju, JS (1990), MGS*	0.82	5.27	Kumar, V (1988), JMR*	0.75	4.13	Dodson, JA (1978), JMR*	0.58	4,80	
Srinivasan, S (2004), MGS	0.90	2.21	Gonul, FF (1993), MS	0.80	1.31	Gupta, S (1992), JCR	0.83	1.65	Lichtenstein, DR (1993), JMR	0.77	1.48	Lal, R (1990), JMR	0.81	1.56	Walters, RG (1986), JR	0.73	1.83	Rothschild, ML (1981), JM	0.57	1,66	
Pauwels, KH (2004), MS	0.88	1.15	Krishnamurthi (1991), MS	0.79	0.99	Mayhew, GE (1992), JCR	0.83	2.54	Blattberg, RC (1978), JMR	0.76	2.73	Jeuland, AP (1985), JB	0.78	1.85	Moriarty, MM (1985), JR	0.71	1.99				
Foekens, EW (1999), ECTR	0.88	1.30	Krishnamurthi, L (1988), MS	0.78	1.53	Kahneman, D (1979), ECTA*	0.82	4.00	Webster, FE (1965), JMR	0.75	2.18	Lal, R (1998), MGS	0.76	0.80	Hoch, SJ (1994), JM	0.69	2.39				
Vanheerde, HJ (2000), JMR	0.87	1.52	Chintagunta, PK (1993), MS	0.75	3.16	Kalyanaram, G (1994), JCR	0.81	1,68	Leone, RP (1996), JR	0.74	1.20	Moorthy, KS (1988), MS	0.75	0.69	Bell, DR (1998), MS	0.69	1.83				
Jedidi, K (1999), MS	0.87	2.5	Chintagunta, PK (1991), JMR	0.74	1.12	Thaler, RH (1985), MS	0.77	3.73	Montgomery, DB (1971), JMR	0.74	2.26	Gerstner, E (1991), AER	0.74	2.01	Mulhern, FJ (1995), JM	0.67	1.15				
Other: 35 publ. (FL ≤ 0.87)			Other: 22 publ. (FL ≤ 0.74)			Other: 17 publ. (FL ≤ 0.77)			Other: 9 publ. (FL ≤ 0.74)			Other: 7 publ. (FL ≤ 0.74)			Other: 8 publ. (FL ≤ 0.67)						
Highest FS: Mela, CF (1997), JMR*	0.82	3.58	Highest FS: Guadagni, PM (1983), MS*	0.64	5.49				Highest FS: Narasimhan, CS (1984), MS*	0.66	3.82										

Note: ECTR: Journal of Econometrics, JMR: Journal of Marketing Research, MS: Marketing Science, IJRM: International Journal of Research in Marketing, MGS: Management Science, JM: Journal of Marketing, JCR: Journal of Consumer Research; ECTA: Econometrica; JR: Journal of Retailing, JB: Journal of Business, AER: American Economic Review, JAR: Journal of Advertising Research, Bk: Book FL = Factor loading, FS = Factor score.

* Highest factor score.

[1] For better graphical representation, only the first author is listed.

Table 2
Top 10 concepts based on relative occurrence count in discourse.

