FUNDAÇÃO GETULIO VARGAS
ESCOLA DE ADMINISTRAÇÃO DE EMPRESAS DE SÃO PAULO

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"LESS SUGAR AND MORE SALES" – The effects of in-store marketing of diet products during economic expansion and contraction cycles in an emerging market.

SÃO PAULO - SP

2019

VIVIANE MOURA ROCHA FERREIRA

Tese

Tese apresentada à Escola de Administração de Empresas de São Paulo, da Fundação Getulio Vargas, em cumprimento aos requisitos para obtenção do título de Doutora em Administração Empresas.

Linha de Pesquisa: Estratégias de Marketing

Orientador: Prof. Dr. Felipe Zambaldi

SÃO PAULO - SP

2019

Ferreira, Viviane Moura Rocha.

'Less sugar and more sales' – the effects of in-store marketing of diet products during economic expansion and contraction cycles in an emerging market. / Viviane Moura Rocha Ferreira. - 2019.

98 f.

Orientador: Felipe Zambaldi.

Tese (doutorado CDAE) – Fundação Getulio Vargas, Escola de Administração de Empresas de São Paulo.

1. Refrigerantes. 2. Marketing. 3. Comércio varejista. 4. Vendas - Promoção. 5. Hábitos alimentares. I. Zambaldi, Felipe. II. Tese (doutorado CDAE) – Escola de Administração de Empresas de São Paulo. III. Fundação Getulio Vargas. IV. Título.

CDU 658.82

Ficha Catalográfica elaborada por: Raphael Figueiredo Xavier CRB SP-009987/O
Biblioteca Karl A. Boedecker da Fundação Getulio Vargas - SP

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Data de avaliação: 07/02/19.

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Ao meu amor, Carlos Ronaldo.

AGRADECIMENTOS

Agradeço,

Ao meu orientador, o professor Felipe Zambaldi, por compartilhar seu conhecimento e por orientar, não apenas na minha carreira como pesquisadora, mas também como docente;

Ao meu co-orientador Leandro Guissoni, pelos conselhos e por me incentivar;

Aos professores Juracy Parente, Eliane Brito, Tânia Veludo, Delane Botelho, Eduardo Francisco, por me inspirarem pelo exemplo;

Ao meu marido, por estar sempre ao meu lado, principalmente nos momentos mais difíceis;

Aos meus pais, pela torcida, pelo exemplo, pelos valores;

Às minhas irmãs e minha família, pelo apoio incondicional;

Aos meus colegas de doutorado, que se tornaram grandes amigos em especial Eliane Santos, Farah Diba, Suzana Batistella, Adelson Santos e Olegário Araujo;

Aos meus colegas economistas e estatísticos, por me ajudarem a relembrar minhas aulas de econometria da graduação, em especial Jonny Mateus, Toni dos Santos, Thais Ortega e Carol;

Aos brilhantes pesquisadores que conheci na academia: Rafaela Almeida, Tobias Parente e Lina Nakata;

Aos meus alunos e colegas professores por me incentivarem a ser uma profissional cada vez melhor;

À Fundação Getulio Vargas, por ter sido a minha segunda casa nos últimos seis anos de mestrado e doutorado;

À NIELSEN pelo acesso e contribuições nas nossas discussões;

Ao CNPq pela bolsa de auxílio financeiro durante a pesquisa;

E principalmente à Deus, presente em todos os momentos.

ABSTRACT

In response to consumers' sugar-related health concerns, as well as high government taxes on sugar products, manufacturers can respond by launching non-sugar carbonated soft drinks. A challenge to soft drink manufacturers and retailers, besides developing these products, is to elaborate in-store marketing in order to generate a better sales response. Even more challenging is selecting the most effective in-store marketing mix according to different economic business cycles (expansion and recession), which often change in emerging markets. This study aims to identify the effectiveness of marketing mix elements – such as price, distribution, promotion communication, and promotion exhibition – for diet carbonated drinks in relation to market share. The elements are evaluated considering different business cycles (expansionary and recessionary), as well as the immediate and persistent effects. The Nielsen database and Brazilian macroeconomic data were employed covering a 47-month period to evaluate market share effects in the short and long term. A panel vector autoregression analysis and impulse response model were employed. The main results showed that the effectiveness of in-store marketing presents different results according to business cycles. In an expansionary business cycle, distribution is the most effective in-store toll for immediate and cumulative response; in a recessionary one, display and price are the most effective approaches in the short term, and display and special offers are the most effective in the long term.

Keywords**:** *In-store marketing, Product strategy, Non-sugar, Business cycle, VAR, Emerging markets*

RESUMO

Em resposta à crescente preocupação dos consumidores com doenças relacionadas a ingestão de açúcar, assim como, a aplicação de sobretaxas aplicadas pelo governo em produtos com alto teor de açúcar, a indústria respondeu intensificando o lançamento de refrigerantes sem açúcar. Além do desenvolvimento de novos produtos, outro desafio – tanto para a indústria, quanto para o varejo – é elaborar ações envolvendo o marketing mix, dentro do ponto de venda, que obtenham a melhor resposta em vendas (market share). Ainda mais desafiador é selecionar a ação mais efetiva no ponto de venda (marketing mix) de acordo com os diferentes ciclos econômicos (expansão e recessão), característicos de mercados emergentes. Este estudo tem como objetivo identificar a efetividade das ações de marketing mix – como preço, distribuição, promoção em comunicação e exibição do produto – para refrigerantes diet e a sua resposta em vendas (*market share*). Os elementos são avaliados considerando diferentes ciclos econômicos (expansão e recessão), assim como os efeitos imediatos e cumulativos. Foram utilizadas bases de dados da Nielsen, em conjunto com dados de indicadores macroeconômicos do mercado brasileiro, cobrindo o período de 47 meses para avaliar os efeitos de curto e longo prazo. Um painel de vetores autoregressivos, assim como a função de impulso-resposta foram empregados para avaliar os dados. Dentre os principais resultados apresentados, a efetividade das ações no PDV (marketing mix) se apresenta de forma distinta de acordo com o ciclo econômico. Em ciclos econômicos de expansão, a distribuição é a ferramenta mais efetiva tanto avaliando o efeito imediato, quanto o cumulativo; enquanto na recessão, display e o preço se apresentam como ferramentas mais efetivas no curto prazo, e display e ofertas especiais são as mais efetivas no longo prazo.

***Palavras-chave*:** *Marketing no ponto de venda, Estratégia de produto, Sem açúcar, Ciclo econômico, VAR, Mercados emergentes*

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ABBREVIATION LIST

CCI: Consumer Confidence Index

GDP: Gross Domestic Product

Merchan: Merchandising

PVAR: Painel Vector Autoregressive

SKU: stock-keeping unit

VAR: Vector Autoregressive

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1. INTRODUCTION

The rise in consumption of high-sugar processed foods has led to increases in obesity, diabetes and cardiovascular disease. Nowadays, multitudes of consumers are increasingly beginning to move in a different direction, seeking out sugar-free products in order to achieve a better life quality (Food Magazine, 2014). Following health constraints, governments of the UK, Mexico, Ireland, and some US cities have begun to apply a sugar tax and encouraged manufacturers to review their sweetening methods (Bloomberg News, 2019; BBC, 2018).

In Brazil, the discussion of a beverage sugar tax started with non-governmental organizations and the National Health Council. Moreover, in November 2018 Brazilian manufactures signed a deal with the Health Ministry to progressively reduce sugar in packaged food and beverages until 2022 (Estadão, 2019). These changes are posing challenges to manufacturers to review their ingredients (Bloomberg News, 2019; Coca-Cola, 2017; Oxfam Briefing Paper, 2013; see also APPENDIX I). Moreover, in the carbonated soft drinks segment, there has been an increase in the launch and development of sugar-free versions of products (Guaraná Antactica, 2019; Coca-Cola, 2017; Scrinis, 2016).

Challenges to soft drinks manufacturers and retailers, besides the development and review of their products, including building their in-store marketing. Product strategies includes the development of new products, but also the management of in-store marketing (price, promotion, and distribution) in order to obtain a better sales response. A well-implemented in-store marketing plan can present a differential sales response (Ataman, Mela, & Van Heerde 2008; Hoeffler & Keller, 2003). As diet products – low-sugar or sugar-free – are launched, it becomes relevant to understand which elements of the marketing mix are most critical for a better sales response over time.

Recent studies on product brand strategy have advanced our understanding of how external factors, such as economic conditions (Dekimpe & Deleersnyder, 2018; Ataman et al., 2008; Van den Bulte & Joshi, 2007), affect the diffusion of new products across the shelves. To better promote these products, economic fluctuations must also be taken into account for a better

marketing mix choice. In emerging countries, such as Brazil, economic fluctuations are a determinant exogenous variable of consumer sales (Rocha et al., 2016). Understanding how the business cycle – recessionary or expansionary periods – affects the promotion of those diet products (Dekimpe & Deleersnyder, 2018) is relevant to maximizing market share.

Previous research has primarily focused on product development as an isolated marketing strategy (Scrinis, 2016). Very little research has been done on in-store marketing of reformulated product ingredients (Taillie, Ng, Xue, Busey, & Harding, 2017), marketing mix actions and sales responses in different business cycles (recessionary and expansionary), or the immediate and persistent effects of the marketing mix (Dekimpe & Deleersnyder, 2018).

In response to consumers' sales behavior, we expect the effects of marketing mix efforts to differ among business cycle periods for diet carbonated soft drinks. This research aims to identify the effectiveness of marketing mix elements for diet carbonated drinks in relation to market share. The elements are evaluated considering different business cycles (expansionary and recessionary), as well as the immediate and persistent effects.

By increasing our knowledge of these mechanisms, it will be possible to (1) evaluate marketing mix actions and market share response to diet carbonated soft drink products; (2) investigate the effects in different business cycle periods (expansionary and recessionary); and (3) understand the market share response's immediate and persistent effects, or sales responses over time.

Identifying the results of applying in-store marketing to obtain a market share sales response at the point of sale for diet carbonated soft drinks represents a relevant challenge, for beverage manufacturers and retailers, as well as for governments to develop public policies to incentivize those products.

The investigation aims to (1) help beverage manufacturers to develop diet carbonated soft drinks products, by means of analyzing the sales response to the actual diet products portfolio; (2) help retailers and manufacturers to understand the mechanisms of, and responses to, in-store marketing to promote diet carbonated soft drink products at the point of sale; (3) consider how the effectiveness of marketing mix elements works in different business cycles, as well its immediate and persistent effects; and (4) help consumers to obtain non-sugar beverage options.

2. CONCEPTUAL BACKGROUND

This section will outline the conceptual background, and present the research questions and hypotheses. Initially, the conceptual background is discussed with reference to product line extension and, as a consequence, product reformulation, in order to emphasize how indicators of non-sugar products are shown. Business cycle theory is then discussed in order to remind us that in order to promote product line extension, external factors affect different business cycles. Finally, the marketing mix and sales response – in terms of both immediate and long-term effects – are discussed, and the hypotheses formulated.

2.1 Product line extension

Line extension is defined as an existing brand's new product offering within the same product class or product category (Sinapuelas, Wang, & Bohlmann, 2015; Keller, 2013). Advantages of a line extension strategy include lower costs and lower risk (Loken, Joiner, & Houston, 2010), as well as the ability to increase sales (Quelch & Kenny, 1994). According to the literature, product activities – such as innovations or changes in form – increase purchase likelihood (Costa & Jongen, 2006), and build equity (Ataman, Van Heerde, & Mela, 2010; Berger, Draganska, & Simonson, 2007), because it increases product line length through the generation of incremental sales garnered by serving more segments (Ataman et al., 2010). Offering more products has a positive effect on base sales because it increases demand by addressing a certain customer niche (Ataman et al., 2010). Product line length is also positively related to brand performance (Ataman et al., 2008; Pauwels, 2004; Sriram, Balachander, & Kalwani, 2007; Van Heerde, Srinivasan, & Dekimpe, 2010) and contributes to market share increase.

Most innovations in the consumer packaged goods industry are related to providing additional benefits through change in packaging or formulation, and may therefore tend to be incremental (Sorescu & Spanjol, 2008). Previous research has presented the use of line extensions as a means to introduce innovative benefits and features (Loken et al., 2010; Ambler & Styles, 1997).

In Brazil, research by Brasil Food Trends (2010) identified major consumer trends as centering on the health and well-being of consumers, but also indicated convenience and practicality factors as determinants in the choice of food. In order to evaluate product line extensions, manufactures must incorporate health factors that significantly influence consumption choices. Brand management plays an important role in communicating a product's benefits (Chrysochou, 2010). Health and nutrition beliefs are an important component in the food choice process (Furst, Connors, Bisogni, Sobal, & Falk, 1996). Health and nutrition values incorporated into food and beverages can be seen as important factors in disease avoidance or control (for example, heart disease, cancer or hypertension), weight control (motivated by health or aesthetics), and bodily well-being (energy and optimal health) (Furst et al., 1996). In addition, convenience is an important factor that influences consumer food choice (Brasil Food Trends, 2010). Packaged food and beverages with nutritional appeal and good in-store position can meet both health and convenience goals. Consumers want to eat more healthily, and need support to do so from both food manufacturers (to offer products that are formulated with healthy ingredients) and retailers (to stock shelves with an adequately priced healthy assortment) (Nielsen, 2016b).

Successful examples of product line extensions in carbonate soft drinks, such as Diet Coke and Diet Pepsi, have benefited from the brand franchise of their parent products (Pitta & Katsanis, 1995). The same can be said of Coca-Cola zero, Coca-Cola "without sugar" (Meio&Mensagem, 2017), and Pepsi Zero (see APPENDIX II).

In evaluating diet products and the marketing mix, Chandon and Wansink (2012) suggested several product-related strategies that could increase beverage and food sales, such as reformulating products through the exclusion of particular unhealthy ingredients (e.g., sugar).

2.2 Product reformulation

As mentioned above, governments are facing increasing concerns about the sugar levels in food and beverage products. In order to force industries to reduce these ingredients, a sugar tax has been imposed by some countries, such as the UK, Mexico, and Ireland, and some US cities (Bloomberg News, 2019; BBC, 2018). This has forced the manufacturers to evaluate sweetening methods (see APPENDIX I). In Brazil, the discussion of a beverage sugar tax started with non-governmental organizations and the National Health Council. The purpose of

raising the tax on sugary drinks is to reduce the progress of sugar-related diseases (Estadão, 2017). In November 2018, 68 Brazilian food and beverage manufacturers – which represents 87% of this sector in the country – signed a deal with the Health Ministry to progressively reduce sugar in packaged food and beverages until 2022 (Estadão, 2019).

In response to consumers' and governmental concerns and issues regarding the consumption of sugar, the 10 biggest manufacturers have responded by modifying their products to reduce or eliminate this ingredient (Associated British Food, 2017, 2018; BRF, 2017, 2018; Coca-Cola, 2017, 2018; Danone, 2017, 2018; General Mills, 2017, 2018; Kellogg's, 2017, 2018; Mondelez, 2017, 2018; Nestlé, 2017, 2018; Pepsico, 2017, 2018).

Product reformulation is the process of altering a food or beverage product's composition to improve its health profile (Scott, Hawkins, & Knai, 2017). It entails attempts to improve the nutrition of a food or beverage product by adding or reducing certain nutrients, such as reducing fat, salt, or sugar (Chrysochou, 2010; Magnusson & Reeve, 2015; Taillie et al., 2017). Such product reformulation attracts consumers that prefer processed, packaged products with an emphasis on nutrition (Moodie et al., 2013).

Product ingredient reformulation is an example of innovation and change in product form. Researchers have devoted considerable attention to developing studies that discuss product reformulation (Scott et al., 2017; Taillie et al. 2017; Scrinis, 2016; Sarkar, 2013). Previous research has addressed several aspects of product reformulation, such as: (1) reformulation of processed foods via specific ingredients (Magnusson & Reeve, 2015; Wahlqvist, 2015; Woodward, Eyles & Ni Mhurchu, 2012); (2) the association between ingredient claims and product quality (Taillie et al., 2017; Sarkar, 2013); and (3) the evaluation of beverage product reformulations and their relationship to industry political strategy (Scott et al., 2017; Scrinis, 2016; Magnusson & Reeve, 2015).

