

The performance of private labels during business cycles: A comparative study of emerging and developed countries



A.M.M. Heijnen (2017759)

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Tilburg School of Economics and Management

Tilburg University

Master Thesis Supervisors:

Dr. L. van de Gucht

T.J.C. de Kort MSc (co-reader)

Management Summary

This study's objective is to fill the gap in the private label literature by evaluating the effects of business cycles on private label share and to determine whether these effects are different for emerging countries as opposed to developed countries. Studies in developed countries have indicated that private label sensitive to business cycles is counter-cyclical. Although some literature on private labels in emerging countries exists, only some attention has been paid to the effects of business cycles on private label share. In addition, research into market characteristics and consumer behavior indicated that there are differences between developed countries and emerging countries. In light of this, the following research question is formulated: *“What is the effect of business cycles on private label share and does this relationship differ between emerging and developed countries and with regard to economic expansions and contractions?”*

To examine the research question empirically, a sample is drawn from CPG private label share in 12 grocery categories over 14 years, and from 73 countries worldwide. Business cycles are measured via a widely used proxy: GDP per capita. To answer the research question a log-log regression is estimated which provides the results in terms of elasticities and thus greatly facilitates future comparison. The sensitivity of private label share to business cycles is pro-cyclical in both emerging and developed countries. In addition, developed countries are more sensitive to the effects of business cycles. When the model uses dummies for contractions and expansions, private label share sensitivity in emerging countries is counter-cyclical during both contractions and expansions whereas private label share in developed countries is pro-cyclical during contractions and counter-cyclical during expansions. Private label share sensitivity in both developed and emerging countries is asymmetric during contractions and expansions. Further indicating that the private label share sensitivity to contractions and expansions is not equal. This study finds that there are extensive differences between emerging and developed countries.

The decreased sensitivity could be due to increased loyalty or the risk averse nature of consumer in emerging countries. Retailers should implement local adaptation strategies in order to account for the differences between emerging and developed countries. Retailers should increase market knowledge and quality perceptions of private label products as these are a primary source of private label introduction failures in emerging countries. Furthermore, future research should further investigate the underlying factors that differentiate the results such as the effects of retailer actions and private label drivers in emerging countries.

Preface

In front of you lies the thesis “*The performance of private labels during business cycles: a comparative study of emerging and developed countries*”, which aimed to understand the differences between developed and emerging countries in terms of private label performance during business cycles. This thesis was written as the final step of completing the master program Marketing Management, Tilburg University, Tilburg School of Economics and Management. The process of writing this thesis has engaged me from September 2018 to February 2019.

This research was conducted under supervision of Linda van de Gucht, who introduced me to this topic. The process of writing this thesis has been challenging. However, conducting this research has allowed me to formulate an answer to the research question. Fortunately, Linda van de Gucht was always willing to answer any questions and guide me through the process of writing this thesis.

I would like to thank Linda van de Gucht for her support and excellent guidance throughout the duration of the research. I also would like to thank my parents, friends, and family for their support and motivational words throughout this process.

Sander Heijnen

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Chapter 1: Introduction and problem indication

1.1 Introduction

In today's day and age, private labels have grown to become a common face in households' grocery cabinet. As private label products began to grow in prominence, it resulted in fierce sword crossing with conventional national brands; i.e. fighting over market share in the consumer-packaged goods (CPG) industry. In the United States alone, 70% of households consider private labels products to be an adequate alternative to national brands (Nielsen, 2016). To illustrate, private label value shares¹ were recorded at 28% in the United Kingdom, 22% in the Netherlands, and 25% in Belgium in 2005 (ACNielsen, 2005). Nine years later, these figures increased to 41%, 27%, and 32% respectively (Nielsen, 2018). Furthermore, retailers have embraced private label products as money-makers due to increased profit margins over national brands (Sayman, Hoch, & Raju, 2002; Ailawadi & Harlam, 2004), increased bargaining power over suppliers (Meza & Sudhir, 2010), and increased store loyalty (Corstjens & Lal, 2000; Ailawadi, Pauwels, & Steenkamp, 2008).

Dekimpe and Deleersnyder (2018) argued that for long business cycles have been overlooked in marketing research. It has only been recently, since the rise of the economic recession in the early 2000s, that an increasing interest in this subject started to emerge. As it is true that multiple definitions on the concept exist, Burns and Mitchell (1946, p.3) have formulated a very popular definition for business cycles. As presented below, this study will adopt this definition when referring to business cycles henceforward.

“A cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years.”

Intuitively one might say that expansions and contractions have impact on economic activities. The effects of business cycles on markets, firms, brands, or products are exemplified as being pro-cyclical where performance follows the same direction as the business cycle or counter-cyclical where performance behaves in the opposite direction of the business cycle.

¹ Value share: the market share of private labels based on total spending grocery retail spending.

Past research has indicated that private label sensitivity to business cycles is counter-cyclical (Lamey, Deleersnyder, Dekimpe, & Steenkamp, 2007; Lamey, Deleersnyder, Steenkamp, & Dekimpe, 2012). Research thus far however has exclusively been conducted in developed countries and results are dated with samples up until the early 2000's. Although, the effects of business cycles in emerging countries have been studied extensively, the effects of business cycles on private label performance in emerging countries are still unknown.

The importance of emerging markets however is growing. For instance, BRIC countries could surpass the G6 countries in terms of GDP by 2050 (Wilson & Purushothaman, 2013). It is important to emphasize that emerging countries differ extensively from developed countries in for instance market characteristics, consumer behavior, and influence of business cycles. The effects of business cycles in emerging countries are bigger in both magnitude and duration as opposed to developed countries (Dutt & Padmanabhan, 2011). In addition, market characteristics in emerging countries are very different as these markets suffer from absence of adequate infrastructure, large variance of quality of products and services, and increased levels of poverty (Sheth, 2011). Furthermore, Bronnenberg and Ellickson (2015) argued that the retail landscape in emerging countries differs extensively from what we are used to in developed countries. Whereas developed countries have completed the process of retail modernization, emerging countries are still in the process of transitioning from traditional retail landscape towards a modern retail landscape.

1.2 Research question

Private label sensitivity to business cycles in developed countries has been addressed in multiple studies. Multiple studies have further addressed the differences between emerging and developed countries with regard to the effects of business cycles and market characteristics. In particular, these studies have indicated factors that suggest that private label sensitivity to business cycles could be different in emerging countries. However, this has not been formally addressed in an empirical study that measures the effects of business cycles on private label performance in both emerging and developed countries. Furthermore, it is interesting to study whether effects of business cycles on private label share are similar or differ for the emerging and developed countries.

This study's objective is to fill the gap in literature by evaluating the effects of business cycles on private label share and to determine whether these effects are different for emerging countries as opposed to developed countries.