Concept	Relative occurrence count…		CSR	Concept	Relative occurrence count…		CSR
	…in discourse	…in factor sample			…in discourse	…in factor sample	
1: Dynamic promotional effects				2: Choice models			
Promotions	60.0%	38.4%	1.6	Brand	78.1%	57.3%	1.4
Category	48.9%	28.0%	1.7	Market	75.0%	53.7%	1.4
Response	42.2%	26.8%	1.6	Choice	75.0%	31.1%	2.4
Long-term	28.9%	8.5%	3.4	Purchase	68.8%	36.0%	1.9
National brand	24.4%	9.8%	2.5	Marketing	62.5%	30.5%	2.1
Elasticity	20.0%	9.1%	2.2	Decisions	53.1%	24.4%	2.2
Advertising	17.8%	9.1%	1.9	Household	43.8%	18.9%	2.3
Effectiveness	15.6%	7.9%	2.0	Preference	31.3%	11.0%	2.8
Benefits	15.6%	6.1%	2.6	Framework	28.1%	12.8%	2.2
Private label	13.3%	6.1%	2.2	Heterogeneity	28.1%	6.1%	4.6
3: Reference effects of price promotions				4: Couponing			
Consumer	70.0%	58.0%	1.2	Behavior	52.6%	29.3%	1.8
Reference price	44.4%	17.1%	2.6	Coupon	52.6%	12.2%	4.3
Experiment	22.2%	9.8%	2.3	Value	31.6%	15.2%	2.1
Expected	22.2%	7.3%	3.0	Variety	10.5%	3.7%	2.9
Loss	22.2%	6.1%	3.6	Tax	5.3%	1.2%	4.3
Frequency	18.5%	11.6%	1.6	Subjective	5.3%	0.6%	8.6
Process	18.5%	5.5%	3.4	Mobile	5.3%	0.6%	8.6
Standard	11.1%	4.3%	2.6	Equity	5.3%	1.8%	2.9
Savings	11.1%	4.3%	2.6	Acquisition	5.3%	1.2%	4.3
Quality	11.1%	7.3%	1.5	Redeem	5.3%	0.6%	8.6
5: Equilibrium pricing strategies				6: Retail promotions			
Manufacturer	41.2%	20.1%	2.0	Price	83.3%	60.4%	1.4
Equilibrium	35.3%	4.9%	7.2	Store	72.2%	29.3%	2.5
Deal	35.3%	17.1%	2.1	Product	72.2%	47.0%	1.5
Discount	35.3%	14.0%	2.5	Retailer	66.7%	27.4%	2.4
Trade	29.4%	10.4%	2.8	Sales	55.6%	32.9%	1.7
Game theory	29.4%	4.3%	6.9	Invest	38.9%	11.0%	3.5
Cost	23.5%	9.1%	2.6	Relationship	33.3%	12.8%	2.6
Competing	23.5%	6.7%	3.5	Industry	27.8%	6.7%	4.1
Loyalty	17.6%	6.7%	2.6	Goods	22.2%	8.5%	2.6
Profits	17.6%	8.5%	2.1	Strategy	22.2%	8.5%	2.6
7: Repeat-purchase probability							
Repeat purchase	66.7%	2.4%	27.3				
Pack	16.7%	7.9%	2.1				
Switching	16.7%	8.5%	2.0				
Involvement	16.7%	0.6%	27.3				
Perception	16.7%	4.3%	3.9				
Management	16.7%	1.8%	9.1				
Contrast	16.7%	4.3%	3.9				
Order	16.7%	4.3%	3.9				

Note: CSR = context-specificity ratio.

The concepts “brand,” “choice,” “purchase,” “decisions,” and “heterogeneity” suggest that the second research stream deals with “choice models,” which simulate consumers' purchase decisions in the presence of heterogeneous preferences. The most influential article (FS = 5.49) is Guadagni and Little's (1983), which finds that a multinomial logit model can accurately explain brand choice. Despite having a relatively low fit with the discourse (FL = 0.64), this work established the methodological basis for consecutive publications, including the streams' most representative article (FL = 0.82) by Bucklin and Gupta (1992). The latter contribution extends previous results by successfully applying disaggregate multinomial logit and nested logit models to price promotions. Both examples show that a strong focus on methodology is a striking characteristic of this research stream: based on utility-maximization theory and revealed preferences, most contributions aim to further refine consumer choice modeling techniques using price promotions as an application area.

The concepts “reference price,” “expected,” and “experiment” provide important hints on the third research stream's content: in an experimental environment, “reference effects of price promotions” are analyzed to understand their role in affecting consumers' price expectations. The most representative contribution (FL = 0.87) is Helson's (1964) adaptation-level theory. Although he did not address the promotional topic specifically, Helson's theory explains why consumers adjust their internal reference prices when exposed to price promotions. The same argument is true for Kahneman and Tversky's (1979) article on prospect theory, which is the most influential work in this discourse (FS = 4.00) but only ranked eighth in terms of fit (FL = 0.82). The article provides a fundamental framework for behavioral-oriented promotion research but is also relevant for many other scientific fields. In contrast, Kalwani and Yim's (1992) representative and influential work (FL = 0.85, FS = 3.04) provides promotion-specific insights. The authors find that frequent and deep price promotions lower consumers' price expectations (i.e., reference prices) and have an adverse impact on brands' profits. Overall, the methodological approach in this research stream is distinct from those in the first and second streams: scanner data analysis is still used but often replaced by more psychology-oriented techniques, such as experiments.