In the US, product reformulations have been widely applied by beverage manufacturers (Scott et al., 2017). An analysis of US retail sales data shows that while non-reformulated product ingredients sales volumes have been flat over the past four years, sales of products with ingredients claims are outpacing total category growth by a significant margin in many categories (Nielsen, 2016b). In Brazil, several sales campaigns – e.g., Coca-Cola, Pepsi and Guaraná – have promoted product ingredient reformulations (see APPENDIX II), which

confirms the increasing importance of this portfolio. According to Nielsen (2016a), 40% of Brazilian consumers (34% global average) that try to avoid consuming undesirable ingredients in beverages mention sugar as something they wish to minimize.

One way to refer to reformulated product ingredients that reduce undesirable ingredients such as sugar is by using terms such as "diet," "light," "zero," and "regular." These terms help consumers to identify beverages without sugar. A strategy adopted by the carbonated soft drinks industry is to adopt brand extension in reformulated products and apply "zero sugar" claims (see APPENDIX II). These claims emphasize the absence or reduction of specific ingredients (European Commission, 2017; Scott et al., 2017), and include diet versions that contain no sugar at all (Guaraná Antarctica, 2019; Coca-Cola Journey, 2016). An increasing number of product brand lines emphasize such reformulations; examples include "Coca-Cola without sugar" (Meio&Mensagem, 2017) – developed a campaign to promote its new line of products without sugar ingredient – as well as Pepsi and Guaraná (see APPENDIX II). Indeed, soft drink industry has shown some dedication to build a healthy image (SuperInteressante, 2016; Veja, 2016), and intends to expand its distribution of less sweet versions of products (Valor Econômico, 2017). Coca-Cola is also investing in replacing conventional sugar by apple juice as another reformulation of a product to obtain a healthier soft drink (Valor Econômico, 2017). The names used for products in this category emphasize the ingredient that has been reduced, and often use claims stating that the sugar reduction makes the drink "diet."

The cost of introducing a new brand into a consumer market can be huge (Pitta & Katsanis, 1995). In emerging countries, where economic fluctuations have more impact, cost-saving measures and tactics to increase competitiveness are used to keep growing and supporting brand extensions despite such fluctuations.

2.3 Business cycle research in marketing

Kydland and Prescott (1982) defined the theory of cycles based on the assumption that multiple-period construction is crucial for explaining aggregate fluctuations; this is known as business cycle theory. The business cycle is visible across multiple aggregate economic series such as gross domestic product (GDP) and employment (Stock & Watson, 1999). The business cycle is determined by a sequential cycle that is repeated (Burns & Michell, 1947), denominated by

recessionary (or contraction) and expansionary periods. To define each business cycle, aggregate economic series must be reviewed (Stock & Watson, 1999).

According to Burns and Michell (1947, p. 3):

> A cycle consists of expansion occurring (…) in many economic activities, followed by similarly general recessions, contraction, and revivals which merge into the expansion phase of the next cycle.

An important definition of recession in business cycles is that it includes two or more consecutive quarters of negative GDP growth (Shiskin, 1974), while the opposite comprises an expansion cycle. GDP is the dominant measure to capture a business cycle (Gordon et al., 2013; Kamakura & Du, 2012; Estelami et al., 2001). Business cycles theory's concepts were initially developed in the economic field (Kydland & Prescott, 1982; Christiano & Fitgerald, 1998; Zarnowitz, 1985). Subsequently, marketing researches identified that business cycles related to brands do not have the same extent of recessionary and expansionary cycles (Dekimpe & Deleersnyder, 2018).

Economic fluctuations are a characteristic of emerging markets, such as in Brazil, and with the increased portfolio of reformulated products, it is also a challenge for brands to manage the marketing mix at the point of purchase in light of the business cycle. According to Dekimpe and Deleersnyder (2018, p. 31), "Business cycles may affect entire markets, and significantly alter many firms' marketing activities and performance." The next section is dedicated to investigate this relation.

Several studies in the marketing field have investigated the impact of the business cycle on various categories (Deleersnyder, Dekimpe, Sarvary, & Parker, 2004; Lamey, Deleersnyder, Dekimpe, & Steenkamp, 2007; Dutt & Padmanabhan, 2011; Ma, Ailawadi, Gauri, & Grewal, 2011; Kamakura & Du, 2012; Lamey, Deleersnyder, Steenkamp, & Dekimpe, 2012; Lamey, 2014; Dekimpe, Peers, & van Heerde, 2016). The majority conducted in the context of developed markets (Table 1).

Table 1 – Characteristics of business cycle studies in marketing

Authors (date)	Entity aggregation	Geographical region	Temporal aggregation	Effect business cycle on	Focus
Deleersnyder et al. (2004)	Category	US	Yearly	Durable sales	Performance (output)
Srinivasan et al. (2005)	Firm	US	Cross-sectional survey	General marketing/ spending	Marketing conduct (input)
Sudhir, Chintagunta, & Kadiyali (2005)	Firm	US	Quarterly	Price	Marketing conduct (input)
Lamey et al. (2007)	Category	US, Belgium, UK, West Germany	Yearly	Private-label share	Performance (output)
Deleersnyder et al. (2009)	Country	37 countries	Yearly	Advertising	Marketing conduct (input)
Dutt & Padmanabhan (2011)	Country; Category	99 countries; 54 countries	Yearly	Aggregate consumer spending	Performance (output)
Ma et al. (2011)	Category; Brand	US	Monthly	Consumer packaged goods spending total across retail formats and across brands	Performance (output)
Kamakura & Du (2012)	Category	US	Yearly	Commodity spending	Performance (output)
Lamey et al. (2012)	Category	US	Yearly	Advertising; innovations; price premium	Marketing conduct (input)
Lamey (2014)	Category	15 European countries	Yearly	Discounter share	Performance (output)
Kashimiri & Mahajan (2014)	Firm	US	Yearly	Advertising; innovations	Marketing conduct (input)
Ozturan et al. (2014)	Firm	Turkey	Cross-sectional survey	Advertising	Marketing conduct (input)
Dekimpe et al. (2016)	Category	30 countries	Yearly	International tourism	Performance (output)
Dubé, Hitsch, & Rossi (2017)	Consumer	US	Monthly	Private-label share	Performance (output)

Souce: Adaped from Dekimpe and Deleersnyder, 2018

Most studies have been dedicated to investigating isolated marketing mix actions (Lamey, 2014; Ozturan et al., 2014; Deleersnyder et al., 2009; Sudhir et al., 2005), or two or three marketing mix actions (Kashimiri & Mahajan, 2014; Lamey et al., 2012), rather than conducting integrated effects analysis. The next section will propose an integrated view of the business cycle.

2.4 In-store marketing and sales response

The marketing mix is composed of marketing activities that are well implemented, can attract a differential response in terms of sales, and build strong brands (Hoeffler & Keller, 2003) or competitive position market share. The concept was introduced in 1960 and marketing mix actions were divided into the "Four Ps" of marketing – product, price, place, and promotion (Grönroos, 1997). The conventional marketing mix model ignores context, where the decision to choose one brand (or product line) entails the simultaneous decision not to choose another one (Cain, 2014). Thus, it is important to analyze marketing in terms of the multi-brand market context, alongside manufacturer and retailer marketing mix actions, through utilization of the market share concept.

Companies spend billions of dollars implementing their marketing strategy using marketing mix actions; accordingly, several studies have suggested that expenditure with an emphasis on price and advertising enhances sales performance over time (Mela, Gupta, & Lehmann, 1997; Ma, Ailawadi, & Grewal, 2013; Srinivasan, Vanhuele, & Pauwels, 2010; Sriram et al., 2007; Mela, Gupta, & Jedidi, 1998; Papatla & Krishnamurthi, 1996). However, less emphasis has been placed on the effects of product line extension, distribution (place) (Van Heerde, Mela, & Manchanda, 2004; Ataman et al., 2010), and promotion (such as communication, exhibition, and discounts) on sales performance.

According to Chrysochou (2010), evaluating marketing mix actions and sales response in non-sugar food and beverages is considered an important tool to communicate the value of health

and to contribute towards healthier food and beverage choices. Chrysochou (2010) not only evaluated how marketing mix elements are used to convey a healthy brand image, but also discussed this via an exclusively manufacturer-oriented view. Similarly, studies that have evaluated marketing mix actions and sales response as combined decisions from manufacturer and retailer management are rare (Venkatesan, Farris, Guissoni, & Neves, 2015).

Reformulated products that, for instance, present a new proposal and different ingredients in it formulation should be promoted in a different way. However, few studies have explored the relationship between emphasizing (the presence or absence of) ingredients in reformulated products and the impact of this at the point of sale (Pettigrew, 2016). The association between new product development via reformulated ingredients in order to provide healthier choices, and consumers' response to this, encompasses several unexplored areas that have recently attracted research attention in relation to evaluating business strategy (Scrinis, 2016).

Successful brand management requires a holistic view of marketing mix actions – price, distribution, and promotion – at the point of sale (Cain, 2014; Bell, Corsten & Knox, 2011) or via in-store marketing. While the literature has covered the positive relation between in-store marketing mix and product purchase (Sinapuelas et al., 2015), the extant research is unclear on how these effects may differ in recessionary versus expansionary business cycles.

In order to review in-store marketing mix actions, the following section considers price, distribution, and promotion, and posits the hypotheses.

2.4.1 Price

The effect of price on sales is one of the most studied areas of the marketing mix in the literature (Nijs, Dekimpe, Steenkamps, & Hanssens, 2001; Pauwels, Hanssens, & Siddarth 2002; Srinivasan et al. 2004; Steenkamp, Nijs, Hanssens, & Dekimpe, 2005). However, it is not clear whether a positive or a negative effect dominates over the long-term in sales.

In terms of beverage purchase decisions, price is an important factor (Chandon & Wansink, 2012; Furst et al., 1996), such that management of this "P" at the point of sale is extremely important to assure sales. Healthy food and beverage products are often perceived by consumers

as more expensive when compared to unhealthy ones (Carrete & Arroyo, 2014; Pettigrew & Pescud, 2013). A reformulated product can be understood as a differentiated or customized alternative that can increase price elasticity (making it less negative), since its strongly differentiated nature can serve specific niches (Ataman et al., 2010). According to Nielsen (2016a), 66% of Brazilian consumers are willing to pay more in order to obtain food and beverage products without "undesirable" ingredients. Such willingness to pay more may contribute to increasing bottom lines for manufacturers and retailers, while also enabling consumers to eat more healthily (Nielsen, 2016a). In addition, demand in expansionary and recessionary business cycles can have direct and indirect effects on price (Sudhir et al., 2005), though this is expected to be more intense during recessionary periods. Thus:

H1: Price sensitivity is higher during recessionary business cycle periods than expansionary business cycle periods, which has an immediate effect on market share.

2.4.1.1 Price promotion or special offers

Studies (Foekens, Leeflang, & Wittink 1994; Jedidi, Mela & Gupta 1999) have suggested that price promotions have a negative effect on base sales, while other studies (Ailawadi, Gedenk, Lutzky, & Neslin, 2007) have suggested a positive effect of price discounts on sales. Sales promotions can also increase the salience of a new line brand extension (Miller & Berry, 1998) such as diet and non-sugar products. In recessionary crises, customers look for cheaper alternatives (Rocha et al., 2016). Thus:

H2: The immediate effect of increasing of special offers on market share, will be higher during recessionary periods than in expansionary periods.

2.4.2 Distribution

Distribution breadth, or the percentage of distributors that carry a brand, positively affects brand sales, and theoretical and empirical evidence has been provided for these effects (Ataman et al., 2010). ncreases in the breadth of distribution lead to higher sales because there is wider availability, which increases consumers' possibilities to find the product (Bronnenberg,

Mahajan, & Vanhonacker, 2000). In the case of non-sugar products, product availability at the point of sale is important for increasing beverage sales (Pettigrew, 2016).

However, according to Nielsen (2015), 70% of consumers' purchases decisions occur at the point of purchase. Pettigrew (2016) investigated the positioning of health products at the point of sale and concluded that it is an important tool to promote sales of food and beverages without sugar (Pettigrew, 2016). Regarding the effect of increased share of shelf, it is expected that in expansion business cycle periods, weighed distribution will affect more sales, compared to in recession periods.

Ataman et al. (2008) also emphasized the positive relation between new products and distribution. Previous research has demonstrated a positive effect of increased distribution on new product trials (Kalyanaram & Urban, 1992; Steenkamp & Gielens, 2003) and, as mentioned, in different business cycles, distribution has an important role (Dekimpe & Deleersnyder, 2018). It is even more important when the market presents an expansive business cycle phase. Thus:

H3: The immediate effect on market share of an increase in distribution will be higher in expansionary business cycle periods than in recessionary periods.

2.4.3 Promotion

Promotion, in point of sale, refers to the process of communicating to retail customers the presence of products in-store (Parente & Barki, 2014). In this research, promotion is divided into communication at the point of sale (merchandising) (section 2.4.3.1) and product exhibition (display and checkout) (section 2.4.3.2). These promotion types will be discussed in the next sections.

2.4.3.1 Promotion: communication at the point of sale (merchandising)

Developing a new product line, or a reformulated product in order to emphasize altered ingredients, are two ways to increase sales. Cao and Yan (2016) investigated the absence of specific ingredients (such as sugar) and their impact on sales and provided important managerial implications related to financial gains to the business by using nutrition claims. They also indicated that merchandising effects will differ by business cycle, and will be higher in expansionary cycles, during which there is more disposable income. Thus:

H4: The immediate effect on market share of increased merchandising will be higher in expansionary business cycle periods than in recessionary periods.

2.4.3.2 Product exhibition: Display and checkout

If a product is not visible at the point of sale, it acts - in the point of sale - as it does not exist (Alvarez, 2000). "Feature or display" and "checkout disposition" are tolls to exhibits products in the point of sale (Parente & Barki, 2014; Alvarez, 2000), as described below.

a) Display

Features and displays can reduce consumers' cognitive efforts and the size of their consideration set (Mitra & Lynch, 1995). Consequently, a display or feature extension will make an item more prominent compared to, and aid in differentiation from, other products (Shankar & Krishnamurthi, 1996). It is also expected that actions that affect the market share vary according to the business cycle. Thus:

H5: The immediate effect on market share of increasing product in displays will be greater in expansionary business cycle periods than in recessionary periods.

b) Checkout

Retail promotion activities can increase consumers' attention towards product extensions, thus encouraging trial purchase. Researchers have shown that the design characteristics

of promotions affect sales via attention (Zhang, Wedel, & Pieters, 2009; Pieters, Wedel, & Zhang, 2007). Promoting a product in the checkout area is a way to emphasize its exhibition (Alvarez, 2000) and enhance its impact on sales (which will be higher during expansionary business cycles). Thus:

H6: The immediate effect on market share of increasing product exhibition in the checkout area will be higher in expansionary business cycle periods than in recessionary periods.

2.4.4 Immediate effects by business cycle and macroeconomic variables

Evaluating which in-store marketing mix performs best according to marketing response helps manufactures and retailers in their decisions. In addition, the business cycle period should be taken into consideration in order to adopt a better mix for each period. Thus, the following research questions (RQs) are presented:

RQ1: Which in-store marketing mix actions (relative unit price, weighted distribution, special offers, merchandising, display and checkout) are the most critical for obtaining an immediate market share response in expansionary business cycle periods?

RQ2: Which in-store marketing mix actions (relative unit price, weighted distribution, special offers, merchandising, display and checkout) are the most critical for obtaining an immediate market share response in recessionary business cycle periods?

In order to evaluate the effect of macroeconomic variables, such as unemployment rate and consumer confidence index, the following additional questions are proposed:

RQ5: Do the unemployment rate and CCI affect market share response? Does this effect vary by business cycle?

2.5 Cumulative effect (long term)

After evaluating the immediate effect, the cumulative effect – or the long-term effect – will be investigated according to each business cycle. Thus, two additional research questions are formulated:

RQ3: Which in-store marketing mix actions (price, special offers, weighted distribution, checkout distribution and display) are the most critical for obtaining a market share persistent response in expansionary business cycle periods?

RQ4: Which in-store marketing mix actions (price, special offers, weighted distribution, checkout distribution and display) are the most critical for obtaining a market share persistent response in recessionary business cycle periods?

3. RESEARCH FRAMEWORK

Based on the above discussion, the model proposed for this research (Figure 1) considers in-store marketing that affects market share (unit market share in thousand liters), taking the business cycle (expansion/recession) as the moderating variable.

The in-store marketing elements evaluated are PRICE (relative unit price), DISTRIBUTION (weighted distribution), PROMOTION price (special offers/discounts), PROMOTION communication (merchandising) and PROMOTION exhibition (feature/display or checkout).