This study is characterized by the following research questions: “*What is the effect of business cycles on private label share and does this relationship differ between emerging and developed countries and with regard to economic expansions and contractions?*”

Figure 1 illustrates the conceptual model that is developed for this study. Previous research addressed the relationship between business cycles and private label share in developing countries. This study further examines this relationship. Business cycles are measured in a continuous fashion by the use of GDP. In a second step in the empirical analysis GDP per capita is used to determine the state of a countries economy in that year i.e. contraction, expansion, or stability. In addition to this, the researcher expects that the relationship is moderated by classification of a country as being either emerging or developed. Furthermore, three different control variables will be included in order to control for differences in modern retail market share, differences between regions and the effects of grocery categories.

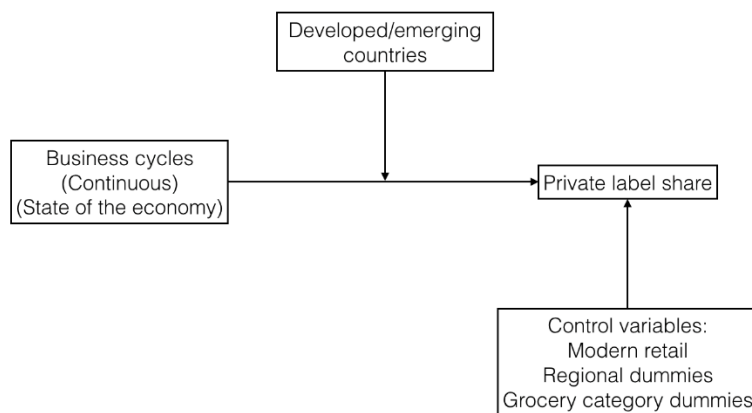


Figure 1: Conceptual model

1.4 Research method

The independent variable in this study is private label share and is measured in the form of private label share per category, year, and country in percentages. The data is provided by Euromonitor and spans 12 grocery categories, 14 years, and 73 countries. Business cycles are measured with use of a proxy in the form of GDP per Capita. The concept of business cycles is measured in two different manners. Firstly, in a continuous fashion n a second step, GDP per capita is used to determine growth on a yearly basis. These growth figures will be used to determine whether a countries economy is in a state of contraction, stability or expansion. Planet retail provides the data for GDP per capita. To determine whether a country is emerging or developed the United Nations

country classification is consulted. The model will include fixed effects for grocery categories and dummy variables to control for regional specific factors that are not included in this study. At first, sample statistics will be used to get to know the data. For the analysis of hypotheses, a log-log regression approach will be used so that the obtained parameter estimates are elasticities. This approach is commonly used by academics in CPG, retail and private label studies. In order to test the robustness of the results the researcher will make several alterations to the model and the data. Firstly, different base cases for grocery categories and regions will be included in the model. In addition to this, the researcher will include a control variable for private label growth. The model will also be estimated with private label share growth as the independent variable rather than private label levels. Furthermore, observations with extreme levels of private label share will be excluded, and more and less stringent criteria for economic contractions will be used to determine the effects. Section 3.3 provides a more in depth motivation for this approach. The estimation of the log-log model will be conducted in STATA.

1.5 Academic relevance

As previously stated, much research has been conducted with regard to private labels (e.g. Ailawadi & Harlam 2004; Ailawadi et al., 2008), and the effects of business cycles on private labels in developed countries (e.g. Lamey et al., 2007; Lamey et al., 2012). Since the data of studies with regard to the effects of business cycles on private labels dates from the 1990s and early 2000s and are limited to some developed countries, the question arises whether these conclusions hold for all developed countries. These studies have indicated that there are differences in private label success between economic contractions and expansions, yet these effects are still unknown for emerging countries and again have only been researched in some developed countries. Even though some exploratory research into private labels has been conducted in, for instance Thailand (Mandhachitara et al., 2008) and India (Sarkar, Sharma & Kalro, 2016) an empirical analysis into the differences or similarities between developed and emerging countries is yet to be conducted. Furthermore, studies regarding differences in market characteristics (Sheth, 2011), the effects on business cycles (Dutt & Padmanabhan, 2011) and retail landscape (Bronnenberg & Ellickson, 2015) suggest that the implications for emerging countries could be different from developed countries. The increasing interest in emerging countries has heightened the need for insight into the effects of business cycles on private labels.

1.6 Managerial relevance

Although research on private label shares exists, gaps in the literature remain. Thus far, there exists no academic literature on the effects of business cycles on private label share in emerging countries, nor to what extent is this similar or different from developed countries. Retail managers might thus find it difficult to develop a strategy to anticipate on contractions and expansions. The lack of knowledge regarding this subject can leave managers with potential interests in emerging countries to guess whether the effects are pro-cyclical or counter-cyclical. In turn, this could cause managers to become cautious to invest in private label operations in emerging countries. Consequently, the lack of knowledge leads to uncertainty when implementing long-term strategies for private labels in emerging countries. For instance, do (marketing) strategies require augmentation during contractions and expansions or does one-size fits all strategy suffice? When the effects of business cycles are for instance falsely estimated by this could lead to overproduction or stock shortages resulting in unnecessary losses, and wrongful or unnecessary marketing and innovation spending thus hurting (long-term) financial prospects. By providing insight into the relation between business cycles and private label share, retail managers can therefore better anticipate on business cycles and on the differences between emerging and developed countries. It is important to note, that the relevance does not solely come from the absence of literature, but also from the increasing importance of emerging markets.

1.7 Structure of the thesis

First, this chapter commences with a brief introduction: involving the objective, overall context, research question, data collection and research method. Secondly, chapter 2 provides a literature review regarding relevant literature of business cycles, private label performance, and consumer behavior and market characteristics of emerging and developed countries. Furthermore, chapter 2 also includes the hypotheses of this study. Chapter 3 addresses the data and methodology. Firstly, chapter 3 provides an overview of the variables and a first look into the data via means of sample statistics. Thereafter, chapter 3 describes the proposed research method, explanation of the regression equations and introduce the method to test for heteroscedasticity and multicollinearity. Chapter 4 presents the empirical results of this study and the testing of heteroscedasticity and multicollinearity. Chapter 5, the last chapter of this study, will further discuss the conclusion, discussion, limitations and interesting topics for future research.