The concepts “coupon” and “redeem” suggest that the fourth discourse is dedicated to a specialized promotion topic—namely, “couponing.” Research in this stream is strongly driven by the questions of why coupons are used, how they are mentally processed by consumers, and why redemption rates differ across buyers. The most prominent work (FL = 0.87) by Lichtenstein, Netemeyer, and Burton (1990) finds that consumers' responses to coupons depend on both

their value consciousness and coupon proneness. Narasimhan's (1984) most influential article (FS = 3.82) reports that coupon users are more price elastic than non-users, which makes coupons an effective price discrimination tool. The concept "behavior" provides a first hint on the theoretic and methodological background of this discourse. Behavioral economics and behavioral pricing build the theoretic foundation for the coupon discussion. In the most prominent studies, the methodology of choice is structural equation modeling based on experimental data.

The first four research streams mainly investigate promotional effects on end customers, while the fifth discourse examines effects of price promotions on a higher (microeconomic) level. The concepts "manufacturer," "trade," and "equilibrium" propose that the actors in this discourse are companies using promotions to compete on price. Thus, the main research quest is to find and characterize (game-theoretic) "equilibrium pricing strategies." The most representative contribution (FL = 0.89) by Rao (1991) finds that, in equilibrium, national brands promote more than private labels to avoid losing customers to the cheaper brands. The most influential work (FS = 5.27) is Raju, Srinivasan, and Lal's (1990), which reports that, in equilibrium, price promotions are less profitable for brands with loyal customers than for brands with less loyal customers. This research stream also differs from the others from both a theoretic and a methodological viewpoint: game theory provides the theoretic framework, relying more on formal mathematical modeling than on multivariate regression analysis or choice modeling.

The characteristic concepts "industry," "retailer," and "store" indicate the sixth discourse's focus on "retail promotions"—that is, application of price promotions from a retailer's perspective. Walters and MacKenzie's (1988) prominent work (FL = 0.85) finds that in-store promotions affect retailers' profits by increasing overall store traffic rather than boosting the promoted items' sales. Kumar and Leone's (1988) most influential work (FS = 4.13) reports that price promotion causes the largest amount of brand substitution in a store, followed by featuring and displays. Overall, research in this stream mainly builds on microeconomic theories, especially the theory of the firm. The dominant methodology comprises structural equation models and multivariate regression models based on scanner data.

Concepts such as "repeat purchase," "involvement," and "switching" hint at a seventh discussion on how price promotions affect the "repeat-purchase probability" of brands after withdrawal of a temporary price reduction. The discourse's most influential work (FS = 4.8) by Dodson, Tybout, and Sternthal (1978) argues that, on an aggregate level, retracting price discounts from a promoted brand results in lower repurchase probabilities. The most representative study (FL = 0.67) by Davis, Inman, and McAlister (1992) disconfirms previous findings showing that, on an individual level, promotions have no adverse effect on brand evaluations and, thus, no negative impact on repurchase probabilities. Overall, the theoretic background of this research stream is located in behavioral economics. The discourse's methodology in early years relied on classic scanner data analysis, while recent contributions focus more on experimental approaches.

4. Findings on the research system

We now zoom out to provide a meta-view on the entire price promotion research system. We summarize the results by comparing discourses' content. Then, we evaluate the research network by uncovering linkages and hidden structures within the research system. Finally, we provide an overview of the evolution of the research system by tracking discourses' development over time. At the end of each step, we discuss white spots on the research map.