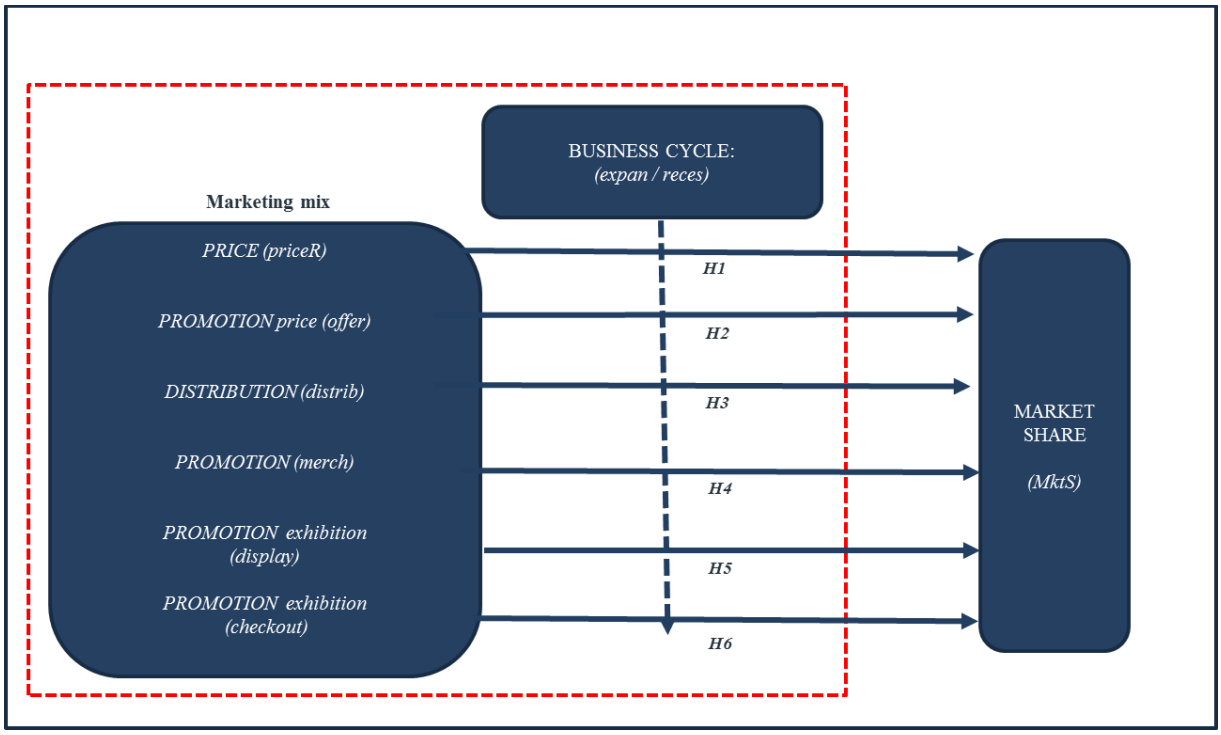


Figure 1 – Research Framework

Source: Author.

In order to develop the research framework, pre-fieldwork was utilized (see APPENDIX III and IV), combined with the literature already presented.

4. METHODOLOGY

Market response research has presented the effects of marketing mix variables on sales market share (Papatla & Krishnamurthi, 1996; Mela et al., 1997; Mela et al., 1998; Sriram et al., 2007), and attempted to understand how consumers respond to marketing activities (Hanssens, Leeflang, & Wittink, 2005). The objective of the current research is to understand the effectiveness of marketing mix elements – such as price, distribution, and promotion – in the short and long term. Moreover, it considers how marketing mix actions (relative unit price, weighted distribution, special offers/discounts, merchandising, feature/display or checkout exhibition) respond in expansionary and recessionary business cycles. Therefore, the application of market response models to support this investigation can contribute to identifying the correct stimulus for a better response.

This section discusses the methodology applied to the data in order to answer the research questions. To build this methodological section, both point-of-sale data (obtained from Nielsen Retail Scan) and Brazilian macroeconomic data (obtained from the Instituto Brasileiro Economia [IBRE] and Intituto Brasileiro de Geografia e Estatística [IBGE] data) are described. Time-series analysis, as applied in marketing research, is then discussed, followed by the panel vector autoregression (VAR) technique and its required tests. Finally, the analytical steps and methodological matrix are presented.

4.1 Database

As described above, this research used two different databases: (1) point-of-sale data from Nielsen Retail Scan, and (2) Brazilian macroeconomic data from IBGE and FGV-IBRE (Fundação Getulio Vargas – Intituto Brasileiro de Economia). Both databases were combined into the same 47-month times series, as detailed in the next section.

4.1.1 Point-of-sale data from Nielsen Retail Scan

The point-of-sale data from the Nielsen database contains information on retail sales in self-service/non-self-service channels for food and beverages in an audited period. In 2017 the self-service sector alone represented 5.4% of GDP in Brazil, and the revenues (as a whole) reached R$ 353.2 billion, with 4.3% annual growth (ABRAS Brasil, 2018).

To obtain this data, the auditor takes an inventory of products available for sale (front of stock) in any temporary storage area and collects records of any purchases by the store since the last audit (Hanssens et al., 2005). Retail sales are calculated as per the following formula:

Retail sales = Beginning inventory (t-1) – Ending inventory (t) + purchases – credits – returns – transfers

---

Previous sales response studies have also used the Nielsen database retail shelf audit or Retail Scan (Kuehn, McGuire, & Weiss, 1966; Bass & Parsons, 1969; Clark, 1973; Foekens et al., 1994). Besides the Nielsen database, other audit databases in sales response studies were researched and applied (Kalyanam, 1996; Terui, 2000).

Retail Scan data is presented monthly, at stock-keeping unit (SKU) level, and is collected around the country (Brazil) divided into seven regions - in this work it was used total Brazil data. The database presents product categories found in the food retail index, and in this research the carbonated category was selected in order to investigate packaged beverage products with less/zero sugar. The selected category is described in the next section.

4.1.2 Beverage category selected

The Nielsen database for carbonated soft drinks was selected based on an analysis developed by Nielsen (2016b) and Euromonitor (2017a), which evaluated the category that presents important product ingredient reformulations in retail beverages. A brief review of category and product launches is presented below. The product launches discussed are focused on reformulated products oriented by ingredients emphasizing nutrition.

4.1.2.1 Carbonated soft drinks category

The selected category was the most affected in the economic crisis in Brazil (Euromonitor, 2017c). Uncertain conditions have inhibited new product launches as a direct consequence of the unstable economic situation in the country (Euromonitor, 2017c). Nevertheless, there were important developments in this category, including the following:

(1) Channels were launched that offer new products with new packaging types/sizes (e.g., Cash and carry), and new ranges of flavors, or formulations of existing products.

(2) In 2016, manufacturers concentrated on new launches and the enrichment of existing products through the expansion of flavors, thereby increasing the specific value of reducing sugar (e.g., Coca-Cola Stevia).

Although manufacturers are investing in reformulating carbonated soft drinks through the reduction of sugar, it is important to mention that this category has an increasingly negative stigma, such as offering “low-quality” (Euromonitor, 2017c) or “unhealthy” beverages.

Carbonated soft drinks categories have been developing important new reformulated products with an emphasis on nutrition and health, and this has presented different sales impacts. Thus, this category was selected in order to investigate diet products, along with in-store marketing actions and the market share response. A summary of the data in business cycles and the Nielsen database is presented in Table 2.

Table 2 – Business cycle periods overview

Economic period	Code	Period		# of months	# of SKUs	# of manufacturers	# of brands	Indicator to identify expansion and recession business cycle
		From	To					
Expansionary period	Expans	Oct. 2012	Dec. 2014	27	155	11	65	GDP (IBGE)
Recessionary period	Reces	May 2015	Dec. 2016	20	163	13	80	

Source: Author.

As can be seen from Table 2, the collected data includes a diversity of SKUs, manufacturers and brands for each business cycle period. Even in a recessionary period, the number of SKUs and brands continues to grow, which signals the importance of studying diet carbonated soft drinks.

Additionally, drill-down views of the Nielsen database showing the volume sales of each manufacture (APPENDIX V) and brand (APPENDIX VI) are presented in the appendix.

4.1.3 Macroeconomic data from IBGE and FGV-IBRE

Economic fluctuations are characteristic of emerging markets such as Brazil. In such fluctuations, or business cycles, there are recessionary and expansionary periods. In an article from the *New York Times* (Shiskin, 1974), recession was defined as two or more consecutive quarters of negative GDP growth (Kamakura & Du, 2012; Sethuraman, Tellis & Briesch, 2011). Table 3 presents Brazilian quarterly GDP growth; recession is defined as four consecutive periods of negative GDP growth.

Table 3 – Quarterly % GDP growth

Year	Quarter	% GDP	Period
2012	1Q	1.71	
2012	2Q	0.99	
2012	3Q	2.49	
2012	4Q	2.48	
2013	1Q	2.72	
2013	2Q	4.02	
2013	3Q	2.76	Expansion
2013	4Q	2.53	
2014	1Q	3.47	
2014	2Q	-0.44	
2014	3Q	-0.64	
2014	4Q	-0. 23	
2015	1Q	-1.62	
2015	2Q	-2.74	
2015	3Q	-4. 26	
2015	4Q	-5.52	
2016	1Q	-5.14	Recession
2016	2Q	-3. 23	
2016	3Q	-2.49	
2016	4Q	-2.32	

Source: IBGE, 2018

Table 4 shows that the annual Brazilian GDP figures indicate that the 2012/2014 period was an expansionary business cycle, whereas the 2015/2016 one was recessionary. These criteria for definition were adopted in this research.

Table 4 – Annual % GDP growth

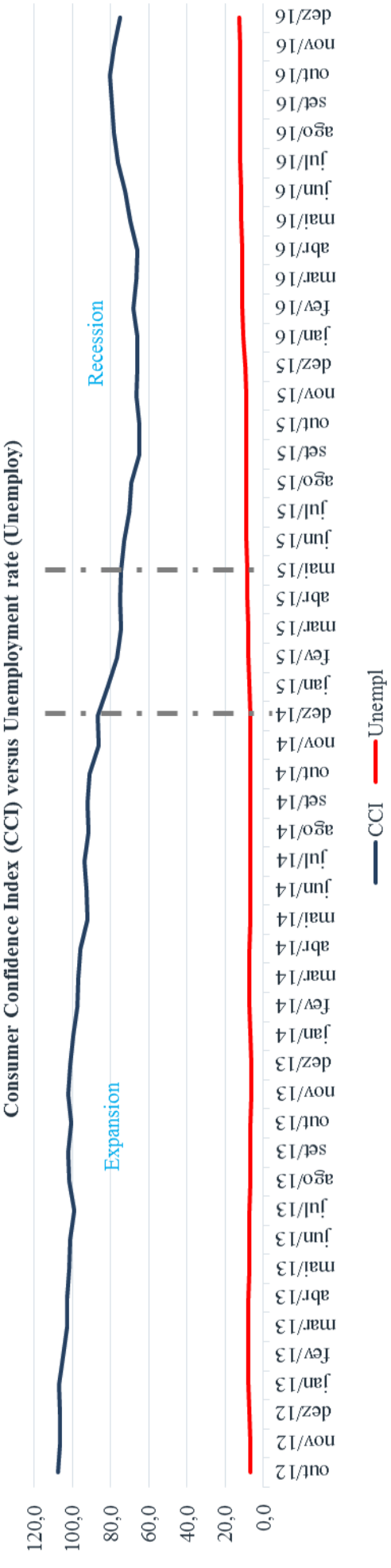
Year	%GDP	Period
2012	1.90%	Expansion
2013	3.00%	
2014	0.50%	
2015	-3.50%	Recession
2016	-3.50%	

Source: IBGE, 2018

Dekimpe and Deleersnyder (2018) presented another indicator, besides GDP, to define the business cycle using the unemployment rate (Unempl) and, in this research, it was addicted consumer confidence index (CCI). In Figure 2, both indicators – unemployment rate (based on IBGE statistics) and CCI (from FGV-IBRE) – are presented for the analyzed period.

Figure 2 – Macroeconomic indicators

Source: Author


Consumer Confidence Index (CCI) versus Unemployment rate (Unemploy)
Expansion
Recession
CCI
Unempl
120,0
100,0
80,0
60,0
40,0
20,0
0,0
out/12
nov/12
dez/12
jan/13
fev/13
mar/13
abr/13
mai/13
jun/13
jul/13
ago/13
set/13
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set/16
out/16
nov/16
dez/16

These data enabled the application of times-series analysis to evaluate the stimulus and effect across time. The time-series analysis technique is explained in the next section.

4.2 Time-series analysis in marketing research

Time-series analysis examines the behavior of data over time as a function of deterministic elements, whose outcome is perfectly predictable at any point of time, and stochastic elements, whose effects cannot be predicted with certainty (Hanssens, Parsons, & Schultz, 2003). If the random component is correlated over time, it may contribute to forecasting, although imperfectly. This is referred to as a systematic time-series component. If the component is uncorrelated, however, it is strictly an error term and is of no use for forecasting. Such terms are known as white noise, shocks, or innovations (Hanssens et al., 2003).

Time-series analysis evaluates the dynamic consequences of events over time (Hamilton, 1994). Dynamic components, and many events and decisions, may take months for their impact to be felt through the system (Griffiths, Hill, & Judge, 1993). The increased use of time-series analysis in marketing research has been motivated by the expansion of marketing databases, which accelerated the change in business environments and led to their increasing application in marketing and finance (Dekimpe & Hanssens, 2010). Time-series analysis allows researchers to study phenomena over time and investigate the effects of longitudinal endogenous variables that can also be applied as exogenous variables over time (lagged). For example, the formulation of future sales forecasts will also be impacted by previous sales, so in this way the exogenous variable can be endogenously lagged.

An example of the increasing application of time-series analysis in marketing research is the growing number of marketing-modeling textbooks (Naert & Leeflang, 2013; Bicheno, 2009; Hanssens et al., 2005; Leeflang & Wittink, 2000) and articles (Dekimpe & Deleersnyder, 2018; Venkatesan et al., 2015; Srinivasan et al., 2010; Srinivasan, Leszczyc, & Bass, 2000; Dekimpe & Hanssens, 1995, 1999) that have devoted attention to time-series techniques.

As marketing environments have become more unstable, time-series techniques can help to explain the effects of the lagged variable and macroeconomic shocks that alter their evolution pattern around a time series (Dekimpe & Hanssens, 2010), since it allows the inclusion of macroeconomic variables into models, and also verification of their effects. Around 40–50% of new product launches – excluding those that fail before reaching the marketplace – no longer remain on retailers' shelves within a year (Ernst & Young Global Client Consulting, 1999). The improvement of prediction models is relevant to obtain better performance in successful product innovations.

This research aims to identify the effectiveness of marketing mix elements for diet carbonated drinks in relation to market share. The elements are evaluated considering different business cycles (expansionary and recessionary), as well as the immediate and persistent effects. Application of time-series analysis fits this research objective. Reformulated products such as diet carbonated soft drinks are a type of new product launch, and time-series analysis allows us to quantify the evolution and drivers of brand sales market share, which is critical to understanding their dynamics across time. This enables managers to set a marketing strategy for optimal, long-term brand performance.

A response model based on time-series or cross-sectional data is called an empirical response model (Parsons & Schultz, 1976). In this research, the objective is to obtain a response model for marketing mix activities (endogenous variables) in market share (response variable) considering macroeconomic indicators such as Unemploy (unemployment rate) and CCI (Consumer Confidence Index) as exogenous variables. In order to obtain these functions, one of the recommended models is the application of VAR to the panel data (Hanssens et al., 2001). This model will be discussed in the next section.

4.3 Vector Autoregression Model

The VAR model is applied for estimation and forecasting (Hamilton, 1994) and is a functional response to stimulus. The initial application of this technique utilized the econometric area in order to predict macroeconomic scenarios, and considered the dynamics of economic systems (Sims, 1980). By using time-series analysis, the VAR model can estimate functions using relations over time. Recently, the VAR model has been utilized in marketing research mainly

for sales forecasts, for example, and can combine short- and long-term effects. Some examples of studies that have applied VAR techniques in marketing, and the number of product categories applied, were highlighted by Srinivasan et al. (2008). Dekimpe and Hanssens (1995, 1999) also employed VAR in order to determine the sales response to evaluate a category of products.