Chapter 2: Literature review and hypotheses

2.1 Business cycles

The definition of Burns and Mitchell (1946, p.3) states that business cycles consist of two different phases and that these faces are recurrent but not fixed in duration. Christiano and Fitzgerald (1998) further confirm the statement that the duration of a business cycle can vary from 1.5 to 8 years. The effects of a business cycle have proven not to be equal in all countries. Whereas effects of economic contractions have been very severe in some countries, effects were non-existent in others (Ang, Leong, & Kotler, 2000). Baxter and Kouparitsas (2005) argued that there are large differences in duration and magnitude of economic contractions and expansions between countries. In emerging countries, the effects of contractions are much more severe in both magnitude and durations (Dutt & Padmanabhan, 2011). Even though business cycles have potential negative effects on firms and their future prospects, research has depicted that some firms flourish during contractions whilst others do not (Gulati, Nohria & Wohlgezogen, 2010). For instance, Reckitt Benckiser, a CPG firm in the United Kingdom. During contractions, the firm has reported increased sales and profit whilst the profits' of its competition have suffered (The Economist 2009). The competition halved their marketing spending whilst Reckitt Benckiser had increased their marketing spending by 25 %. The Wall Street Journal (2009) echoed this conclusion in a study where 2500 companies were analysed over 8 years. In total, 24% of companies in leadership positions within their respective industries have lost their position and fell behind during contractions. Whereas, 20 % has managed to increase market share towards a position of leadership during that same contraction. In conclusion, past research has indicated that business cycles and their impact differs in both time and from country to country and firm to firm. Furthermore, business cycles provide both opportunities and threats to markets, firms, brands, and categories. Whilst business cycles lie beyond a firms' control, their actions in response do not.

2.2 Private label performance and business cycles

Many factors could possibly influence the performance of private labels. In the past years, researchers have identified different behavioural strategies of consumers in response to business cycles. Moreover, various factors of private label performance have been studied: increased marketing and production efforts, effects of economic expansion and contraction, and the role of the retail landscape.

2.2.1 Consumer behavior and business cycles

During economic contractions, consumers tend to show three different kinds of behaviours (Dekimpe and Deleersnyder, 2018). Firstly, Mukherjee and Xiao (2016) and Dhar and Weinberg (2016) argued that consumers decrease the level of demand during contractions. Secondly, according to Kamakura and Du (2012), consumers re-allocate spending budgets both in time and product categories. Millet, Lamey and Van den Bergh (2012) stated that during economic expansion spending budgets are re-allocated towards products that yield positive outcomes whilst during contractions products that avoid negative outcomes are more popular. Lastly, Lamey et al. (2007) argued that instead of changing budgets or decreasing product demand during economic contractions, consumers switch to less-expensive brands within the same product category. Nevertheless, strategies are not applicable to all product categories. For instance, the lifetime of durable goods can often be extended and re-purchase can be postponed. The lifetime of CPG however, in most cases cannot be extended. The purchase of CPG is often habitual and due to that consumers find it harder to adjust for the quantity. In the case of CPG, consumers tend to follow the last of the three behavioural strategies and thus switch to less-expensive alternatives (Lamey et al., 2007).

According to the assumption of standard economic theory, the household expenditures are based on the specific needs of the household and the budget available (Kamakura & Du, 2012). However, extensive research has showed that expenditures are not always solely based on this principle. Research on consumer spending has revealed different drivers for consumer spending: conspicuous consumption (Leibenstein, 1950; Bagwell & Bernheim, 1996), competitive consumption (Schor, 1999) and positional spending (Frank 1985a, 1985b, 1999; Hirsch 1976). These drivers respectively either focus on impressing, imitating or distinguishing consumers from or with the reference groups instead of purely functional as proposed in standard economic theory by Kamakura and Du (2012).

During economic contractions, more specifically during the depression of 2007, 62 percent of American citizens have reduced spending (Pew Research Centre, 2010). When consumers decrease, spending changes in budget distribution become apparent. Budget cuts are not equally distributed over the different categories. Percent wise spending on positional goods or luxurious goods is decreased whilst spending on necessities are increased. The reason for the decrease in

budgets can be attributed to either a decrease in income or consumers becoming more risk averse and thus allocating more money towards a savings account (Kamakura & Du, 2012). As discussed earlier, both the magnitude and duration of contractions are greater in emerging countries. Consumers in emerging countries are even more likely to decrease budgets. In 70% of the emerging countries, the decrease in spending shows to be bigger than the decrease in income (Dutt & Padmanabhan, 2011).

2.2.1 Consumer behavior and private labels during business cycles

In the case CPG, consumers chose for cheaper alternatives rather than to reduce consumption quantity, re-allocate budgets to other categories or postpone purchase. Often consumers turn to private label products in order to satisfy their quantity needs. Private label products have gained more and more market share in the past years: upwards to 41 % in United Kingdom, 27 % in Netherlands and 32 % in Belgium (Nielsen, 2018). Several studies identified the drivers of private label growth: increased budget for sales promotions (Hoch, Montgomery & Park, 2002), improvement of private label product quality (Steenkamp & Dekimpe, 1997) and economic contractions (Quelch & Harding 1996, p. 99; Deloitte & Touche, 2003, p. 2).

In addition to these factors, discounters also attribute to the increased popularity of private labels. As discounters are private label dominated and offer a narrow assortment of national brands, thus forcing consumers into private label alternatives (Dekimpe, Gielens, Raju, & Thomas, 2011; Lamey, 2014). Lamey et al. (2007) further indicated that discounters are important in private label growth. For instance, Aldi, one of the fastest growing discounters was responsible for 18 % of total grocery sales in 2002 in Germany. During contractions, consumers show more inertia, a lower level of loyalty, towards consumer-packaged goods thus making it easier for consumers to switch between brands (Gijzenberg, Van Heerde, Dekimpe, & Steenkamp, 2009).

However, it is clear that private label share flourishes during contractions, negative effects on private label share have been found during times of economic expansion. Lamey et al. (2007) argued countercyclical sensitivity of private label growth and business cycles in Belgium, United Kingdom, United States and West Germany. A 1 % growth in GDP causes a -0.28 % change in private label shares. Whereas a 1 % decrease in GDP causes a 1.22 % change in private label shares. In addition, Lamey et al. (2007) have confirmed that this results in permanent private label growth

over the course of an entire business cycle. Furthermore, a study by Dubé, Hitsch and Rossi (2018) found that private label usage is negatively correlated with consumer income and wealth.

There are three motives as to why consumers are less likely to switch back to national brands during expansions (Lamey et al., 2007). Firstly, consumers often tend to be at the lowest of their income or do not have the buying power to purchase national brands right after downturn (Gale, 1996). Secondly, increased income during in early stages of expansion is used to pay off debts or to increase savings (Carroll, 1992). Lastly, the contraction decreases consumers trust in income expectations and thus makes consumers more conservative in future financial estimates (Katona, 1975). As these motives describe why consumers tend to shy away of national brands during expansions another economic principle explains the reaction towards business cycles. The breaching of trust by contractions is far easier done than the process of rebuilding consumer trust during times of economic expansion (Katona, 1975; Nooteboom, Berger, & Noorderhaven, 1997).