4.1. Discourse comparison

Table 3 summarizes and compares the key characteristics of each discourse derived in the previous sections across four dimensions: main topics, key findings, the dominant theoretical background, and typical research methodology and data. The comparison affirms that price promotion research is a diverse and complex scientific field. Discourses cover a wide variety of topics reaching beyond the traditional scope of price promotions as a simple marketing instrument to boost sales. In contrast, more strategic issues are addressed: researchers in the first discourse, for example, assess long-term promotional effects on key performance indicators, such as market share and profitability. Studies in the third stream examine psychological effects on consumers' price perceptions. The fifth discourse deals with promotions' role as a competitive pricing tool and investigates promotional strategies to succeed in pricing games. Table 3 also shows that price promotion discourses address their research topics with distinct theories and different methodologies. In particular, behavioral economics and game theory transcend the boundaries of classic economic theory and introduce psychology- and microeconomic-oriented methodologies to the research field.

Differences among discourses offer a good starting point to detect white spots on the research map because they raise the question whether certain streams could generate new insights by borrowing proven methodologies and theories from other streams. Researchers investigating dynamic promotional effects, for example, could presumably advance their discourse by respecting behavioral aspects in their explanation models. The same argument holds for the microeconomic discourses on "equilibrium pricing strategies" and "retail promotions." Although experiments are more difficult to conduct in this business setting, psychological theories might still provide insightful explanations and solutions to extend the discourse's knowledge.

4.2. Research network

Equipped with a good understanding of research streams' differences, we now analyze their linkages. Fig. 1 depicts how publications and discourses are related to each other by means of co-citation patterns present in the factor sample. Publications' prevalence, measured by citation counts, is reflected in the nodes' size, while line thickness represents the tie strength between contributions, measured by their pairwise co-citations. The spring-embedded algorithm of UCINET (Borgatti et al., 2002) positions publications according to their geodesic distance, indicating how similar or dissimilar they are in content (For calculation details, please refer to Web appendix D). For ease of reading, only connections reflecting more than 12 co-citations are displayed.

To substantiate graphical interpretation, an important network characteristic is numerically captured by the density indicator (Table 4). Density measures the average tie strength of co-citations and the speed at which information is exchanged between and within discourses (Hanneman & Riddle, 2005). High density scores indicate intensive idea sharing, while low density scores signal little intellectual connection. We follow Biehl et al. (2006) and use the average tie strength as a cutoff value to dichotomize data for density calculation. Web appendix D provides details on density score calculation.

Overall, the tight network structure in Fig. 1 and the high density scores in Table 4 reveal that price promotion research is a well-established strongly connected research system. Research streams develop distinct ideas but learn from each other and develop the research field together. The network map (Fig. 1) shows that price promotion research is organized around central hubs (large nodes) that represent the main intellectual pillars of the scientific field and connect the seven discourses (thick and frequent lines). The main hubs are the classic works of Blattberg and Neslin (1990); Gupta (1988), and Guadagni and Little (1983). Another group of publications functions as an interface between discourses, as most links to other streams run through them: Winer's (1986) work, for example, is the main linkage between the "reference effects" discourse and the "choice model" stream. Finally, contributions such as Rao's (1991) are highly discourse specific because they share links almost exclusively within their respective streams.

Table 3
Comparison of discourses.