In this research, a panel VAR analysis was selected because it enables the researcher to obtain an impulse-response function (market share), and consistently relate the effect of marketing activities developed at the point of sale (price, distribution, and promotion).

4.4 Required tests to apply VAR

In order to apply VAR, it is assumed that the time series used in the construction of forecasting or response modeling is stationary (Griffiths et al., 1993); it develops in time randomly around a constant average, reflecting a stable equilibrium. After this step, it is important to check the number of lagged time series and conduct a cointegration test. The three required tests to apply VAR, which were employed in this research, are described below:

a) Unit root test: to verify whether the time series is stationary; i.e., whether it has average and varying constants over time (Bueno, 2011). In this case, it is recommended that the augmented Dickey–Fuller test be applied (Dickey & Fuller, 1981).

b) Number of lags: after solving the stationary problem, the number of lags of the time series is considered (Vartanian, 2010). The objective of this test is to identify the VAR order or the number of lags of each stimulus that will be reflected in the study function.

c) Cointegration test: to verify the influence of one time series on the other over the long term. In this case, Johansen's cointegration test (Johansen, 1991) was applied.

4.5 VAR model variables

The variables to be analyzed in this research for the proposed model (Figure 1) – definition, variable code, data source, and level – are presented in Table 5. A VAR model is a multivariate regression technique in which each dependent variable is regressed on lags of itself and on lags of all the other dependent variables in the model (Hanssens et al., 2003). Exogenous variables were also included in the model (Becketti, 2013).

The panel VAR was built using two different data types: (1) point-of-sales data, from Nielsen Retail Scan, which presents all data at SKU level (variables of product, price, distribution, and promotion); and (2) Brazilian macroeconomic data, from the IBGE (GDP and unemployment rate) and FGV-IBRE (CCI) databases.

Table 5 – Operationalization of the Variables

Marketing mix action	Variable description	Variable code	Definition/formula	Data source	Level
Input					
PRICE	Relative unit price	priceR	Relative unit price = unit price/average total price	Nielsen	SKU
PROMOTION price	Special offers/discounts	Offer	Discount given by manufacturer		
DISTRIBUTION	Weighted distribution	Distrib	Weighted distribution = product category volume retail distribution (net of out-of-stocks)		
PROMOTION merch	Merchandising	Merch	Special pop as clip strip, ... To divulgate product in point of sale		
PROMOTION exhibition	Feature/display (special exhibition)	Display	Special display of the product besides the usual point		
	Checkout distribution	checkout	Special display of the product next to checkout		
Moderator					
BUSINESS CYCLE (ECONOMIC PERIOD)	Expansionary economic period/ recessionary economic period	Expans/ Contrac	Expansionary period: Oct. 2012–Dec. 2014 Contractionary period: Jan. 2014–Dec. 2016	IBGE (GDP)	Quarterly
Variable response					
MARKET SHARE	Market share	MktS	Market share = Sales in thousand liters by SKU/Total sales in thousand liters	Nielsen	SKU (stock-keeping unit)
Exogenous variable					
Unemployment rate & consumer confidence index		Unempl/CCI		IBGE (Unempl) / FGV-IBRE (CCI)	Monthly

Source: Author.

4.6 Model response in sales

Sales is the most direct measure of the outcomes of marketing mix elements; thus, market response models with sales as the dependent variable are very common (Hanssens et al., 2005). In this research, the proposed model presents the marketing mix variables (price, distribution, and promotion) that generate a sales market share response function as follows (Figure 3):

$$\begin{bmatrix} MktS_{cit} \\ PriceR_{cit} \\ Distrib_{cit} \\ Merch_{cit} \\ Display_{cit} \\ Offer_{cit} \\ CheckOut_{cit} \end{bmatrix} = \begin{bmatrix} \alpha_{1i} \\ \alpha_{2i} \\ \alpha_{3i} \\ \alpha_{4i} \\ \alpha_{5i} \\ \alpha_{6i} \\ \alpha_{7i} \end{bmatrix} + \begin{bmatrix} \gamma_{1t} \\ \gamma_{2t} \\ \gamma_{3t} \\ \gamma_{4t} \\ \gamma_{5t} \\ \gamma_{6t} \\ \gamma_{7t} \end{bmatrix} + \begin{bmatrix} \beta_{11c} & & \beta_{17c} \\ \beta_{21c} & \cdots & \beta_{27c} \\ \beta_{31c} & & \beta_{37c} \\ \beta_{41c} & \ddots & \beta_{47c} \\ \beta_{51c} & & \beta_{57c} \\ \beta_{61c} & \cdots & \beta_{67c} \\ \beta_{71c} & & \beta_{77c} \end{bmatrix} x \begin{bmatrix} MktS_{cit-1} \\ PriceR_{cit-1} \\ Distrib_{cit-1} \\ Merch_{cit-1} \\ Display_{cit-1} \\ Offer_{cit-1} \\ CheckOut_{cit-1} \end{bmatrix} + \begin{bmatrix} \xi 1_{cit} \\ \xi 2_{cit} \\ \xi 3_{cit} \\ \xi 4_{cit} \\ \xi 5_{cit} \\ \xi 6_{cit} \\ \xi 7_{cit} \end{bmatrix}$$

Exog *(CCI cit ; Unempl cit*)

Figure 3 – Formula model

Source: Author.

where:

MktS cit = Market share for SKUi, month t for business cycle c;

PriceR cit = Unit relative price for SKUi, month t for business cycle c;

Distrib cit = Weighted distribution for SKUi, month t for business cycle c;

Merch cit = Merchandising for SKUi, month t for business cycle c;

Offer cit = Special offers for SKUi, month t for business cycle c;

Checkout cit = Checkout for SKUi, month t for business cycle c.

Unempl *cit* = *Unemployment rate*

CCI *cit* = *Consumer confidence index*

$\{ \alpha_{1i}, \alpha_{2i}, \ldots, \alpha_{7i} \}$= SKU fixed effects

$\{ \gamma_{1i}, \gamma_{2i}, \ldots, \gamma_{7i} \}$= time fixed effects

$\{ \beta_{1i}, \beta_{2i}, \ldots, \beta_{7i} \}$= equation coefficients

$\{ \xi_{1i}, \xi_{2i}, \ldots, \xi_{7i} \}$= random errors

4.7 Analysis steps

The steps of the analysis described in this section follow the sequence shown in Figure 4.

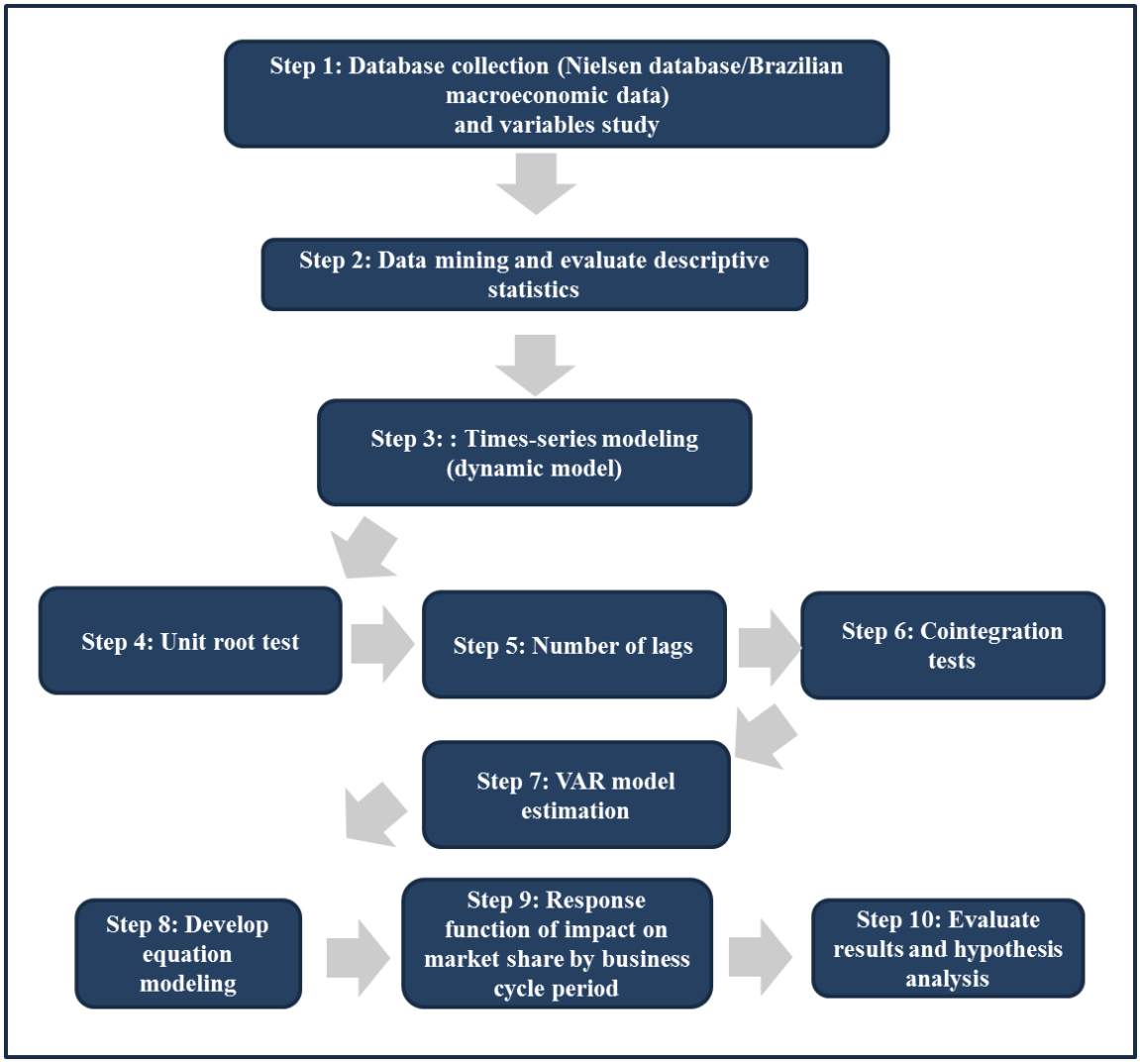


Figure 4 – Analysis steps
Source: Adapted from Guissoni (2012).

STEP 1: Database collection (Nielsen database and Brazilian macroeconomic database) and variables study: In this first step both sets of data were collected and variables were studied.

STEP 2: Data mining and evaluate descriptive statistics: After organizing and cointegrating all the files, the data was analyzed using descriptive statistics. The data from both databases was organized to be input to the statistical software in order to structure the next step.

STEP 3: Time-series modeling (dynamic model): After the data was input to the statistical software (STATA), a dynamic model was built. This statistical software was also used by Venkatesan et al. (2015). This step was important to develop the autoregressive model.

STEPS 4–6: Validate dynamic model to be applied (VAR): In order to validate the dynamic model to be applied to the collected data, as suggested in this project, the VAR model required three different tests, as described in *Step 4: Unit root test, Step 5: Number of lags,* and *Step 6: Cointegration tests.* The tests required were as described in the previous sections.

STEPS 7–9: VAR model estimation: After the validation to apply the VAR model, in this step the objective was to estimate the model equation as a function of the impulse response (market share and marketing mix). In this estimation, two other steps were developed: *Step 8: Develop equation modeling,* and finally *Step 9: Develop response function of impact on sales market share by business cycle (recessionary and expansionary periods).*

STEP 10: Evaluate results and hypothesis analysis: In this final step, the objective was to evaluate the results obtained and the research hypotheses.

4.8 Data work

Prior to carrying out estimations and tests, (4.8.1), (1) the research data was collected; and (2) variables and seasonal effects were calculated. These are presented in the next two sections.

4.8.1. Research data collected from Nielsen, FGV-IBRE, and IBGE

- Nielsen database: Data extraction and meetings about the carbonated soft drinks category were conducted in phases, and are described in APPENDIX II.

- FGV/IBRE and IBGE data were collected, and possible impact on carbonated beverage consumption was discussed with four economists in order to understand indicators and it relationship with the research model (unemployment rate, CCI, and GDP). Organization of each database was carried out, with initial information handling.

- The variables of each database were examined by business cycle category – expansionary and recessionary – and a table (see APPENDIX VII) was elaborated in order to verify the research possibilities. In this phase, discussions were carried out with one statistical professional in order to investigate

methodological possibilities. The exogenous and endogenous model variables were selected (see Table 5) in order to initiate the VAR model.

4.8.2 Calculation of variables and seasonal effects

The means by which variables including relative unit price (a), unit market share (b), and seasonal effects (c) was calculated are presented below:

a) Relative unit price

The calculation to build the relative unit price was structured into two steps: (1) calculation of the monthly average price; and (2) division of the SKU price by the monthly average price.

b) Unit market share

The calculation to build unit market share was split into the following stages: (1) calculation of the monthly sum of sales (in liters); and (2) division of SKU sales (in liters) by monthly sum of sales (in liters).

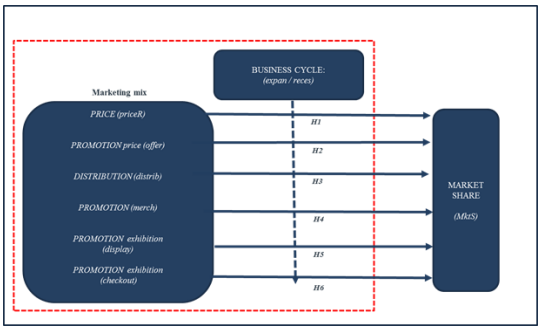
c) Seasonal effects

The seasonal effect of each database, for expansionary and recessionary periods, was evaluated by observing data across time series. For period 1 (expansionary business cycle) five months of the season were employed and for period 2 (recessionary business cycle) 12 months.

4.9 Methodological matrix

In order to summarize the research objectives and the methodology used in this project, a methodological matrix (Mazzon, 1981) was formulated. This matrix was formed from the proposed theoretical framework, research objectives, hypotheses, research variables to be tested, test used, and model applied. Figure 5 summarizes this.

Theoretical Framework



Research question:	*This research aims to identify the effectiveness of marketing mix elements – such as price, distribution, promotion communication, and promotion exhibition –for diet carbonated drinks in relation to market share. The elements are evaluated considering different business cycles (expansionary and recessionary), as well as the immediate and persistent effects.*				
Research objectives	**Code**	**Hypotheses/ Research Question**	**Variables**	**Test**	**Model**
PriceR – Evaluating *relative unit price* and *sales market share* response in different business cycle periods	*H1*	*Price sensitivity is higher during recessionary business cycle periods than expansionary business cycle periods, which has an immediate effect on market share.*	priceR, business cycle period	β difference/confidence interval	VAR equation modeling
PROMOTION price – Evaluating special offers/discounts and sales market share response in different business cycle periods	*H2*	*The immediate effect of increasing of special offers on market share will be higher during recessionary periods than in expansionary periods.*	offer, business cycle period	β difference/confidence interval	VAR equation modeling
DISTRIBUTION – Evaluating weighted distribution and *sales market share* response in different business cycle periods	*H3*	*The immediate effect on market share of an increase in distribution will be higher in expansionary business cycle periods than in recessionary periods.*	distrib, business cycle period	β difference/confidence interval	VAR equation modeling
PROMOTION place – Evaluating merchandising and sales market share response in different business cycle periods	*H4*	*The immediate effect on market share of increased merchandising will be higher in expansionary business cycle periods than in recessionary periods.*	merch, business cycle period	β difference/confidence interval	VAR equation modeling
PROMOTION place – Evaluating feature/display and sales market share response in different business cycle periods	*H5*	*The immediate effect on market share of increasing the number of displays will be greater in expansionary business cycle periods than in recessionary periods.*	display, business cycle period	β difference/confidence interval	VAR equation modeling
PROMOTION place – Evaluating checkout and sales market share response in different business cycle periods	*H6*	*The immediate effect on market share of increasing product exhibition in the checkout area will be higher in expansionary business cycle periods than in recessionary periods.*	checkout, business cycle period	β difference/confidence interval	VAR equation modeling

Short term effect Business cycle expansion period/in-store marketing actions	*RQ1*	*Which in-store marketing mix actions (relative unit price, weighted distribution, special offers, merchandising, display and checkout) are the most critical for obtaining an immediate market share response in expansionary business cycle periods?*	priceR, distrib, offer, merch, display, business cycle period (expansion)	β value	VAR equation modeling
Short term effect Business cycle recession period/in-store marketing actions	*RQ2*	*Which in-store marketing mix actions (relative unit price, weighted distribution, special offers, merchandising, display and checkout) are the most critical for obtaining an immediate market share response in recessionary business cycle periods?*	priceR, distrib, offer, merch, display, business cycle period (recession)	β value	VAR equation modeling
Long term effect Business Cycle expansion period/In-store marketing actions	*RQ3*	*Which in-store marketing mix actions (price, special offers, weighted distribution, checkout distribution and display) are the most critical for obtaining a market share persistent response in expansionary business cycle periods?*	priceR, distrib, offer, merch, display, business cycle period (expansion)	Impulse response graph	Impulse response function
Long term effect Business cycle recession period/in-store marketing actions	*RQ4*	*Which in-store marketing mix actions (price, special offers, weighted distribution, checkout distribution and display) are the most critical for obtaining a market share persistent response in recessionary business cycle periods?*	priceR, distrib, offer, merch, display, business cycle period (recession)	Impulse response graph	Impulse response function
Business cycle period /unemp/CCI	*RQ5*	*RQ5: Do the unemployment rate and CCI affect market share response? Does this effect vary by business cycle?*	business cycle period, unempl, CCI	β difference/confidence interval	VAR equation modeling

Figure 5 – Methodological matrix

Source: Author.