Consumers show to be creative when it comes to coping with budgetary restrictions. For CPG this often leads to cheaper alternatives to satisfy quantity needs. Private labels profit from these budgetary restrictions not only during contractions but also during expansions. Furthermore, private label shares are influenced by both factors that can be influenced by managers e.g. improved private label characteristics and factors that lay beyond the control of managers such as business cycles and behavioural mechanisms. Consistent with past research we thus predict that:

H1: Private label share sensitivity in developed countries is counter-cyclical

H2: Private label share sensitivity in developed countries is asymmetric

2.3 Private label performance and business cycles in emerging countries

It is important to emphasize that emerging and developed countries are fundamentally different and require separate research. When looking at for instance the market characteristics, consumer behavior and retail landscape in emerging countries large differences from developed countries can be observed.

2.3.1 Private label studies in emerging countries

Most studies regarding private labels, their performance and the drivers of their performance have been conducted in developed countries. Most of this research has concentrated in United States, United Kingdom and other Western European countries. Whilst research of private labels in

emerging countries is still limited researcher often, rely on research from developed countries (Saraswet et al., 2010; Diallo, 2012). Retailers in emerging countries are actively following strategies from retailers in developed countries (Sarkar & Sharma, 2016). Indian retailers for instance use the house of brands strategy following the world's largest retailer Walmart. Moreover, private label products are also presented in packages with high levels of similarity to their national brand equivalents. However, the same research has also indicated that consumers in India still perceive a large gap between the quality of private labels and their equivalent national labels. Reduced prices however, are seen as an important motivation for private label purchases in India. Lupton, Rawlinson and Braunstein (2010) also found similar effects. Consumers in China perceive private label products as being of inferior quality as opposed to national brands. Mandhachitara et al. (2007) found three major reasons as to why private label introductions thus far have failed in Thailand. Thai consumers lacked market knowledge due to the newness of private labels in Thailand. Consumers are more influenced by interpersonal factors due to their collectivist nature of their culture, decreasing deal proneness. Moreover, consumers infer quality from price, thus resulting in a lower quality perception of private label products.

The effects of economic contractions and expansions on private label performance have thus far only been documented for some developed countries, Table 1 further illustrates these studies. The effects of business cycles on private label share have not yet been documented in emerging countries (Dekimpe and Deleersnyder, 2018).

Researcher	Geographical region	Time span
Hoch and Banerji (1993)	United States	1987
Lamey et al. (2007)	Belgium, United Kingdom, United States, and West Germany	1971 – 2004
Lamey et al. (2012)	United states	1985 – 2005
Lamey (2014)	15 European countries	1991 – 2008
Dubé et al. (2017)	United States	2004 – 2012

Table 1: Overview of studies regarding the effects of business cycles on private label performance

2.3.2 Market characteristics in emerging countries

Although these effects have not yet been investigated, emerging countries are becoming increasingly important as a source of sales and income for multinational firms (Wessel and Greenberg, 2011). Furthermore, Wilson and Purushothaman (2003) predicted that by the year 2050 the GDP of BRIC countries would be larger than the GDP of the G6 combined. Whilst in the last

century marketing was focused on developed countries, researchers have argued that this century will further focus on emerging countries (Engardio 2007; Sheth 2008; Sheth & Sisodia 2006).

Sheth (2011) identified the following factors on which emerging countries fundamentally differ from developed countries: market heterogeneity, socio-political differences, unbranded competition, chronic shortages of resources, and inadequate infrastructure. Emerging countries suffer from increased market heterogeneity, meaning that there is large variance between products and services on for instance quality. In fact, emerging countries are often local, small scale and fragmented. Furthermore, up to 50-60 percent of consumers in emerging countries suffer from poverty as well as limited access to running water, banking, and modern transport. Consequently, affordability and accessibility are more important than a superior product. Secondly, emerging countries often suffer from a high level of socio-political influence by governments and religious institutions. A result of this, there is a large degree of market power asymmetries in favour of government or religious favoured parties. Unbranded competition is the third differential factor in emerging countries. As much as 60% of consumption originates from unbranded products². As households are often not only consumption units but also production units. This suggests that branded manufacturers have to convince consumers to switch from traditional to modern retail formats and to motivate them to pay the price premium that comes with national brands (Alba et al., 1997). Emerging countries often also suffer from resource shortages such as raw material, electricity, and skilled labour. The last factor is inadequate infrastructure, emerging countries often lack both physical infrastructure such as roads and logistics and market transaction enablers. The last consists of communication, information, and transaction technology; resulting in profitability of non-traditional market channels.

Bronnenberg and Ellickson (2015) further described stark differences between emerging and developed countries in terms of retail landscapes. Firstly, developed countries have transitioned over the last decade from traditional retailing format to a modern retailing format. A transition that is characterized by a number of advantages for consumers: lower prices, increased convenience, increased productivity, and larger assortments. Mass-market retailing takes shape in the form of club stores, discounters, supermarkets, hypermarkets, and supercentres. These mass-market

² Unbranded products are products produced by households themselves, for instance milk that comes from their own cow.

concepts offer firms both scale and logistical advantages. Bronnenberg and Ellickson (2015) found that mass retailers more and more incorporate segmentation and targeting. Instead of targeting the whole market, differentiation strategies are implemented to target consumers that fit the needs and wants of said retailer on for instance: variety, price, or convenience.

However, emerging countries are not as far along in this process. Currently, these countries are in the middle of transitioning from a traditional retail concept, meaning small individual stores and open-air markets supplied by small-scale suppliers, towards modern retail formulas. Grocery expenditure has started to shift from traditional formats towards modern formats. The markets share of traditional retailers in emerging countries has declined from 80 percent in 2000 to 57 percent in 2014. This effect is due to the increased availability of supermarkets and hypermarkets/mass merchandisers, which represented 37 percent grocery market share in 2014. Their market share is still expanding to up to 6 percent per year. Discounters and warehouse/club stores, low price, and limited assortment retailers, are not yet very popular as they only attribute a market share of 3 percent in 2014. However, as previously mentioned the modernization in emerging countries is still in progress. Developed countries that have completed retail modernization, only showed large-scale adaptation of low price and limited assortment retailers in the last phase of modernization.

Emerging countries, while having attractive future prospects, are posing a challenge for manufacturers. High poverty levels, absence of required infrastructure and unbranded competition could potentially negatively influence private label performance. In addition to this, increased effects of business cycles and more conservative budgeting need to be taken into account (Dutt & Padmanabhan 2011). Bahadir, Bharadwaj, and Srivastava (2015) argued that in order to generate a large market share it is imminent that products with lower prices are targeted at the lower income segment. The modernization of retail shows promising prospects in emerging countries. However, the absence of a fully modernized retail landscape creates challenges for private label share.