Discourse	Main topics	Key findings	Dominant theoretical basis	Typical research methodology/data	Typical research methodology/data	Suggested readings
1: Dynamic promotional effects	Long-term promotional impact on key performance indicators (e.g., sales, market share, profit).	1. In the long run, price promotion increases price sensitivity. 2. Promotional effects on sales do not persist in the long run.	Classic economic theory (utility maximization)	Multivariate regression models, scanner data	Multivariate regression models, scanner data	Dekimpe et al. (1998); Mela et al. (1997)
2: Choice models	Brand choice models simulating consumers' purchase decisions.	Multinomial logit models are an accurate instrument to model and explain consumers' purchase decisions.	Classic economic theory (utility maximization)	Probabilistic choice models (esp. Logit), scanner data	Probabilistic choice models (esp. Logit), scanner data	Bucklin and Gupta (1992); Guadagni and Little (1983)
3: Reference effects of price promotions	Role of reference prices in affecting consumers' expectations of price promotions.	Price promotions lower a brand's reference price and negatively affect a brand's profit.	Behavioral economics, esp. behavioral pricing	Experiments, also multivariate analysis on scanner data	Experiments, also multivariate analysis on scanner data	Kalwani and Yim (1992)
4: Couponing	Explanation of coupon usage, mental processing of coupons, and differences in redemption rates.	1. Consumers' responses to coupons depend on both their value consciousness and coupon proneness. 2. Coupon users are more price elastic than non-users.	Behavioral economics, esp. behavioral pricing	Structural equation models, experiments	Structural equation models, experiments	Lichtenstein et al. (1990); Narasimhan (1984)
5: Equilibrium pricing strategies	Competitive promotional strategies and equilibrium solutions of pricing games.	1. National brands promote more than private labels to retain consumers. 2. Price promotions are less profitable for brands with loyal customers than for brands with less loyal customers.	Microeconomic theory, esp. game theory	Formal mathematical models, conceptual reasoning	Formal mathematical models, conceptual reasoning	Raju et al. (1990); Rao (1991)
6: Retail promotions	Optimization of promotional strategies to enhance store performance.	1. Promotions affect retailers' profits through their impact on overall store traffic. 2. Price promotion causes the largest amount of brand substitution in a store, followed by featuring and displays.	Microeconomic theory, esp. theory of the firm	Structural equation models, multivariate regression models, scanner data	Structural equation models, multivariate regression models, scanner data	Kumar and Leone (1988); Walters and MacKenzie (1988)
7: Repeat-purchase probability	Influence of price promotions on repurchase probability of brands after withdrawal of temporary price reduction.	1. Early research: retracting price discounts results in lower repurchase probability on an aggregate level. 2. Current research: promotions have no adverse effect on brand evaluations on an individual level and, thus, no negative impact on repurchase probabilities.	Behavioral economics, esp. behavioral pricing	Early research: choice models on scanner data; Current research: experiments	Early research: choice models on scanner data; Current research: experiments	Davis et al. (1992); Dodson et al. (1978)

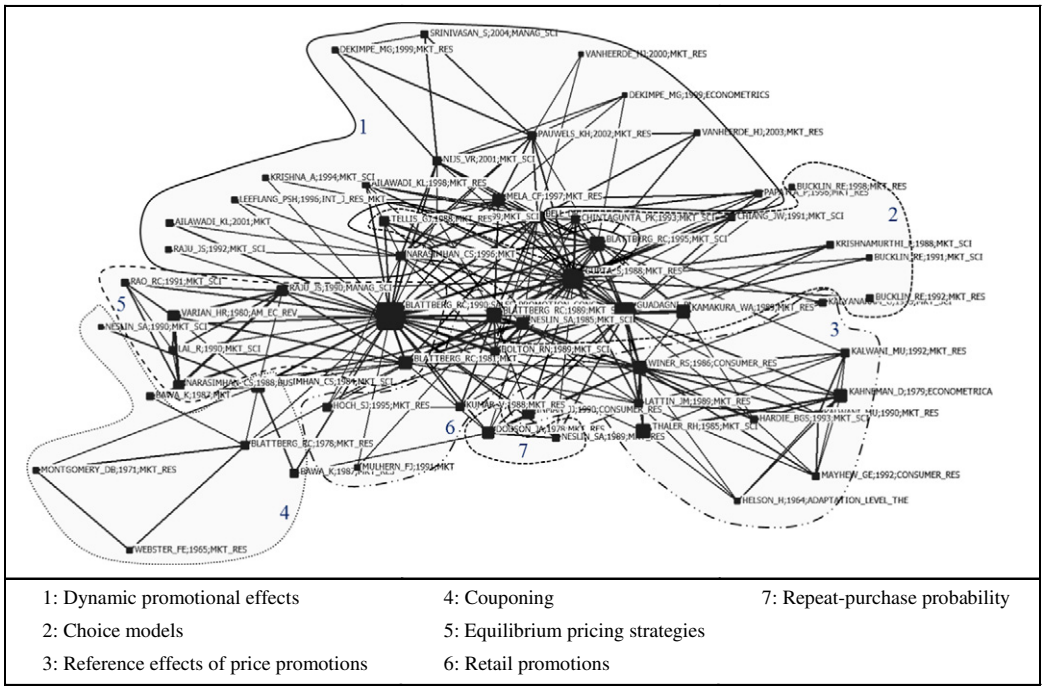

Fig. 1. Interrelations of discourses.