5. ANALYSIS

This research aims to identify the effectiveness of marketing mix elements – such as price, distribution, promotion communication, and promotion exhibition –for diet carbonated drinks in relation to market share. The elements are evaluated considering different business cycles (expansionary and recessionary), as well as the immediate and persistent effects. In order to achieve this objective, this chapter elaborates on the analysis conducted. The chapter was organized into four sections: Section 5.1 provides a descriptive analysis of the database; Section 5.2 outlines the tests required to apply the VAR model; Section 5.3 presents the VAR model estimation and equation modeling with the immediate effects; and finally Section 5.4 presents the impulse-response function to evaluate the long-term effects.

5.1 Descriptive analysis

In order to analyze the data, Table 6 presents descriptive statistics for expansionary and recessionary business cycle periods, including the mean, standard deviation (SD), minimum (min.), and maximum (max.) values.

Table 6 – Descriptive statistics

		Expansionary period				Recessionary Period			
Variable	Variable code	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
Market Share	MktS	0.615	0.035	0	4.365	0.057	0.333	0	3.825
Special Offers	offer	0.272	1.372	0	17	0.265	1.239	0	14
Price	priceR	1.062	0.625	0.409	4.544	1.066	0.668	0.385	5.365
Distribution	distrib	4.955	12.159	0	86	4.704	11.882	0	84
Merchandising	merch	0.457	2.747	0	34	0.388	2.569	0	33
Display	display	1.902	6.724	0	65	1.887	6.791	0	63
CheckOut	checkout	2.270	8.192	0	77	2.277	8.300	0	75

Source: Author.

After evaluating both business cycle periods – expansionary and recessionary – market share (MktS) shows different means of μ_e =0.615 for the expansionary period and μ_r =0.057 for the recessionary period. This signals that the business cycles are quite different.

Evaluating the display of diet carbonated soft drinks in the checkout area, it was also identified that their presence differs across business cycles (μ_e=2.270/μ_r=2.777), with a wide standard error (SDe=1.372/SDr=0.265). This indicates that it differs across the two business cycles.

Analyzing promotions as special offers (μ_e=0.272/μ_r=0.265) shows a similar average in both business cycles; however, the wide standard error (SDe=8.192/SDr= 8.300) suggests an opportunity to change the promotion source in different business cycles (expansionary versus recessionary).

Merchandising (μ_e=0.457/μ_r=0.388) and display (μ_e=1.902/μ_r=1.887) presented different means by business cycle with a small standard error.

5.2 Results of tests required to apply VAR

As mentioned in Section 4.4, the following tests to assure the validity of the model are required to apply VAR: unit root test (Section 5.2.1), lag test (Section 5.2.2), and cointegration test (Section 5.2.3). The results of the three required tests to apply VAR are discussed in the next sections.

5.2.1 Unit root test

The unit root test verifies whether the time series is stationary; i.e., whether it has average and varying constants over time (Bueno, 2011). Application of the unit root test is necessary to verify whether there are stationary characteristics of the time series (Griffiths et al., 1993). In this case, it is recommended that the Dickey–Fuller test be used (Dickey & Fuller, 1981). For the regression analysis, one of the hypotheses of the model is that the series are stationary; that is, they always vary around the same mean. The test used to verify the existence of the unitary roots was the augmented Dickey–Fuller (ADF) test. If the unit root test is identified, the recommendation is to conduct data handling (Hanssens et al., 2003).

To certify that there is no unit root, the ADF statistic has to be less than the critical Dickey–Fuller value (Griffiths et al., 1993). The results of the unit root test are presented in Table 7.

Table 7 – Unit root test

	Constant	Trend	Critical Dickey–Fuller		ADF	
			1%	5%	Expansion (T1)	Contraction (T2)
Market share	No	No	-2.58	-1.95	-11.95	-10.67
	Yes	No	-3.43	-2.86	-11.75	-10.68
	No	Yes	-3.96	-3.41	-11.76	-10.68
Price index	No	No	-2.58	-1.95	-5.01	-3.67
	Yes	No	-3.43	-2.86	-8.03	-6.91
	No	Yes	-3.96	-3.41	-5.70	-6.98
Weighted distribution	No	No	-2.58	-1.95	-5.63	-1.67
	Yes	No	-3.43	-2.86	-4.67	-1. 28
	No	Yes	-3.96	-3.41	-5.12	-1.3
	No	No	-2.58	-1.95	-2.16	-6.66
Merchandising	Yes	No	-3.43	-2.86	-2.13	-6.6
	No	Yes	-3.96	-3.41	-2.09	-6.61
Feature	No	No	-2.58	-1.95	-3.49	-0.31
/display	Yes	No	-3.43	-2.86	-3.34	-0. 29
	No	Yes	-3.96	-3.41	-3. 23	-0.31
Special offers/	No	No	-2.58	-1.95	-8.78	-3.74
Discounts	Yes	No	-3.43	-2.86	-8.83	-3.82
	No	Yes	-3.96	-3.41	-8.77	-3.79
Checkout	No	No	-2.58	-1.95	-2.45	-0.13
	Yes	No	-3.43	-2.86	-2.36	-0.17
	No	Yes	-3.96	-3.41	-2. 23	-0.19

Source: Author.

As can be seen, all ADF statistics are smaller than the critical Dickey–Fuller values (Griffiths et al., 1993), so there is no unit root in either period.

5.2.2 Number of lags (lag test)

After solving the stationary problem by applying the unit root test in the previous section, the objective of the lag test is to identify the number of lags in a time series (Vartanian, 2008). The objective of this test is to identify the VAR order or the number of lags of each stimulus that will be reflected in the study function. The Akaike information criterion (AIC), or Akaike's

statistic, and the Bayesian information criterion (BIC), or Bayesian statistic, are the suggested tests (Bueno, 2011).

The lag will be the smallest number of the two statistics (AIC and BIC). As presented in Table 8, the lag is 1 for both business cycles (expansionary period and recessionary period), as shown in italics.

Table 8 – Lags test

AIC and BIC criteria

	Expansionary period		Recessionary period	
Lag	MBIC	MAIC	MBIC	MAIC
1	*-1302.113*	*-145.3705*	*-2359.604*	*-402.502*
2	-978.666	-111.109	-2176.212	-371.792
3	-654.464	-76.093	-1936.303	-330.832
4	-354.973	-65.787	-1677.167	-289.152

Source: Author.

5.2.3 Cointegration test

Pauwels et al. (2002) suggested applying the cointegration test to verify the long-term equilibrium between endogenous variables. This test aims to verify the influence of one time series on another over the long term.

In this research, Johansen's (1991) cointegration test was applied as a means to verify the existence of cointegration by observing the eigenvalues of the coefficient matrix. The test seeks a greater number of eigenvalues than the number of linear regressions.

No cointegration problem was identified, as can be seen in Tables 9a and 9b; all eigenvalues are higher than the critical value (Griffiths et al., 1993).

Table 9a – Cointegration: Expansionary period

		Eigenvalue	Trace	Critical Value	P-Value
Test of rank =	0	0.25747253	2324.4478	2112.19	0.000000
Test of rank =	1	0.16768513	1295.3148	1222.11	0.000000
Test of rank =	2	0.08260145	660.80157	642.42	0.000000
Test of rank =	3	0.03983832	362.76227	356.87	0.000000
Test of rank =	4	0.03492527	222.22282	219.15	0.000000
Test of rank =	5	0.02184916	99.327346	98.41	0.000000
Test of rank =	6	0.00661885	22.957414	22.88	0.000002

Source: Author.

Table 9b – Cointegration test: Recessionary period

		Eigenvalue	Trace	Critical Value	P-Value
Test of rank =	0	0.32447144	1889.4957	1659.29	0.000000
Test of rank =	1	0.20902054	976.31477	903.92	0.000000
Test of rank =	2	0.08469494	430.4377	417.32	0.000000
Test of rank =	3	0.05126942	224.41465	220.16	0.000000
Test of rank =	4	0.02311487	101.89104	100.8	0.000000
Test of rank =	5	0.01972993	47.44796	46.99	0.000000
Test of rank =	6	0.00045416	1.0575166	1.06	0.303837

Source: Author.

5.3 VAR model estimation and equation modeling

The panel VAR model was estimated using STATA software according to the methodology provided by Abrigo and Love (2016). Fixed effects in the research model were correlated with the lagged dependent variable. This enables the researcher to obtain an impulse response function (market share) and consistently link the effect of marketing activities developed at the point of sale (price, distribution, and promotion). This effect is presented in Figure 3.

The estimation results in STATA were built in two different business cycles: an expansionary business cycle period (from October 2012 to December 2014) and a recessionary business cycle

period (from May 2015 to December 2016). The estimation results are presented in Tables 10a and 10b.

Table 10a – Estimation results: Expansionary period

Equation	Coefficient	Mean	Standard error
Sales market share			
	Lagged market share	0.795 ***	0.016
	Lagged price	-0.005**	0.002
	Lagged distribution	0.002***	0
	Lagged merchandising	-0.005***	0.001
	Lagged feature/display	-0.004***	0.001
	Lagged special offers/discounts	n.s.	n.s.
	Lagged checkout	n.s.	n.s.
	Consumer confidence index	n.s.	0
	Unemployment rate	-0.0006 *	0

*** Significant at p<0.01; ** Significant at p<0.05; * Significant at p<0.10
Souce: Author.

Table 10b – Estimation results – Recessionary period

Equation	Coefficient	Mean	Standard error
Sales market share			
	Lagged market share	0.728***	0.001
	Lagged price	0.040***	0
	Lagged distribution	0.001***	0
	Lagged merchandising	-0.005***	0
	Lagged feature/display	0.038***	0
	Lagged special offers/discounts	-0.007***	0
	Lagged checkout	-0.028***	0
	Consumer confidence index	0.0004 ***	0
	Unemployment rate	-0.0011***	0

*** Significant at p<0.01; ** Significant at p<0.05; * Significant at p<0.10
Source: Author.

Table 11 presents the confidence interval for each business cycle. This was built by calculating each mean (beta) and sum and deducting one standard error (Table 11).

Table 11 – Confidence interval and coefficient difference

		Interval= Mean (β)+/-s.d.				
Equation	Coefficient	Expansion business cycle		Recession business cycle		Interval comparison for both cycles
Market Share		Min *(β+s.e.)*	Max *(β-s.e.)*	Min *(β+s.e.)*	Max *(β-s.e.)*	
	Lagged market share	0.779	0.811	0.727	0.729	Different
	Lagged price	0.003	0.003	0.040	0.040	Different
	Lagged special offers/discounts	n.s.	n.s.	-0.007	-0.007	Not comparable
	Lagged distribution	0.002	0.002	0.001	0.001	Different
	Lagged merchandising	-0.006	-0.004	-0.005	-0.005	Not different
	Lagged feature/display	-0.005	-0.003	0.038	0.038	Different
	Lagged checkout	n.s.	n.s.	-0.028	-0.028	Not comparable
	Consumer confidence index	n.s.	n.s.	0.0004	0.0004	Not comparable
	Unemployment rate	-0.0006	-0.0006	-0.0011	-0.0011	Different

Source: Author.

In order to evaluate H1 to H6, each estimation result and the difference, confidence interval, was compared. Table 10a presents the expansionary results and Table 10b the recessionary results, while Table 11 shows the confidence interval (beta plus and minus standard error) to check the beta difference. Other estimations are presented in APPENDIX VIII.

Lagged *sales market share* ($MktS_{t-1}$) is the most relevant variable to predict *market share* ($MktS_t$) in both expansionary and recessionary cycles, as presented in Tables 10a and 10b: expansionary business cycle (β_E=0.795, $p<0.01$) and recessionary business cycle (β_R=0.728, $p<0.01$). These results emphasize the importance of *market share* ($MktS_t$) growth to maintain an increasing trend in the next period. Table 11 also indicates that both values present different confidence intervals, and in expansionary cycles lagged market share is even more relevant to predict the next market share.

In recessionary business cycles, *price* (priceR) has a higher impact (β_R=0.040, p<0.01) on *market share* than in an expansionary period (β_E=-0.005, p<0.05). The difference was also confirmed via the confidence intervals shown in Table 11.

In expansionary business cycles, *distribution* (distrib) has a higher immediate impact (β_E=0.002, p<0.01) on *market share* than in recessionary periods (β_R=0.001, p<0.01). The difference was also confirmed via the confidence intervals shown in Table 11. This emphasizes the importance of distribution in expansionary economic periods.

Merchandising (Merch) actions applied at the point of sale have no difference (β_E=-0.005, (p<0.01)/β_R=-0.005(p<0.01)) in terms of immediate impact for either business cycle (expansion/contraction), as presented in Table 11.

The use of *feature/display* (display) or extra point of sale locations is more effective on *market share* ($MktS_t$) in a recessionary business cycle (β_E=-0.004(p<0.01))/β_R=0.038(p<0.01)). The differences are again confirmed in Table 11.

Special offers/discounts (offer) and *checkout* (checkout) could not be compared for either business cycle, although they did not present relevant statistics to the recessionary business cycle period.

In order to evaluate the most critical in-store marketing actions for a better immediate market share response, both business cycle periods were evaluated. According to the coefficients presented in Tables 10a and 10b, each business cycle's results are as follows:

(a) For the expansionary business cycle, the most effective marketing mix action is *distribution* (β_E=0.002, p<0.01).
(b) For the recessionary business cycle, *price* (priceR) (β_R=0.040, p<0.01) and *feature/display* (display) (β_R=0.038, p<0.01) show better results.

These findings serve as a reminder that to be effective in the short term (immediate effect) for greater *market share* (MktS), it is important to apply different in-store marketing combinations in each business cycle period. In expansionary business cycles, *distribution* is the most

important in-store marketing action, whereas *price* (priceR) and *feature/display* (display) present better results in recessionary business cycle periods.

Exogenous variables:

The evaluation of the exogenous variables – unemployment rate and CCI – in each business cycle period is shown in Tables 10a and 10b.

Unemployment rate (Unempl) from the IBGE database is negatively related to *market share* (MktS) in both business period cycles. The higher the unemployment, the lower the market share. Moreover, in recessionary business cycles the effect on *market share* (β_R=-0.0011, $p<0.01$) is even higher when compared to expansionary cycles (β_E=-0.0006, $p<0.1$).

Consumer Confidence Index (CCI) from the FGV-IBRE database is positively related to *market share* (MktS) in recessionary periods (β_R=0.0004, $p<0.01$). In expansionary periods the result was not significant.

Thus, in recessionary business cycle periods unemployment rate and consumer confidence index will have even more impact on market share.

In the next section, the cumulative effect – the impact on market share in the long term – will be presented applying the impulse-response function.