Altogether, emerging countries adapt some of the strategies used by retailers and manufacturers in developed countries. Consumer behaviour however is different in these countries as consumers are more risk averse, lack marketing knowledge and are less prone to deals. Furthermore, consumers in emerging countries also tend to inference quality perceptions based on price; thus perceiving

private labels as being of lower quality. Suggesting that consumers in emerging most likely have smaller interest in private labels as opposed to consumers in developed countries. Furthermore, market characteristics in emerging countries do fundamentally differ from those in developed countries. In addition to this, emerging countries are still in the process of retail modernization. Nevertheless, the more extreme duration and magnitude of business cycles is likely to further increase sensitivity of private label shares in emerging countries. The factors that influence emerging countries, in combination with the existing stream of literature regarding private label performance in developed countries led to the following hypotheses:

H3: Private label share sensitivity in emerging countries is counter-cyclical

H4: Private label share sensitivity in emerging countries is greater than in developed countries

H5: Private label share sensitivity in emerging countries is asymmetric

H6: Asymmetric private label share sensitivity in emerging countries is different from developed countries

Chapter 3: Data and methodology

3.1 Variables and data preparation

3.1.1. Private label share

In this study, the dependent variable is *Private label share*. The observations for private label share are levels of market share of specific in percentages of specific grocery product categories, measured annually from 2005 to 2017 for 73 countries. The data for this variable is acquired from Euromonitor and has been used in numerous academic studies (e.g. Bronnenberg & Ellickson, 2015; Cuneo, Millberg, Benavente, & Palacios-Fenech, 2015). Private label share data is provided in two separate datasets each spanning 10 years; 2004 – 2013 and 2008 – 2017. Unfortunately, the two datasets did not completely match with regard to the product categories used to identify the observations. Some categories are the same in both dataset and could thus be merged easily. However, some categories in the most recent file are subdivided in different categories in the older file. For instance, dairy products and alternatives in the new file are subdivided into cheese, drinking milk products, ice cream, and yoghurt and sour milk products in the older file. For these cases, an average³ over the subcategories is calculated in the old file and renamed into dairy products and alternatives. Table 2 gives an overview of the grocery categories in this study and how the grocery categories are merged.

File 2004 – 2013	File 2008 – 2017 (final product categories)
Baked goods	Baked goods
Breakfast cereals	Breakfast cereals
Cheese	Dairy products and alternatives
Drinking milk products	
Ice cream	
Yoghurt and sour milk products	
Oils and Fats	Edible oils
	Processed fruit and vegetables
	Processed meat and seafood
Ready meals	Ready meals
Pasta	Rice, pasta and noodles
Noodles	
Sauces, dressings and condiments	Sauces, dressings and condiments
Biscuits	Snacks
Gum	
Snack bars	
Sweet and savoury snacks	
Soup	Soup
Spreads	Spreads

Table 2: Overview of the categories and how the categories are merged between the files

³ A value-weighted mean approach would have been preferred but was not possible because market value figures for these categories are not available.

The most recent file is leading in the process of creating final categories as categories in the oldest file could be merged easily. For the years 2008 – 2013, only data from the most recent dataset is used so that the final sample does not contain any duplicates. Due to the absence of figures in the most recent dataset for the categories dairy products & alternatives and snacks, the oldest file is used to collect this data.

Categories from the oldest file that did not appear in the newest file are discarded because of the absence of more recent observations. This is the case for the following categories: baby food, meal replacement, canned/preserved food, chilled processed food, dried processed food, and frozen processed goods. Outliers in the data will be detected via means of visual inspection using a colour scale analysis in Microsoft Excel. If, for any reason drastic growth or decline in private label share is observed for a category the data will be flagged. The flagged observation will be compared with other data for the specific country and category in order to determine whether the changes are believable. For the observations of Thailand in the category ready meals, this is not the case. Private label shares in the first file range from 1.9 percent to 5.3 percent. The latest dataset however shows private label shares in the range of 41.6 percent to 45.0 percent. These differences leads to deletion of the observations as these differences are highly unlikely and most likely subject to flaws. For similar reasons data for Czech Republic, Denmark, Norway and Netherlands for the category edible oils are deleted as well. In total 70 out of 9289 observations are discarded for this variable.

3.1.2 Business Cycles

Business cycles can span multiple years and are subject to three different stages namely expansion, stability, and contraction. Multiple aggregate measures are available as a proxy to assess business cycles. Stock and Watson (1999) have identified three proxies for business cycles: GDP, real income and unemployment. Following multiple studies on the effect of business cycles on CPG (e.g. Lamey et al., 2007; Lamey et al., 2012; Lamey, 2014) this study uses GDP in euros to measure the general economic activity of a nation during a year. In order to correct for differences in population sizes, GDP per capita is used. The data for GDP per capita in euros on a yearly basis per country is obtained from Planet Retail and has been used in multiple academic studies (e.g. Keller, Dekimpe, & Geyskens, 2016; Gielens & Dekimpe, 2007). In the empirical analysis, GDP per capita is used in two different forms. Firstly, as a continuous numeric variable in the form of

ln_GDP. Secondly, as a categorical variable that distinguishes whether a country's economy is in a state of expansion, contraction or stability. To determine the state of the economy annual GDP growth is calculated. The study includes a stable state of the economy to ensure that expansions and contractions do not include very small growth rates: only sufficiently large changes in GDP were marked as either expansion or contraction. The assignment to the respective state is done on the basis of percentiles. The 50th percentile was used as a cut-off point: values greater than the 50th percentile of all positive growth rates (0.064) are considered to be expansions while positive annual growth rates less than the 50th percentile are considered to represent stability. Likewise, negative annual growth rates smaller than the 50th percentile (-0.036) in absolute value are classified as contractions and the other negative growth rates are classified as stable states of the economy.⁴

3.1.3. *Emerging versus developed countries*

The hypotheses derived from the literature review in chapter 2 predict that the relationship between business cycles and private label performance is different for emerging and developed countries. This study follows the United Nations (UN, 2018) classification of countries, which is based on basic economic conditions: emerging developed and transition countries. This study classifies both emerging and transition economies as emerging countries.