Geographic proximity (Fig. 1) and high density scores (Table 4) between discourses indicate sharing of similar ideas and quick information exchange, while distant locations and low densities signal the opposite. The discourses on "retail promotions" and "equilibrium pricing strategies" are located next to each other, sharing intensive and frequent links and high density scores and therefore indicating an intensive collaboration between research streams. Conversely, the "couponing" discourse is located on the periphery of the research system and shows low density scores compared with other discourses. This observation indicates that couponing is more of a specialized side topic than a central concern of price promotion research. Spatial distance and low inter-discourse density identify the streams of "reference effects" and "dynamic promotional effects" as opposite poles within the research system. The "reference effects" stream represents the behavioral perspective on the promotion topic, while research in the "dynamic promotional effects" stream constitutes the classic economic perspective. The gap between these antagonistic forces is bridged by the discourse on "choice models," which attracts both empirical modelers and behavioral scientists. Finally, local proximity and high density scores indicate that the small and specialized discourse on "repeat-purchase probability" borrows its theoretical background (i.e., behavioral economics) and part of its research methodology (i.e., experiments) from the larger and more general discourse on "reference effects."

Discourses' intellectual distance indicates white spots on the research map. This is the case for the streams based on classic economic theory (particularly stream one) and the behavioral theory-driven streams (streams three, four, and seven). These main forces in the price promotion research system could produce new findings by addressing their respective research topics with the theory and methodology of their counterparts. Behavioral theories could, for example, provide meaningful explanations for phenomena observed when examining price promotions' dynamics. Conversely, a dynamic evaluation of repeat-purchase probabilities may yield new insights into the stream of behavioral decision research.

Table 4
Density scores within and between discourses.

		Density						
Discourse		1	2	3	4	5	6	7
Dynamic promotional effects	1	72%	37%	22%	9%	25%	33%	29%
Choice models	2		65%	24%	10%	35%	35%	26%
Reference effects of price promotions	3			74%	26%	20%	25%	46%
Couponing	4				72%	19%	33%	33%
Equilibrium pricing strategies	5					74%	33%	32%
Retail promotions	6						80%	34%
Repeat-purchase probability	7							100%
Entire research system					34%			

4.3. Temporal evolution

So far, we have analyzed price promotion research from a static perspective. In a final step, we complete the picture by evaluating the temporal development of the price promotion research system—specifically, when research streams emerged, and how their prevalence in the overall research system evolved. A discourse's prevalence is measured by the relative number of citations received from the 1165 price promotion articles in the publication sample. A stream's citation count at a given point in time is divided by the sum of citations given to all streams in the same period (Fig. 2).

Fig. 2 shows that, since the 1980s, research on price promotions has undergone major changes. "Couponing" is a specialized side topic of price promotion research that lost prevalence after larger topics entered the field. The timely development of "equilibrium pricing strategies" follows a similar pattern, though the topic is broader and more prevalent than "couponing." Conversely, "choice models" gained importance over time, becoming the most referenced discourse in the second half of the 1990s. The discussion attracted not only researchers interested in the promotional topic but also scientists interested in the methodology of choice modeling. However, "choice models" primarily investigated consumers' reactions to promotions in static environments. Recognition that promotional effects change over time led to the emergence of the discussion on "dynamic promotional effects" in the early 1990s. In the following years, the prevalence of this research stream augmented, replacing choice models as the most prevalent discourse. Finally, a paradigm shift in economic theory took place in recent years, moving from the image of the utility-maximizing homo

economicus to a more realistic image of a bounded rational consumer. Thus, the discourse on "reference effects" gained momentum as researchers recognized the relevance of psychological theories to explain consumers' response to price promotions.

The temporal development of research streams puts the previous discussion on white spots into perspective. Dynamic evaluations of promotional effects prevail over static investigations in the long run. Furthermore, behavioral-oriented methodologies are gaining ground over methodologies based on classic economic theory. Therefore, future research endeavors need to continuously rejuvenate their methodological and theoretical approaches to stay at the forefront of price promotion research and successfully advance findings within their research stream.