5.4 Impulse-response function and cumulative effect

While VAR equation modeling presents the immediate in-store marketing effect – or the effect for the next month on market share – the impulse-response function has the objective of evaluating the cumulative effect, or the effect for the next few months. The impulse-response function is represented in Figure 7 (expansionary period), while Figure 8 (recessionary period) presents the next 10 months of the impulse-response for each in-store marketing mix action (price, promotion, and distribution) through periods of expansion versus recession. This

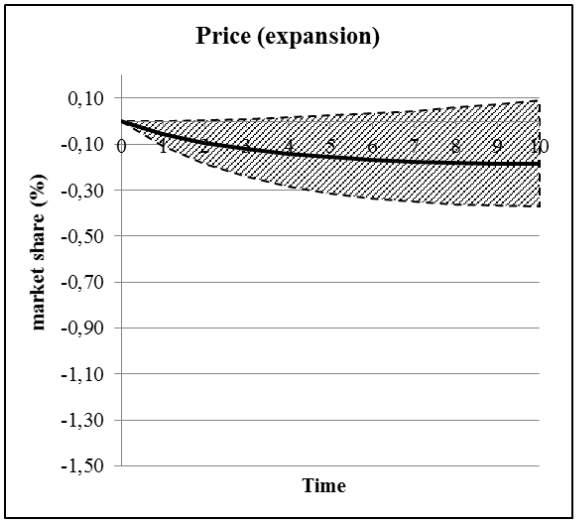
analysis contributes to identifying the cumulative effect of each in-store marketing mix action in both business cycles.

In order to evaluate the impulse-response results, graphs are provided to represent each increase of 1% in in-store marketing actions (Figure 6 (price), Figure 7 (distribution), Figure 8 (merchandising), Figure 9 (display), Figure 10 (special offers/discounts), and Figure 11 (checkout)). The STATA 15.1 output is presented in APPENDIX IX.

I. Price

A 1% increase in relative unit price has a negative impact on market share for both business cycle periods (Figure 6). Indeed, in recession periods the effect after two months of a loss in market share is higher (Figure 6b) than in expansion periods (Figure 6a).

6a



6b

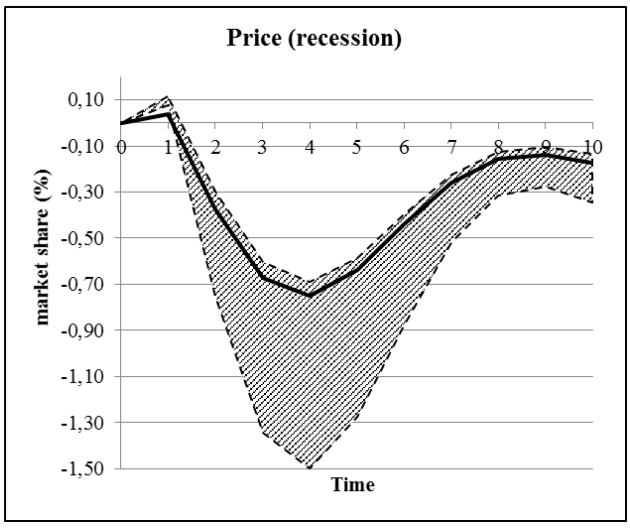


Figure 6 – Impulse-response graph: Price

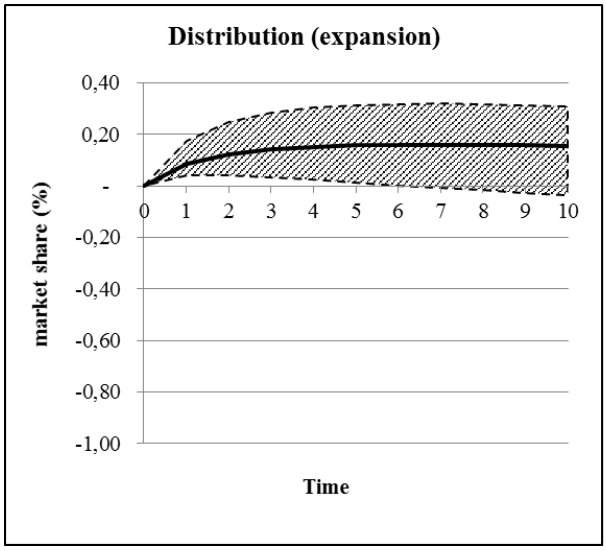
Source: Author.

II. Distribution

A 1% increase in weighed distribution has a positive impact for both cycles in terms of immediate effect. Regarding cumulative effect, the market share effect in expansionary

business cycles (Figure 7a) is positive; in recessionary business cycle it is only positive in the first two months, and after that the recession effect decreases market share (Figure 7b).

7a



7b

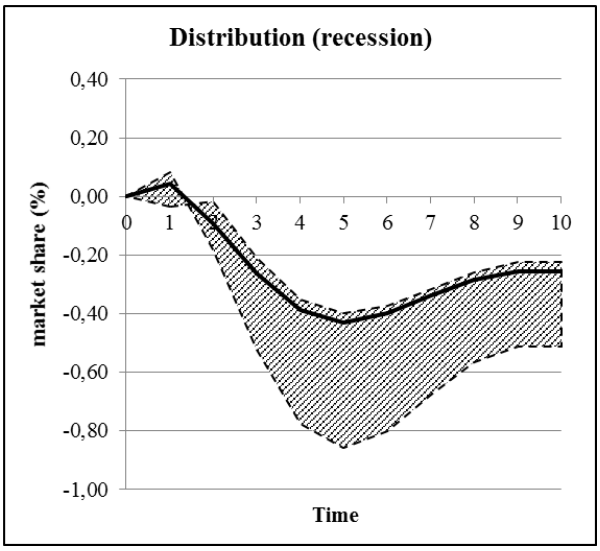


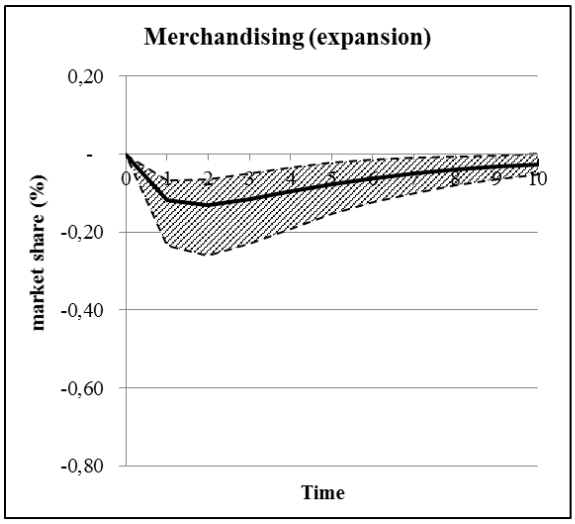
Figure 7 – Impulse-response graph: Distribution

Source: Author.

III. Merchandising

A 1% increase in merchandising does not mean an increase in market share, at least in the first three months, for either business cycle (Figure 8a and Figure 8b). This indicates that this investment is not effective in any scenario.

8a



8b

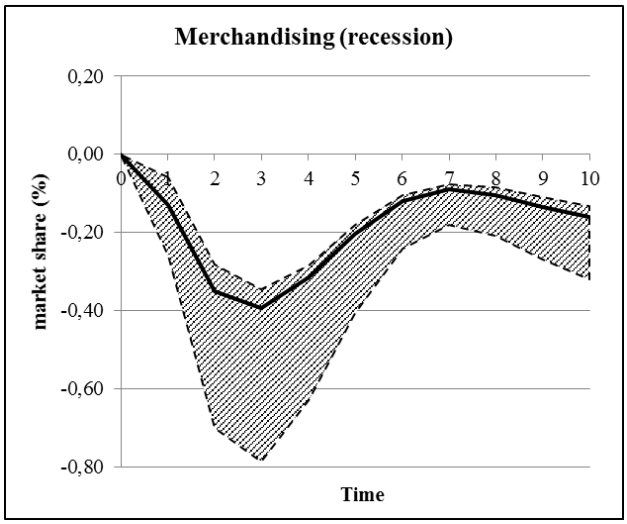


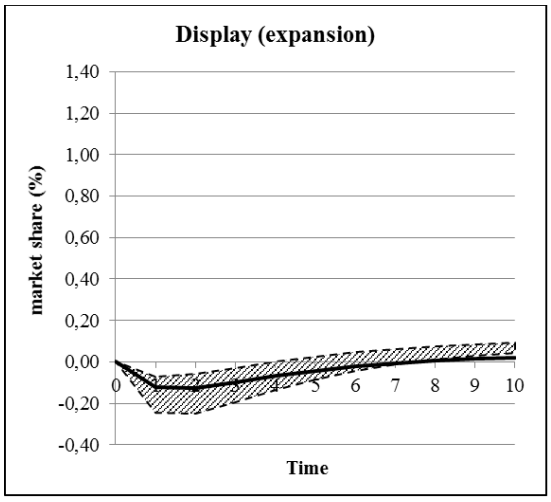
Figure 8 – Impulse-response graph: merchandising

Source: Author.

IV. Display

A 1% increase in display and features increases market share in recession periods (Figure 9b). The opposite effect applies in expansion cycles (Figure 9a), which means this in-store marketing action should be employed in recessions for a better sales response.

9a



9b

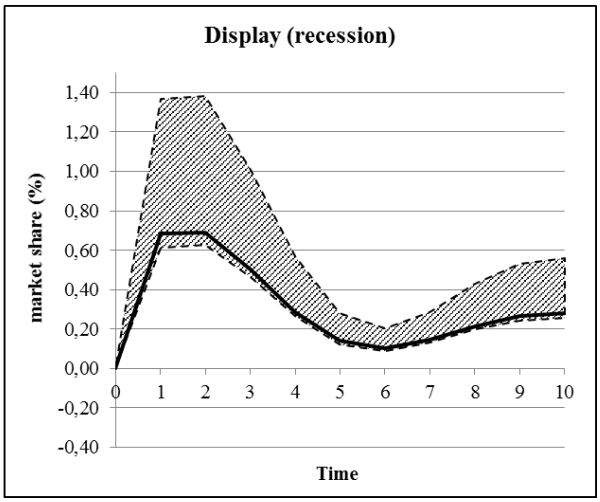


Figure 9 – Impulse-response graph: Display

Source: Author.

V. Special offers/ discounts

A 1% increase in special offers or discounts means a decrease in sales market share in the short term (first three months). After three months the effect is extremely positive for recessionary cycles (Figure 10). As shown in Table 10a for expansionary cycles, special offers are not statically significant.

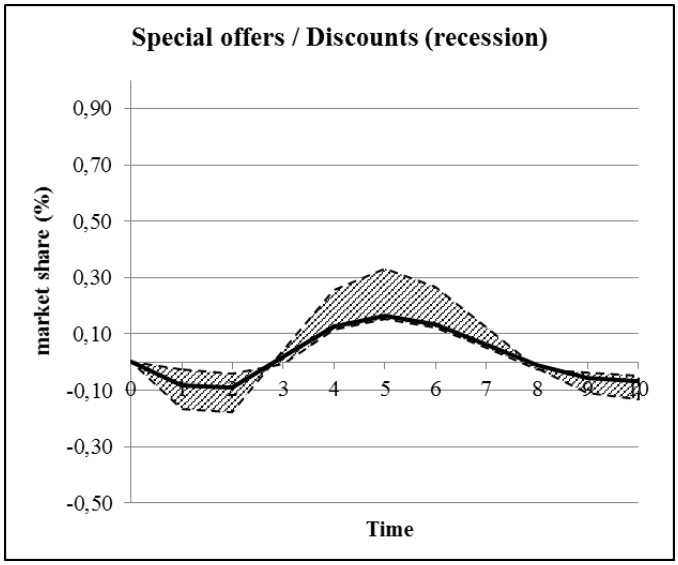


Figure 10 – Impulse-response graph: special offers/ discounts

Source: Author.

VI. Checkout

A 1% increase in checkout product displays does not increase market share and does not present an effective in-store marketing strategy (Figure 11). Table 10a shows that checkout is not statically significant for expansionary cycle special offers.

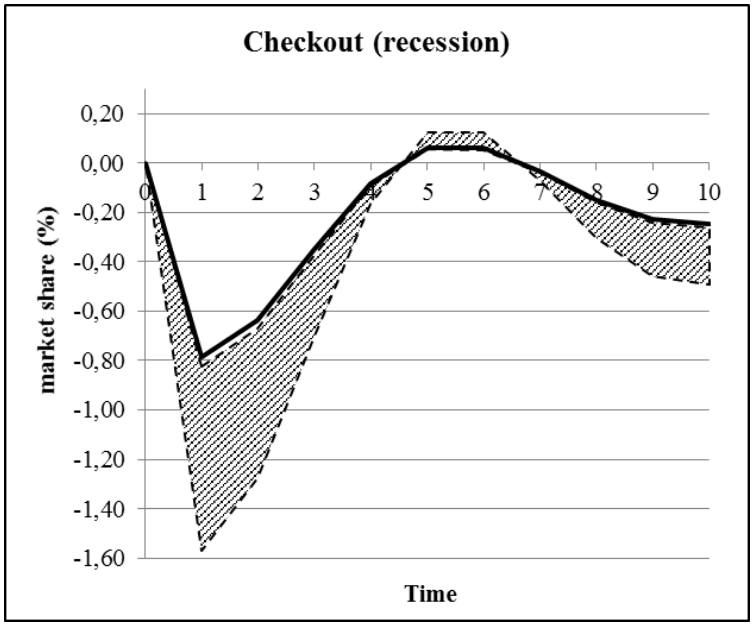


Figure 11 – Impulse-response graph: Checkout

Source: Author.

The results from the impulse-response function and cumulative effect are summarized as follows:

- In expansionary periods, distribution (Figure 7a) presents as an effective in-store approach to increase market share.
- In recessionary periods, first display (Figure 9b) and then special offers (Figure 10) have more effective results on market share response.

6. DISCUSSION

As the incidence of obesity-related health problems increases around the globe (Ailawadi, Ma, & Grewal, 2018), stimulated by sugar consumption, consumers and government are pressure manufactures of high-sugar products. Signaling theory (Spence, 1978) contributes to the current study's insights into the phenomena from growing product line extension (Sinapuelas et al., 2015) – that emphasizes diet products "without sugar" (Guaraná Antactica, 2019; Coca-Cola, 2016) and attempts to distinguish these products from sugar options on the shelves. These growing product lines respond to government sugar taxes and pressure on manufacturers to review their sweetening methods (Bloomberg News, 2019; BBC, 2018) and produce reformulated products.

Moreover, business cycle theory (Burns & Michell, 1947) contributes to identifying the effectiveness of marketing mix elements for diet carbonated drinks in terms of market share across different business cycles (expansionary and recessionary), as well as the immediate and cumulative effects. Dekimpe and Deleersnyder (2018) emphasized the importance of marketing studies considering the business cycle that are not focused on mature (US and Western European) economies, and this study contributes to filling this gap by studying an emerging economy, Brazil.

The challenges to marketers of packaged food and beverages after launching new diet products were also studied in this research. After investigate the effects of in-store marketing of diet products, this research sought to understand the effectiveness of marketing mix elements for diet carbonated drinks in terms of market share; this was evaluated considering different business cycles (expansionary and recessionary), as well as immediate and persistent effects.

Table 12 summarizes the results for the hypotheses and RQs (Figure 6) of this research, presents the study's results, and, in the case of unsupported or untested hypotheses, provides explanations therefor.

Table 12 – Hypotheses and research question results

Cod	Hypotheses/ Research Question	Results	Explanation
H1	*Price sensitivity is higher during recessionary business cycle periods than expansionary business cycle periods, which has an immediate effect on market share.*	*Supported*	
H2	*The immediate effect of increasing of special offers on market share will be higher during recessionary periods than in expansionary periods.*	*Not tested*	No statistical significance in expansionary cycle
H3	*The immediate effect on market share of an increase in distribution will be higher in expansionary business cycle periods than in recessionary periods.*	*Supported*	
H4	*The immediate effect on market share of increased merchandising will be higher in expansionary business cycle periods than in recessionary periods.*	*Not supported*	Both equal: not worth
H5	*The immediate effect on market share of increasing displays will be greater in expansionary business cycle periods than in recessionary periods.*	*Not supported*	Betas are different, but in the opposite direction of H5 (display works better in recessions)
H6	*The immediate effect on market share of increasing product exhibition in the checkout area will be higher in expansionary business cycle periods than in recessionary periods.*	*Not tested*	No statistical significance in expansionary period
RQ1	*Which in-store marketing mix actions (relative unit price, weighted distribution, special offers, merchandising, display and checkout) are the most critical for obtaining an immediate market share response in expansionary business cycle periods?*	*Distribution*	Higher positive betas
RQ2	*Which in-store marketing mix actions (relative unit price, weighted distribution, special offers, merchandising, display and checkout) are the most critical for obtaining an immediate market share response in recessionary business cycle periods?*	*Price (1st) and display (2nd)*	Higher positive betas
RQ3	*Which in-store marketing mix actions (price, special offers, weighted distribution, checkout distribution and display) are the most critical for obtaining an immediate market share response in expansionary business cycle periods?*	*Distribution*	Figure 7
RQ4	*Which in-store marketing mix actions (price, special offers, weighted distribution, checkout distribution and display) are the most critical for obtaining a market share persistent response in recessionary business cycle periods?*	*Display (1st) and special offers (2nd)*	Figure 9b and Figure 10
RQ5	*Do the unemployment rate and CCI affect market share response? Does this effect vary by business cycle?*	*Unemployment is negatively related to market share, and even wortly in recessionary business periods. CCI not tested.*	Table 9a and Table 9b

Source: Author.