3.1.4 *Control variables*

Different control variables will be included in this study to control for confounding variables as these could possibly influence the results of the statistical model. *Region* controls for regional-specific factors that may influence the relation between the variables but are not included in this model (such as culture for instance). *Modern retailing* relates to the percentage of total market share of modern retailing outlets. This variable controls for the level of retail development. It is expected that the market share of modern retailing outlets positively influences private label share. The influence due to the retail landscapes as studied by Bronnenberg and Ellickson (2015). For instance, the prominence of modern retailing outlets in developed countries is higher as opposed to emerging countries. However, the researcher hesitates to include this variable in the model because it is expected to cause collinearity with GDP per capita. Section 3.4 describes the procedure in order to test for collinearity in the model and what action will be taken. Modern

⁴ To examine the robustness of the findings, the 33th percentiles (contraction=-.025; expansion=0.040) and 66th percentiles (contraction=-0.063; expansion=0.975) values are used as more and less stringent cut-off points for the assignment to the different states of the economy.

retailing is measured in market share per year and will be obtained from Planet Retail. Lastly, the model will include fixed effects for the different grocery categories.

3.2 Data description

At first glance, private label share appears to differ greatly across countries, years and grocery categories. Table 3 illustrates a breakdown of the private label shares across the different categories. The figures in table 3 represent all of the 9219 observations over 12 categories and 73 countries from 2004 – 2017.

Grocery category	Minimum value	Maximum value	Mean	Std. Deviation	N
Private label share (overall sample)	0.00 %	92.20 %	13.16 %	14.24	9219
Baked goods	0.10 %	27.60 %	5.89 %	6.51	886
Breakfast cereals	0.00 %	46.40 %	11.70 %	11.30	744
Dairy products and alternatives	0.00 %	43.93 %	11.05 %	11.01	729
Edible Oils	0.10 %	58.00 %	16.51 %	15.00	734
Processed fruits and vegetables	0.00 %	72.70 %	20.89 %	19.18	591
Processed meat and seafood	0.20 %	80.90 %	17.63 %	19.52	627
Ready Meals	0.00 %	92.20 %	20.75 %	20.61	816
Rice, pasta, and Noodles	0.10 %	69.90 %	16.63 %	14.31	844
Sauces, dressings, and condiments	0.10 %	42.00 %	9.81 %	9.81	904
Snacks	0.00 %	42.95 %	7.55 %	8.03	887
Soups	0.00 %	28.50 %	8.20 %	7.63	626
Spreads	0.10 %	50.00 %	13.74 %	11.06	831

Table 3: Private label category shares

The descriptive statistics present some interesting insights. The average private label share of the overall sample is 13.16 %. Notwithstanding, large differences occur between the different categories. For instance, the average share of processed fruits and vegetables is 20.89 % whilst the average for baked good is much lower with 5.89 %. The minimum values are almost identical across the different categories. The maximum values however present large differences. Ready meals, one of the largest categories in this sample, has a maximum value of 92.20 % whilst baked goods maxes out at 27.60 %. The same holds for observations within categories, stark differences in standard deviations are observed. For instance, processed fruit and vegetables (SD=19.18), processed meat and seafood (SD=19.52), and ready meals (SD=20.61). On the contrary smaller standard deviations are exhibited by for instance baked goods (SD=6.51) and soups (SD=7.63).

Table 4 offers an overview of the countries within the sample and the geographical region to which they belong. The descriptive statistics per region are presented in Table 5. The statistics indicate that there are rather large differences between the respective regions. The mean GDP per capita in Africa (€2,266) and Central America (€4,525) for instance, is notably lower than the mean GDP per capita in Western Europe (€37,432) and North America (€37,411). Similar differences occur for the level of modern retailing. Again, Africa (29.39%) and Central America (39.43%) score markedly lower than Western Europe (91.62%) and North America (91.43%). The same holds for private label share; Western Europe (27.27%) has by far the largest share, whilst Asia (5.88%), Central America (5.35%), and South America (5.32%) show figures far smaller.

Africa: Cameroon, Côte d'Ivoire, Morocco, and South Africa
Asia: Azerbaijan, China, Georgia, Hong Kong (China), India, Indonesia, Israel, Japan, Malaysia, Oman, Philippines, Russia, Saudi Arabia, Singapore, South Korea, Taiwan, Thailand, Turkey, United Arab Emirates, and Vietnam
Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom
Eastern Europe: Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Serbia, Slovakia, Slovenia, and Ukraine,
North America: Canada and United states
Central America: Costa Rica, Dominican Republic, Guatemala, Honduras, and Mexico
Oceania: Australia and New Zealand
South America: Argentina, Bolivia, Brazil, Chile, Columbia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela

Table 4: Countries per region

Region	Mean private label share	Mean GDP per capita	Mean market share of modern retailing	Std. Deviation of GDP per capita	Number of countries
Africa	12.13 %	€2,266	24.39 %	€1,653	4
Asia	5.88 %	€12,882	46.30 %	€1,900	20
Western Europe	27.27 %	€37,432	91.62 %	€12,906	15
Eastern Europe	10.30 %	€9,404	64.41 %	€5,153	16
Central America	5.35 %	€4,525	39.43 %	€2,660	5
North America	16.27 %	€37,411	91.43 %	€6,360	2
Oceania	13.65 %	€33,750	88.96 %	€10,210	2
South America	5.32 %	€5,574	48.90 %	€3,472	10

Table 5: Descriptive statistics of the different regions

Table 6 on the next page displays the statistics regarding the classifications of the countries as emerging or developed. This sample includes 40 developed and 33 emerging countries. The differences in terms of GDP per capita and market share of modern retail are rather large. As expected, developed countries have a higher mean GDP per capita and mean modern retail market share (€23,486; 74.85%) than emerging countries (€7,586; 40.33%). With regard to business cycles, in total 35.7% of the observations are classified as expansions, 10.5% as contractions and the remaining 53.8% as stability using the 50th percentile cut-off.

Classification of country and state of business cycle	Mean Private label share	Mean GDP per capita	Mean market share of modern retailing	Number of countries	N observations
Developed countries	19.48 %	€23,586	74.85 %	40	5753
Emerging countries	5.80 %	€7,586	40.33 %	33	3466

Table 6: Classification of countries and business cycles

In addition to overall statistics, some individual countries show remarkable observations for private label share. The highest share is 92.2 % for ready meals in Taiwan. The private label share of this category rose from 79.6 % to 92.2 % between 2004 and 2017. The lowest observation is 0.0 % for several countries and categories. Unique is the increase in private label share in South Korea, the private label share for ready meals rose from 4.1 % in 2004 to 58.6 % in 2017. The private label share in South Korea increased on average with 17.2 % per year. Moreover, large differences within countries across the different categories are exhibited as well. For instance, ready meals in 2017 in China is 26.1 % whilst sauces, dressings, and condiments is 0.1 % for all observations between 2004 and 2017. Similarly, differences within regions have been observed as well. For instance, in Africa: Cameroon averaged 12.8 % in 8 different categories whilst Morocco averaged 0.9 % in 6 categories. Brazil, Russia, India, and China (BRIC) illustrate low levels of private label shares. The average market share was 2.2 %, the minimum value and maximum values being 0.1 % and 26.1 %. The largest economy, the United States, had an average market share of 16.9 %; with minimum and maximum values at 5.1 % and 43.2 %.