5. Discussion

Price promotions constitute an important pillar of a company's marketing policy, and researchers have generated substantial insights for the field. This study adopts an informetric approach to offer an accessible overview of extant price promotion knowledge captured in 1165 journal articles published from 1980 to 2013. The paper complements and extends existing literature reviews by providing an up-to-date, non-marketing-focused meta-view on the price promotion research landscape using quantitative analysis tools to enhance the objectivity of results.

5.1. Reflection on main results

The paper's results reveal that price promotion is not just a simple tool to boost sales but a differentiated strategic pricing instrument. Factor analysis shows that the price promotion knowledge base is fed by seven major research streams that are shaped by different groups of researchers who examine different promotional topics using a broad range of theories and methodologies.

The first stream investigates dynamic promotional effects on key performance indicators, such as revenues and profits. Major contributions in this stream show that in the long run, price promotions increase price sensitivity but have no persistent effect on revenues or profits. The second stream focuses on modeling brand choice and demonstrates that multinomial logit models are an accurate instrument to model and explain consumers' purchase decisions. Psychological effects of price promotions are the main research subject of the third stream. Influential articles find that price promotions lower a brand's reference price and negatively affect price expectations and profits. The fourth discourse investigates reasons for coupon usage, mental processing of coupons, and differences in redemption rates. Prominent contributions argue that consumers' value consciousness and deal proneness influence their responses to coupons.

The fifth stream on equilibrium pricing strategies lifts the promotion discussion to a strategic, game-theoretic level. Influential contributions find that, in equilibrium, national brands promote more intensively than private labels to retain customers. A retailer's optimal promotional strategy to enhance store performance is the main topic of the sixth discourse. Leading researchers show that promotions affect retailers' profits through their impact on overall store traffic. The seventh research stream explores brands' repurchase probability after withdrawal of price promotions. Current research demonstrates that promotions have no adverse effect on brand evaluations on the individual level and, thus, no negative impact on repurchase probabilities.

This paper's results are somewhat similar to those of existing prominent literature reviews on price promotion (Blattberg & Neslin, 1989, Blattberg et al., 1995, Neslin, 2002) because they summarize empirical findings of influential publications and thereby organize knowledge. However, this work not only structures insights but also characterizes the underlying research system by uncovering the major schools of thought (i.e., research streams), analyzing their knowledge exchange, and exploring their development over time. Thus, this contribution complements existing reviews by adding a meta-view of the research landscape that facilitates access to complex knowledge, helps researchers locate their work within the field, and identifies new directions for future research.

5.2. Future research paths

Social network analysis reveals that the degree of knowledge sharing between certain discourses is still low indicating white spots on the research landscape. Behavioral economics, for example, is a relatively new but increasingly important topic in pricing (Somervuori, 2014). However, psychology-oriented theories and methodologies have not yet penetrated all the price promotion research streams. Particular potential exists for discourses that mainly rely on classic economic theory, such as the discussions on dynamic promotional effects and retail promotions. Research in these areas

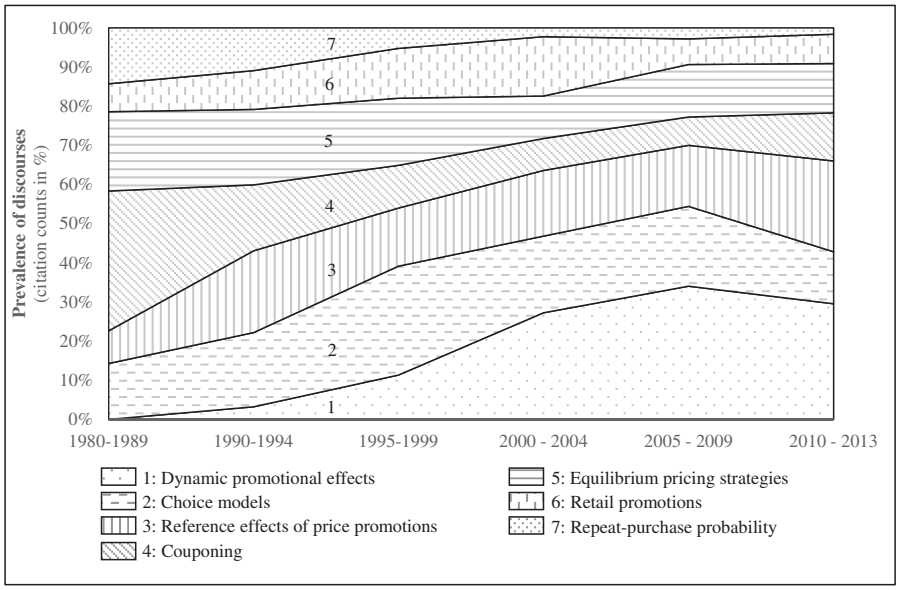

Fig. 2. Prevalence of discourses over time.