H1 (price) and H3 (distribution) were supported; H5 (display) was not supported, but the difference buy business cycle was identified in the opposite direction. H2 (special offers) and H6 (checkout) were not tested because they were not statically significant in expansionary periods. Only H4 (merchandising) represents equal results for both economic cycles.

The results by business cycle, as proposed in RQ 1–4, are as follows: (1) During expansionary periods, the most effective in-store marketing approach is distribution, in both the short term and the long term. As found by Venkatesan et al. (2015), distribution is an important tool for sales in emerging markets. This study confirms Venkatatesan's research and advances it by identifying that distribution for expansionary cycles is even more important, compare to recessionary ones. (2) During recessionary periods, price and display are the most effective in-store marketing strategies for immediate effect, while in the long term, display and special offers are the most effective, probably for signalizes as cheaper alternatives for consumers - or at least seems to be. A reason for this may be that during recessions customers are more price sensitive, and an increase in relative unit prices results in even less market share than during periods of expansion.

Additional findings regarding each marketing approach are as follows: (1) Display has different effects for immediate effect in each business cycle period, but in the opposite way proposed by H5. It was verified that display is more effective in recessionary periods. (2) Merchandising was similar for both cycles (Figure 8), in the short or long term. (3) As already mentioned, special offers and checkout could not be tested because they were not statistically significant in expansionary cycles.

A contribution of this research is that it considered in-store marketing effects as mixed in-store actions together, unlike in previous studies (see Table 1) that evaluate those studies presented in Table 1 as isolated actions (marketing studies applied business cycle theory – Dekimpe & Deleersnyder, 2018). Business cycle theory (Burns and Michell, 1947) was also applied to explain the fact that market share effects change with economic fluctuations, and these phenomena affect emerging countries such as Brazil.

The methodology applied in this research advance to use secondary databases that identify sales, rather than using questionnaires, which may not reflect real purchase data.

7. MANAGERIAL IMPLICATIONS

This research has implications for manufactures, retailers, consumers, and governments. The findings can help beverage manufacturers to develop diet carbonated soft drinks products by means of analyzing the sales response to actual diet product portfolios, including "non-sugar" brand line extensions (Guaraná Antarctica, 2019; Coca-Cola Journey, 2016; Coca-Cola Brasil, 2017). As sales of carbonated soft drinks have suffered due to the health movement there are actions to increase it, by better promote sugar free product in the point of sale.

For retailers and managers that invest in differentiated spaces at the point of sale, the research identifies the mechanisms of, and responses to, in-store marketing mix actions to promote diet carbonated soft drink products at the point of sale. It shows that in-store marketing works differently in different parts of the business cycle, and that there can be both immediate and cumulative effects. Moreover, to maximize the gains it is important to use a different mix for each cycle and expected return (immediate and cumulative). In order to maximize their investment, retailers must implement and share with manufactures the most effective approach by business cycle and immediate/cumulative effect. If immediate effects are required during recessionary periods it is important to invest in price and display, while if a cumulative effect is required display and special offer strategies should be applied. In expansionary cycles, distribution increases represent the best in-store marketing approach for both immediate and cumulative effects (see Table 12).

In addition, for consumers, this study help them to obtain diet beverage choices in the point of sales. Better in-store marketing will guide consumer at the point of sale to find better diet options.

Finally, government policy makers' incentivizes to manufacturers of non-sugar beverage products have been demonstrated to be effective. Such incentives regarding product reformulations can lead to two approaches: (1) increasing diet brands and diet SKUs, even in a recessionary crises (see Table 2), and (2) better promoting non-sugar carbonated soft drinks by improving packaging (see APPENDIX II).

8. LIMITATIONS AND SUGGESTION FOR FUTURE STUDIES

The findings of this study are subject to several limitations that provide potential extensions for future research. Clearly, there are many other diet beverage and diet food products to be explored. This study only considered one product category – diet carbonated soft drinks. Other diet categories that have increased their market share, such as yogurt, juice, and so on, should be investigated in order to extent the findings.

In addition, non-sugar, non-sodium, and non-fat are increasing in market share and can brings additional findings to provide better in-store marketing approaches. An interesting avenue would be to consider how to maximize in-store marketing investments.

Moreover, we developed a SKU-based in-store marketing model to capture the difference responses between recessionary and expansionary business periods in an emerging market, Brazil. Other emergent markets, such as Russia, India, China, and South Africa should be investigated in future researches. These markets are extremely important to beverage manufactures and retailers as revenue streams. Investigating market share responses can guide these countries in how to invest in effective in-store marketing according to business cycles, which frequently change in those markets.

Forth, panel VAR was adopted as to explore the data in this study. Other techniques, such as hierarchical models, could advance the findings to explore brand effects, as well as comparing in-store and brand effects.

Advertising expenditure could be evaluated to determine advertising's influence on consumer choice and therefore market share, and presenting additional findings regarding in-store investment.

Finally, other in-store marketing strategies could be evaluated, such as share of shelf and relationship rewards, to measure sales responses and investigate the effectiveness of these initiatives.

A hierarchical model could also be applied to evaluate whether brand effects make a major contribution to consumer choice, and to what extent.

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APPENDIX I – ANNUAL REPORTS

Annual Reports revised

Annual Report	Company	Developments
Coca-Cola (2018,2017) ; Pepsico (2018, 2017) Associated British Food (2018,2017) ; BRF (2018,2017) ; Danone (2018,2017) ; General Mills (2018,2017) ; Kellogs (2018,2017); Mondelez (2018,2017) ; Nestlé (2018,2017); ; Unilever (2018,2017)	Coca-cola, Pepsico, British Food, BrasilFoods, Danone, General Mills, Kellogs, Mondelez, Nestlé, Unilever	Investing in health product and discuss product reformulation to active more nutritive packed food.
Danone (2018;2017)	Danone	Report evidences of investment in health products by competitors.
Coca-cola (2018;2017)	Coca-cola	Presents in Annual Report the risks for business of consumers´ health movement.
Sadia (2018;2017)	Brasil Foods	BRF discuss campaign “30% less sodium” as a strategic positioning .
Mondelez (2018;2017)	Mondelez	Investing in wellness and healthy products with significant focus in research and development initiatives

APPENDIX II - ADS

Ads related with less sugar ingredient beverage products

Coca-cola Brasil

Source:: Folha de São Paulo, 31 May 2017.

Coca-cola carbonate soft drink

Source:: Folha de São Paulo, 31 May 2017.

Guaraná Antarctica

Source: Mundo do Marketing, 2007.

Pepsi Brasil

Source: Pepsi Facebook page, 2019.

APPENDIX III - SCHEDULE

Project schedule

SCHEDULE: Main steps	fev/15 – sep/16	oct/16	nov/16	dec/16	jan/17	feb/17	mar/17	apr/17	may/17	jun/17	jul/17	aug/17	sep/17	oct/17	nov/17	dec/17	jan/18	feb/18	mar/18	apr/18	may/18	jun/18	jul/18	aug/18	sep/18	oct/18	nov/18	dec/18	jan/19	feb/19
(1) Preparation for project qualification																														
Literature Review																														
Researchers interview																														
Industry managers interview																														
Retail managers interview																														
(2) Data Collection																														
Fieldwork: Visits to retail company that audit data																														
(3)Qualification exam																														
Qualification exam																														
(4) Data analysis																														
Database analysis (integrate different databases, data minnig..)																														
Database analysis (descriptive statistics..)																														
Apply model VAR required tests (unit root test, number of lags and co-integration test)																														
VAR model estimation, Develop equation modeling																														
Response function of impact in sales by product category																														
Residual analysis																														
Development of conclusions and Evaluate results and hypothesis analysis																														
(6) Final writing																														
(7) Preparation for dissertation presentation																														
Define and invite members																														

Dissertation protocol																														
(8) Dissertation presentation																														
Exam																														
Reviews and protocol																														

APPENDIX IV - FIELD

Field diary

The visits and meetings with Nielsen in order to obtain data access to this research is described below:

1. April 7th, 2017: First meeting to know the company and training to work with Nielsen BI (Advisor) in order to extract data for the research.

2. April 27th, 2017: Meeting with Innovation department to get in touch with Nielsen researches in Health foods and training to work with Nielsen BI (Advisor).

3. May 18th, 2017: Training to work with Nielsen BI (Advisor) and Nielsen Data Extraction (First data extractions).

4. Jun 2nd, 2017: Nielsen Data Extraction and negotiation to obtain more data. Meeting with category specialist.

5. Jun 9th, 2017: Nielsen Data Extraction with new data and access to data dictionary. Meeting with category specialist.

6. Jun 22th, 2017: Nielsen Data Extraction with new data.

7. Jul 7 th, 2017: Nielsen Data Extraction and negotiation to obtain more data.

8. Jul 27 th, 2017: Nielsen Data Extraction with new data.

9. Aug 24 th, 2017: Nielsen Data Extraction with new data, meeting this head of Innovation department of Nielsen about the project.

This agenda and the establishment of a close relationship with Nielsens´ team was important to obtain recent and reliable data and to know more about Nielsen research and product category dynamic.

APPENDIX V- MANUFACTURES

Manufactures of diet carbonated soft drinks

Expansion period (T1 - Oct/12-Dec/14) *27 Months*

Manufacture	Sum of Sales (in Thousand Liters)	%	Monthly Average (in Thousand Liters)
COCA-COLA CIA	883.135,60	61%	32.708,73
ANTARCTICA CIA	247.723,50	17%	9.174,94
PEPSI CIA	227.295,40	16%	8.418,35
Others manufactures	80.883,60	6%	2.995,69
BRASIL KIRIN	12.555,70	1%	465,03
NEW AGE	2.078,80	0%	76,99
Private Label	1.574,50	0%	58,31
REFRIGERANTES COROA	1.046,70	0%	38,77
PSIU	233,90	0%	8,66
SANTA CLAUDIA CIA	117,50	0%	4,35
BRAHMA CIA	48,60	0%	1,80
Total Geral	1.456.693,80		53.951,62

Recession period (T2 - May/15-Dec/16) *20 Months*

Manufacture	Sum of Sales (in Thousand Liters)	%	Monthly Average (in Thousand Liters)
COCA-COLA CIA	522.785,90	62%	26.139,30
ANTARCTICA CIA	134.525,00	16%	6.726,25
PEPSI CIA	133.010,80	16%	6.650,54
Others manufactures	35.911,90	4%	1.795,60
BRASIL KIRIN	7.167,30	1%	358,37
FRUKI LTDA	4.511,10	1%	225,56
Private Label	720,10	0%	36,01
NEW AGE	589,10	0%	29,46
AGUAS MINERAIS SARANDI LTDA	510,40	0%	25,52
REFRIGERANTES COROA	416,80	0%	20,84
PSIU	78,20	0%	3,91
BRAHMA CIA	25,20	0%	1,26
SANTA CLAUDIA CIA	23,50	0%	1,18
Total Geral	840.275,30		42.013,77

APPENDIX VI– BRANDS

Brands of diet carbonated soft drinks

Expansion period (T1 - Oct/12-Dec/14) *27 Months*

Brand	Sum of Sales (in Thousand Liters)	%	Monthly Average (in Thousand Liters)
COCA COLA ZERO	689.968,70	47%	25.554,40
GUARANÁ ANTARCTICA	247.722,90	17%	9.174,92
H2OH	198.556,30	14%	7.353,94
AQUARIUS FRESH	73.188,70	5%	2.710,69
FANTA ZERO	40.271,60	3%	1.491,54
Others brands	39.045,70	3%	1.446,14
SPRITE ZERO	29.123,00	2%	1.078,63
KUAT ZERO	27.548,90	2%	1.020,33
PEPSI	21.144,40	1%	783,13
SCHWEPPES KO	13.347,60	1%	494,36
MATE COURO	7.861,60	1%	291,17
PEPSI TWIST	7.446,90	1%	275,81
COCA COLA LIGHT	7.037,70	0%	260,66
DOLLY	6.452,80	0%	238,99
MINEIRINHO	5.238,20	0%	194,01
FIBZ	4.924,80	0%	182,40
VIVA SCHIN	4.455,70	0%	165,03
GRAPETTE	3.415,30	0%	126,49
ITUBAINA	3.173,70	0%	117,54
FUNADA	2.450,50	0%	90,76
MINEIRO+ZAP COLA	2.405,40	0%	89,09
CLASSIC	2.078,80	0%	76,99
CINI	1.797,50	0%	66,57
COCA COLA LIGHT PLUS	1.603,10	0%	59,37
MARCA PROPRIA	1.574,50	0%	58,31
TIO SAM	1.275,70	0%	47,25
POTY	1.118,40	0%	41,42
ARCO IRIS	1.085,90	0%	40,22
JESUS	922,90	0%	34,18
MIL	866,60	0%	32,10
CONVENCAO	797,70	0%	29,54
GOIANINHO	678,00	0%	25,11
DEL REY/FANNY	635,50	0%	23,54
COROA	460,00	0%	17,04
IR.PARAZZI+S.BENTO+FERRASPARI	427,80	0%	15,84
UAI	416,90	0%	15,44
MANTIQUEIRA	369,80	0%	13,70
GOLE	351,30	0%	13,01
ICE COLA	346,00	0%	12,81
PAULISTINHA	311,30	0%	11,53
PITCHULA	300,40	0%	11,13
TOBI	299,90	0%	11,11
RINCO	293,90	0%	10,89

TOP	289,50	0%	10,72
MARAJA	251,00	0%	9,30
IATE	240,70	0%	8,91
PSIU TEEN	233,90	0%	8,66
VENCETEX	229,50	0%	8,50
KIKO	220,80	0%	8,18
REGENTE	213,50	0%	7,91
TAJU+MOGI	207,70	0%	7,69
CONQUISTA	204,00	0%	7,56
PUREZA	193,70	0%	7,17
THOM	148,30	0%	5,49
PEPSI TWIST 3	147,80	0%	5,47
IRON	147,00	0%	5,44
MAX WILHELM	136,10	0%	5,04
VEDETE	129,70	0%	4,80
PIRACAIA	123,70	0%	4,58
KUAT EKO	122,70	0%	4,54
REAL/SANTA CLAUDIA	117,50	0%	4,35
OURO VERDE	108,80	0%	4,03
BIRI	104,60	0%	3,87
FRUTILLA	70,50	0%	2,61
GOLD SCRIN	61,80	0%	2,29
GAROTO	54,30	0%	2,01
PAKERA	49,40	0%	1,83
SUKITA	48,60	0%	1,80
CRISTALINA	21,60	0%	0,80
BOITUVA/BACANA	18,10	0%	0,67
XERETA+TIETE+AVESANI	3,60	0%	0,13
SCHIN	1,50	0%	0,06
COCA COLA LIGHT LEMON	0,70	0%	0,03
GUARAH	0,60	0%	0,02
RC COLA	0,30	0%	0,01
Total Geral	1.456.693,80	100%	53.951,62