3.3 Regression model

A log-log regression analysis is used to test the hypotheses and the effects of various (control) variables. This approach is very popular in market-response literature and has been widely used to accommodate for analysis in private label and retail context (e.g. Keller et al., 2016; Gielens et al., 2008; Ter Braak et al., (2013). Hanssens, Parsons, and Schultz (2001, p. 100-103) and Leeflang, Wittink, and Naert (2000, p.74-75) have identified the reasons for the popularity of the log-log regression approach. Firstly, the log-log approach measures elasticities (Hanssens, 2015). In this case measuring the percentage changes in private label share given a one-percent change in GDP per capita. This greatly facilitates the comparison across industries, countries and categories, as elasticity is a unit-free measure as opposed to one-euro or one-dollar. Secondly, this approach does not assume a linear relation between dependent and independent variables but instead assumes that ever-increasing values of the independent variable (GDP) have a diminishing impact on the dependent variable (private label share). Lastly, the data is heavily skewed towards lower market

shares. Log transforming the data reduces some of the skewness and helps to ensure the normality and constant variance assumptions.

However, the use of a log-log model is not straightforward, as this requires some changes to the data. Firstly, in order to take a natural logarithm of a value it is required to be positive and nonzero. As previously showed, some of the observations exhibit private label share of zero percent. In order to ensure that the observations are positive and nonzero, a transformation will be conducted to the continuous variables (being private label share, GDP per capita, and modern retail market share). The transformation is as follows: $\ln [(Y+0.01)*100]$.

In total, five different regression equations will be used to test the hypotheses as specified in section 2.4. These regressions are discussed below. For ease of expositions, Table 7 provides an overview of the variables and corresponding beta's in the different regression equations. Table 8 provides an overview of all the variables, and their operationalization.

Hypotheses	Equation	Coefficients
H1 Private label share sensitivity in developed countries is countercyclical	Eq(1)	$\beta_1 \ln_GDP (-)$
H2 private label share sensitivity in emerging countries is countercyclical	Eq(2)	$\beta'_1 \ln_GDP (-)$
H3 Private label share sensitivity in developed countries is smaller than in emerging countries	Eq(1)	$\beta_1 \ln_GDP (-) + \beta_3 \ln_GDP * Emerging (-)$
H4 Private label share sensitivity in developed countries is asymmetric	Eq(4)	$\beta_4 \text{ Contraction } (+) \neq \beta_6 \text{ Expansion } (-)$
H5 Private label share sensitivity in emerging countries is asymmetric	Eq(5)	$\beta'_4 \text{ Contraction } (+) \neq \beta'_6 \text{ Expansion } (-)$
H6: Asymmetric private label share sensitivity in emerging countries is different from developed countries	Eq(4) and Eq(5)	(Eq(4): $\beta_4 \text{ Contraction } (+); \beta_6 \text{ Expansion } (-) \neq$ (Eq(5): $\beta'_4 \text{ Contraction } (+); \beta'_6 \text{ Expansion } (-)$)

Table 7: The hypotheses and their expected signs of the coefficients

Variable	Operationalization
ln_PLshare	Natural logarithm of private label share per year, country, and category
ln_GDP	Natural logarithm of GDP per capita in euros, per year, and per country
Emerging	1 for emerging countries and 0 for developed countries
Developed	1 for developed countries and 0 for emerging countries
ln_GDP*Emerging	Natural logarithm of GDP per capita in euros * 1 for emerging and 0 if developed
ln_GDP*Developed	Natural logarithm of GDP per capita in euros * 1 for developed and 0 if emerging
Contraction	1 for contraction and 0 if otherwise
Contraction*Emerging	1 for contraction and 0 if otherwise * 1 for emerging and 0 if developed
Contraction*Developed	1 for contraction and 0 if otherwise * 1 for developed and 0 if emerging
Expansion	1 for expansion and 0 for stability and contraction
Expansion*Emerging	1 for expansion and 0 otherwise * 1 for emerging and 0 for developed
Expansion*Developed	1 for expansion and 0 otherwise * 1 for developed and 0 for emerging
Control variables	
ln_Modern retailing	Natural logarithm of the market share of modern retailing per year per country in percentages
Baked goods	1 for baked goods 0 for all other categories
Breakfast cereals	1 for breakfast cereals 0 for all other categories

Dairy products and alternatives	1 for dairy products 0 for all other categories
Edible oils	1 for edible oils 0 for all other categories
Processed fruits and vegetables	1 for processed fruits and vegetables 0 all other categories
Processed meat and seafood	1 for processed meat and seafood 0 for all other categories
Ready meals	1 for ready meals 0 for all other categories
Rice, pasta, and noodles	1 for rice, pasta, and noodles 0 for all other categories
Sauces, dressings and condiments	1 for sauces, dressings and condiments 0 for all other categories
Snacks	1 for snacks 0 for all other categories
Soups	1 for soups 0 for all other categories
Spreads	1 for spreads 0 for all other categories
Africa	1 for Africa 0 for all other regions
Asia	1 for Asia 0 for all other regions
Central America	1 for Central Europe 0 for all other regions
Eastern Europe	1 for Eastern Europe 0 for all other regions
North America	1 for North Europe 0 for all other regions
Oceania	1 for Oceania 0 for other all regions
South America	1 for South Europe 0 for all other regions
Western Europe	1 for Western Europe 0 for all other regions

Table 8: List of (control) variables and their operationalization

3.3.1 Private label share and private label share sensitivity

In order to test the hypotheses regarding private label share and sensitivity of private label share the following model is used.

$$\ln_PLshare_{ijt} = \alpha + \beta_1 \ln_GDP_{it} + \beta_2 Emerging_i + \beta_3 \ln_GDP_{it} * Emerging_i + \text{control vars} + \varepsilon, \quad Eq (1)$$

For each country i , category j , and year t . $Emerging$ is included to control for potential differences in the levels of private label share between developed and emerging countries. The implication of this model is as follows. If \ln_GDP is significant, the sign determines whether the private label share sensitivity is pro-cyclical (+) or counter-cyclical (-) in developed countries. $\ln_GDP * Emerging$ determines whether private label sensitivity to business cycles is different (higher or lower) in emerging than in developed countries. If both \ln_GDP and $\ln_GDP * Emerging$ are significant and the signs are negative, then private labels behave countercyclical in both types of countries, but private label share is more sensitive to business cycles in emerging countries. In the case that \ln_GDP is significant and negative but $\ln_GDP * Emerging$ is significant and positive, private label share sensitivity to business cycles is smaller in emerging countries. The sum of \ln_GDP and $\ln_GDP * Emerging$ shows the sensitivity of private label share for emerging countries. However, it is not straightforward to determine whether $\ln_GDP + \ln_GDP * Emerging$ is significant; i.e. determining the significance of the sum of two coefficients is not readily observable from the

regression outputs of Eq (1). However, there is an easy way to determine whether private label sensitivity in emerging countries is significant: estimate a new regression equation:

$$\ln_PLshare_{ijt} = \alpha + \beta'_1 \ln_GDP_{it} + \beta'_2 Developed_i + \beta'_3 \ln_GDP_{it} * Developed_i + \text{control vars} + \varepsilon,$$

Eq (2)

In Eq (2), the sensitivity of emerging countries is captured by one coefficient: β'_1 and its sign determines whether private label share sensitivity is pro-cyclical (+) or counter-cyclical (-) in emerging countries.