could advance findings by applying theories, methodologies, and insights of behavioral economics to better understand how customers perceive and process information and, thus, to better explain and predict their behavior. Psychology-grounded theories also carry great potential to enhance comprehension of organizations' promotional practices. Companies do not make decisions—the responsible individuals do. Thus, systematically examining the impact of individual psychological traits on promotional decisions represents another promising research avenue.

Analysis of temporal evolution shows that streams examining promotions in a static environment are continuously replaced by streams exploring dynamic promotional effects. Findings reveal that promotional effects are time dependent and may persist, disappear, weaken, and even change the direction of influence when analyzed over time. Knowing whether an investment in price will yield long-term benefits is crucial for managers. Discourses that mainly focus on static environments, such as the reference price discussion and the couponing stream, could therefore increase their contribution by accounting for these dynamics. Conducting repeated experiments, for example, could generate additional valuable insights by assessing the temporal persistence of causal effects.

The "couponing" discourse shows that a price reduction can take various forms and is not restricted to a simple discount. Thus, future research could assess more closely whether promotional effects differ for various promotion types (e.g., discounts, rebates, free product offers, coupons). Furthermore, a comparison of discourses shows that the current research focus is on consumer promotions, while trade promotions or other business-to-business price investments receive less attention. New research projects could verify whether the insights gleaned in business-to-consumer markets could transfer over to the business-to-business segment.

Recent advances in technology and methodology represent additional promising stimuli for future price promotion research. The emergence of various e-commerce platforms and price comparison websites, for example, has tremendously increased price transparency (Grewal, Roggeveen, & Nordfält, 2014; Miyazaki, 2003). Although being beneficial for consumers, transparent prices may trigger rapid price erosion turning promotions into a less attractive, or even harmful, marketing instrument for sellers. In contrast, new communication technologies also provide great opportunities. By offering context- or time-specific price incentives on e-commerce platforms or on mobile devices, retailers can effectively differentiate prices or encourage unplanned spending (Chen & Hsieh, 2012; Hui, Inman, Huang, & Suher, 2013). Thus, price promotion researchers may have to re-evaluate existing findings by accounting for the new threats and opportunities introduced by the growing e-commerce and m-commerce business.

As argued earlier, understanding consumers' and managers' cognitive decision making is essential for successful price promotion management. However, humans' underlying mental processes are difficult to examine. Recent neurophysiological methods in psychology provide a promising approach to reveal emotional, motivational and memory processes triggered by price stimuli (Venkatraman et al., 2015). Therefore, applying this modern methodology in price promotion research may generate valuable new insights.

5.3. Implications

This study's results create substantial value for researchers and practitioners. Scientists entering the field may find value in the compact overview of current topics, methodologies, and progress in price promotion research. Experienced scholars can benefit from insights into how their sub-field is embedded in the research system, which streams generate new valuable ideas, and where future research potential is located. For scientists interested in informetric methodology, this paper provides a blueprint on how to combine sophisticated bibliometric analysis with modern text-mining techniques to generate more objective results. Finally, the paper may help practitioners efficiently detect solutions for and insights into their respective price promotion problem by depicting main promotional topics, summarizing major findings, and outlining suggested readings for further reference.

6. Concluding remarks

This study applies quantitative analysis to provide an up-to-date, domain-neutral, and objective review of the existing price promotion literature. We identified and characterized the field's major research streams, mapped their intellectual connections, and tracked their temporal evolution. The findings suggest that price promotion is an important, well-established, and differentiated scientific field that still has substantial research potential. In particular, applying behavioral economic theory and accounting for dynamics of promotional effects when answering existing and new research questions would offer promising opportunities.

Appendix. Methodological details

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jbusres.2015.11.004.

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