Recession period (T2 - May/15-Dec/16) *20 Months*

Brand	Sum of Sales (in Thousand Liters)	%	Monthly Average (in Thousand Liters)
COCA COLA ZERO	413.681,00	49%	20.684,05
GUARANÁ ANTARCTICA	133.945,00	16%	6.697,25
H2OH	121.661,30	14%	6.083,07
AQUARIUS FRESH	35.152,60	4%	1.757,63
FANTA ZERO	18.774,20	2%	938,71
SPRITE ZERO	16.549,40	2%	827,47
KUAT ZERO	14.386,00	2%	719,30
COCA COLA COM STEVIA	14.002,00	2%	700,10
Others brands	13.284,80	2%	664,24
SCHWEPPES KO	5.271,30	1%	263,57
PEPSI	5.007,70	1%	250,39
MATE COURO	4.832,00	1%	241,60
FRUKI	4.511,10	1%	225,56
PEPSI ZERO	4.148,20	0%	207,41
COCA COLA LIGHT	4.144,60	0%	207,23
MINEIRINHO	3.548,40	0%	177,42
ITUBAINA	3.478,00	0%	173,90
DOLLY	2.465,40	0%	123,27
PEPSI TWIST	2.171,80	0%	108,59
VIVA SCHIN	2.020,80	0%	101,04
GRAPETTE	1.845,10	0%	92,26
MINEIRO+ZAP COLA	1.789,50	0%	89,48
FIBZ	1.666,80	0%	83,34
FUNADA	1.291,10	0%	64,56
CINI	910,30	0%	45,52
TIO SAM	832,30	0%	41,62
MARCA PROPRIA	720,10	0%	36,01
CLASSIC	589,10	0%	29,46
GUARANÁ ANTARCTICA BLACK	580,00	0%	29,00
POTY	551,10	0%	27,56
ARCO IRIS	526,90	0%	26,35
JESUS	511,80	0%	25,59
SARANDI	510,40	0%	25,52
CONVENCAO	399,50	0%	19,98
GOIANINHO	356,20	0%	17,81
MIL	346,60	0%	17,33
COROA	329,80	0%	16,49
COCA COLA LIGHT PLUS	311,90	0%	15,60
MANTIQUEIRA	272,30	0%	13,62
PAULISTINHA	271,80	0%	13,59
MARAJA	228,80	0%	11,44
GOLE	225,30	0%	11,27
VENCETEX	190,70	0%	9,54
UAI	178,00	0%	8,90
IR.PARAZZI+S.BENTO+FERRASPARI	156,30	0%	7,82
RINCO	148,70	0%	7,44
TOBI	143,50	0%	7,18
TOP	141,90	0%	7,10
CONQUISTA	123,80	0%	6,19

MAX WILHELM	116,80	0%	5,84
PUREZA	112,60	0%	5,63
DEL REY/FANNY	93,20	0%	4,66
IATE	83,20	0%	4,16
REGENTE	81,10	0%	4,06
PSIU TEEN	78,20	0%	3,91
VEDETE	74,00	0%	3,70
OURO VERDE	70,30	0%	3,52
TAJU+MOGI	52,70	0%	2,64
THOM	48,30	0%	2,42
PAKERA	35,40	0%	1,77
FRUTILLA	34,90	0%	1,75
GAROTO	32,90	0%	1,65
PITCHULA	26,70	0%	1,34
CRISTALINA	26,20	0%	1,31
SUKITA	25,20	0%	1,26
REAL/SANTA CLAUDIA	23,50	0%	1,18
PEPSI TWIST 3	21,70	0%	1,09
PIRACAIA	18,40	0%	0,92
BIRI	13,80	0%	0,69
GOLD SCRIN	13,10	0%	0,66
ICE COLA	3,80	0%	0,19
SCHIN	1,70	0%	0,09
COCA COLA LIGHT LEMON	0,90	0%	0,05
KIKO	0,70	0%	0,04
RC COLA	0,20	0%	0,01
SABORAKI	0,20	0%	0,01
BOITUVA/BACANA	0,10	0%	0,01
DIET COKE	0,10	0%	0,01
KUAT EKO	0,10	0%	0,01
PEPSI MAX	0,10	0%	0,01
Total Geral	840.275,30	100%	42.013,77

APPENDIX VII – DISPOSABLE VARIABLES

Description of disposable variables by product category

CARBONATE SOFTDRINK			
#	**Variable**	**Operationalization**	**Example**
1	Manufacture	Manufacture that produces	Coca-cola cia
2	Brand	Brand	Coca-cola
3	Family Brand	Brand line	Coca-cola Stevia
4	Calories level	classify if it low or regular calories	regular / diet/ light/ zero
5	Weight range	How many ml	Until 200 ml / 1000 to 1249 ml/ ...
6	Flavor	Fruit or flavor	cola, orange, guarana,..
7	Packing	Type of material used in packing	plastic, can, glass
8	Promotion	Package promotion	Take 3 pay 2 ; Pay 100 ml take 120 ml

APPENDIX VIII– ESTIMATION RESULTS

Table VIII a – Estimation results (expansion) Other equations model

Equation	Coefficient	Mean	Standard error
Price			
	Lagged market share	-0.016	0.032
	Lagged price	0.954	0.053
	Lagged distribution	0.003	0.002
	Lagged merchandising	0.000	0.003
	Lagged feature/display	0.016	0.006
	Lagged special offers/discounts	-0.006	0.003
	Lagged checkout	-0.025	0.006
	Consumer confidence index	-0.000	0.003
	Unemployment rate	0.001	0.005
Distribution			
	Lagged market share	1.247	0.714
	Lagged price	-0.351	0.229
	Lagged distribution	0.735	0.039
	Lagged merchandising	-0.110	0.069
	Lagged feature/display	0.052	0.086
	Lagged special offers/discounts	0.090	0.069
	Lagged checkout	0.437	0.093
	Consumer confidence index	0.002	0.002
	Unemployment rate	-0.035	0.035
Special offers/discounts			
	Lagged market share	6.561	0.613
	Lagged price	0.067	0.060
	Lagged distribution	0.022	0.015
	Lagged merchandising	0.098	0.051
	Lagged feature/display	-0.066	0.034
	Lagged special offers/discounts	0.265	0.035
	Lagged checkout	-0.018	0.031
	Consumer confidence index	-0.001	0.001
	Unemployment rate	0.022	0.012
Merchandising			
	Lagged market share	1.825	0.498
	Lagged price	0.031	0.050
	Lagged distribution	0.052	0.014
	Lagged merchandising	0.472	0.042
	Lagged feature/display	-0.142	0.027
	Lagged special offers/discounts	0.028	0.032
	Lagged checkout	0.100	0.026
	Consumer confidence index	-0.001	0.000

	Unemployment rate	0.000	0.001
Feature/Display			
	Lagged market share	-0.214	0.779
	Lagged price	-0.111	0.122
	Lagged distribution	0.194	0.025
	Lagged merchandising	-0.202	0.054
	Lagged feature/display	0.520	0.055
	Lagged special offers/discounts	0.071	0.050
	Lagged checkout	0.001	0.061
	Consumer confidence index	-0.002	0.001
	Unemployment rate	0.018	0.019
Checkout			
	Lagged market share	-0.306	0.614
	Lagged price	0.212	0.108
	Lagged distribution	0.263	0.025
	Lagged merchandising	-0.097	0.051
	Lagged feature/display	0.118	0.050
	Lagged special offers/discounts	0.030	0.050
	Lagged checkout	0.205	0.059
	Consumer confidence index	-0.003	0.001
	Unemployment rate	-0.002	0.018

*** Significant at p<0.01; ** Significant at p<0.05; * Significant at p<0.10
Souce: The author.

Table VIII b – Estimation results (recession) Other equations model

Equation	Coefficient	Mean	Standard error
Price			
	Lagged market share	-1.369	0.004
	Lagged price	0.976	0.003
	Lagged distribution	0.035	0.000
	Lagged merchandising	-0.051	0.000
	Lagged feature/display	0.134	0.000
	Lagged special offers/discounts	-0.137	0.000
	Lagged checkout	-0.103	0.000
	Consumer confidence index	0.006	0.000
	Unemployment rate	-0.005	0.000
Distribution			
	Lagged market share	-10.930	0.019
	Lagged price	0.424	0.005
	Lagged distribution	0.835	0.001
	Lagged merchandising	-0.319	0.001
	Lagged feature/display	1.405	0.003
	Lagged special offers/discounts	0.135	0.002
	Lagged checkout	-1.073	0.002
	Consumer confidence index	-0.011	0.000
	Unemployment rate	0.041	0.003
Special offers/discounts			
	Lagged market share	5.298	0.021
	Lagged price	-1.784	0.008
	Lagged distribution	-0.077	0.001
	Lagged merchandising	-0.082	0.001
	Lagged feature/display	-1.446	0.002
	Lagged special offers/discounts	0.734	0.002
	Lagged checkout	1.284	0.001
	Consumer confidence index	0.004	0.000
	Unemployment rate	-0.007	0.001
Merchandising			
	Lagged market share	3.109	0.007
	Lagged price	-0.016	0.000
	Lagged distribution	0.007	0.000
	Lagged merchandising	0.375	0.001
	Lagged feature/display	0.093	0.000
	Lagged special offers/discounts	-0.088	0.000
	Lagged checkout	-0.064	0.000
	Consumer confidence index	0.001	0.000
	Unemployment rate	-0.003	0.000
Feature/Display			

	Lagged market share	8.366	0.015
	Lagged price	-1.726	0.008
	Lagged distribution	0.017	0.001
	Lagged merchandising	-0.772	0.001
	Lagged feature/display	-0.076	0.001
	Lagged special offers/discounts	0.128	0.001
	Lagged checkout	0.425	0.001
	Consumer confidence index	0.015	0.000
	Unemployment rate	-0.043	0.001
Checkout			
	Lagged market share	2.266	0.017
	Lagged price	0.432	0.003
	Lagged distribution	0.239	0.001
	Lagged merchandising	-0.744	0.001
	Lagged feature/display	0.253	0.001
	Lagged special offers/discounts	-0.147	0.001
	Lagged checkout	0.137	0.001
	Consumer confidence index	-0.002	0.000
	Unemployment rate	0.030	0.001

*** Significant at p<0.01; ** Significant at p<0.05; * Significant at p<0.10
Souce: The author.

APPENDIX IX – CUMMULATIVE EFFECT

Expansionary period

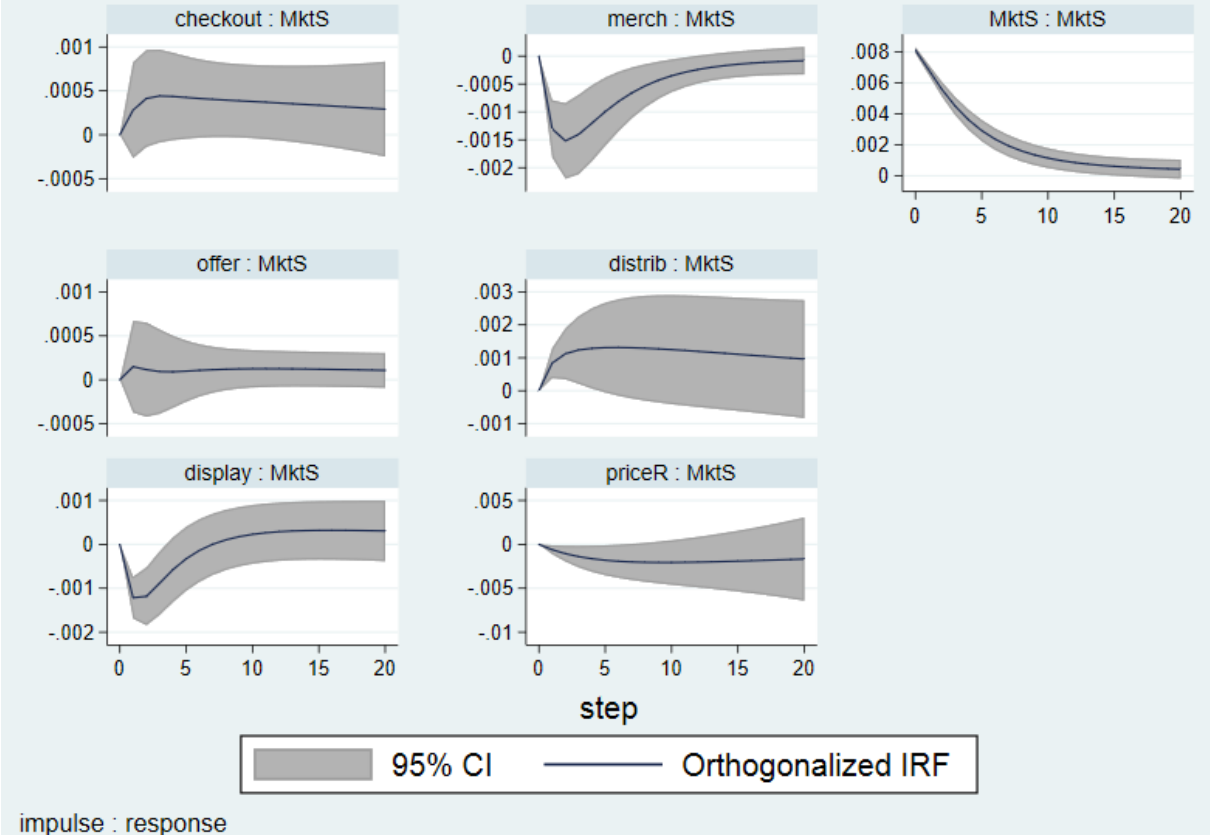

Figure IX a – Graph: impulse response function – cumulative effect: expansion

Source: Author (STATA 15.1).

Recessionary period

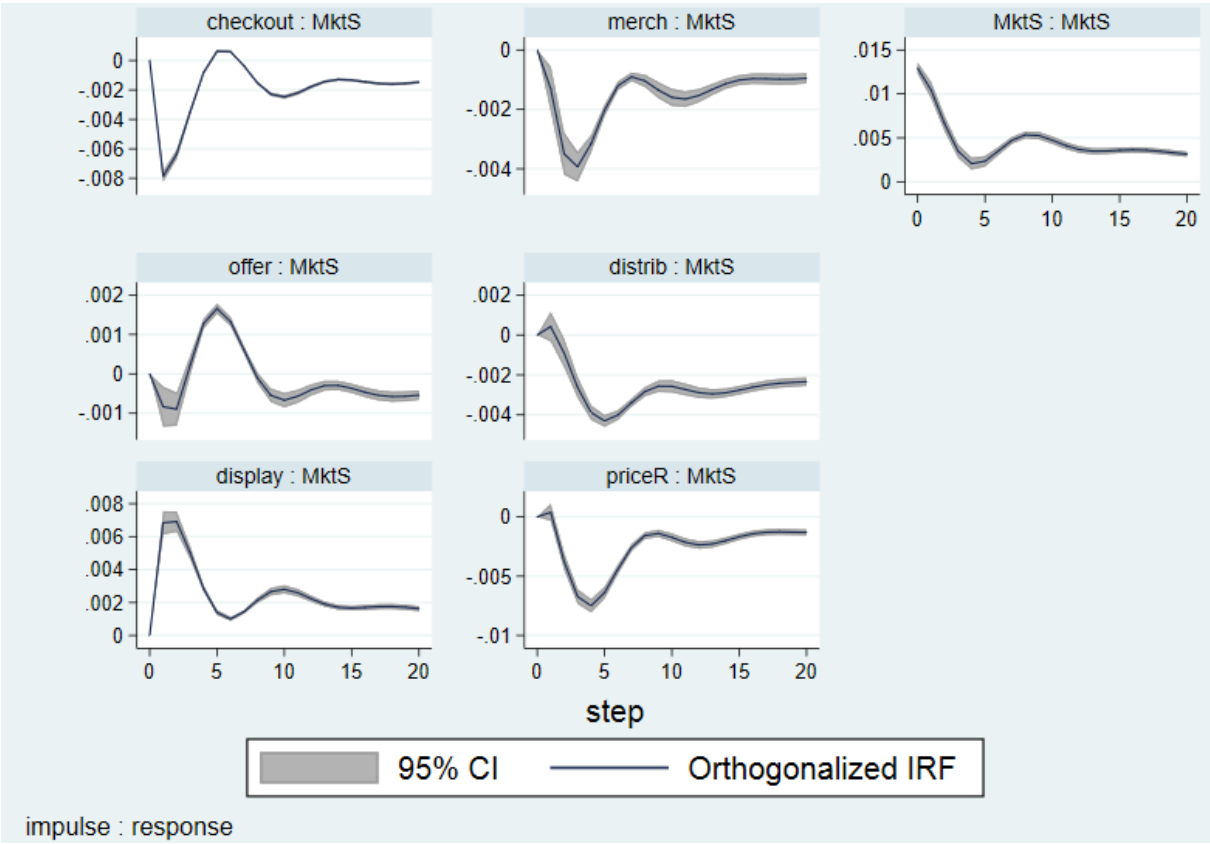

Figure IX b – Graph: impulse response function – cumulative effect: recession

Source: Author (STATA 15.1).