3.3.2 Asymmetry of private label sensitivity

The asymmetry of private label sensitivity for all countries in the sample will be tested with equation 3.

$$\ln_PLshare_{ijt} = \alpha + \beta_4 Contraction_{it} + \beta_6 Expansion_{it} + \text{control vars} + \varepsilon,$$

Eq (3)

Private label share sensitivity is counter-cyclical if Contraction is significant and positive or if Expansion is significant and negative. Private label sensitivity is asymmetric for all countries if the absolute value of Expansion is not equal to the coefficient of Contraction. In order to test the asymmetry for emerging countries versus developed countries equation 4 will be estimated.

$$\ln_PLshare_{ijt} = \alpha + \beta_2 Emerging_i + \beta_4 Contraction_{it} + \beta_5 Contraction_{it} * Emerging_i + \beta_6 Expansion_{it} + \beta_7 Expansion_{it} * Emerging_i + \text{control vars} + \varepsilon,$$

Eq (4)

Private label share sensitivity in developed countries is counter-cyclical if Contraction is significant and positive. If Contraction*Emerging is significant, the coefficient shows whether the impact for contractions is different in emerging countries as opposed to developed countries. The sum of Contraction and Contraction*Emerging indicates counter-cyclicity in emerging countries if positive. To determine if sensitivity is greater or smaller in developed countries as opposed to emerging countries Contraction versus Contraction + Contraction*Emerging are observed. If Contraction is significant and smaller than Contraction + Contraction*Emerging sensitivity is greater for emerging countries. Again, it is not straightforward to determine whether Contraction + Contraction*Emerging is significant; there is however, an easy way to determine whether the impact of contractions in emerging countries is significant: estimate regression equation 5.

Private label share sensitivity in developed countries is counter-cyclical if Expansion is significant and negative. When Expansion*Emerging is significant, the coefficient tells if impact of expansions is different for developed versus emerging countries. If the sum of Expansion and Expansion*Emerging is negative private label share sensitivity is counter-cyclical in emerging countries. To determine whether emerging countries are more or less sensitive to the impact of expansions as opposed to developed countries Expansion versus Expansion + Expansion*Emerging are observed. If Expansion is significant and smaller than Expansion + Expansion*Emerging the impact of expansions is larger in developed countries. Again, regression equation 5 is used to test the significance for emerging countries.

If the absolute value of Contraction is not equal to the absolute value of Expansion, private label share sensitivity is asymmetric in developed countries. If Contraction + Contraction*Emerging is not equal to Expansion + Expansion*Emerging private label share sensitivity is asymmetric in emerging countries. Again, regression equation 5 will provide a direct test.

$$\ln_PLshare_{ijt} = \alpha + \beta'_2 \text{Developed}_i + \beta'_4 \text{Contraction}_{it} + \beta'_5 \text{Contraction}_{it} * \text{Developed}_i + \beta'_6 \text{Expansion}_{it} + \beta'_7 \text{Expansion}_{it} * \text{Developed}_i + \text{control vars} + \varepsilon$$

Eq (5)

Private label sensitivity in emerging countries is counter-cyclical if Contraction is significant and positive or if Expansion is significant and negative. Private label sensitivity to business cycles is asymmetric in emerging countries if the absolute value of Expansion is not equal to Contraction.

3.4 Multicollinearity and heteroscedasticity checks

The absence of multicollinearity assumption describes the problem of a correlation between any of the variables. The ceteris paribus presupposition states that if GDP increases, given that all other variables remain the same, a change in Y occurs. However, if multicollinearity exists between any of the independent variables, a change in GDP would most likely lead to a change in another independent variable as well. Multicollinearity also increases the difficulty of finding individual significance for the independent variables (Nieuwenhuis, 2009). To test for multicollinearity two steps will be taken. Firstly, pairwise correlations will be calculated as a first test; potential problems could arise if variables exhibit correlations of >0.8 (Judge et al., 1988). Secondly, variance inflations factors (VIF) will be reported alongside the regression outputs. Following Hair et al. (2009), variables with VIF >10 will be excluded from the analysis due to

multicollinearity. However, there is one exception to this rule. The inclusion of interaction terms in the models could cause $VIF > 10$ for the related variables and the interaction terms without necessarily giving cause for concern (Disatnik & Sivan, 2016). The model will first be estimated without interaction terms, and any variables exceeding $VIF > 10$ will be omitted from the model. After this procedure, the interaction terms will be added to the model. $VIF > 10$ for the variables that in the first model showed $VIF < 10$ should then not pose a problem.

Heteroscedasticity could also prove to be a problem for the regression model. Heteroscedasticity occurs when the common variance linearly depends on the observed values of the independent values. This could lead to the problem that the standard deviation of a β is underestimated. This also means that the standard deviation cannot be used to interval testing and more importantly hypothesis testing (Nieuwenhuis, 2009). Heteroscedasticity will be tested in STATA using the Bruesch-Pagan test. In the case that the Bruesch-Pagan test is significant, the equation suffers from heteroscedasticity. If this is the case, the regression equations will be estimated with robust standard errors in STATA.

Chapter 4: Analysis and findings

4.1 Assumptions of the linear regression model

Firstly, the researcher will test for problems with multicollinearity and heteroscedasticity as mentioned in section 3.4. Table 9 provides an overview of the pairwise correlations of the variables.

	ln_PLshare	ln_GDP	Emerging	Developed	Contraction	Expansion
ln_GDP	.521**					
Emerging	-.552**	-.628**				
Developed	.552**	.628**	-1.000**			
Contraction	.006	.039**	.019	-.019		
Expansion	-.260**	-.256**	.234**	-.234**	-.255**	
ln_Modern retail	.554**	.923**	-.754**	.751**	0.35**	-.277

Table 9: Correlation matrix of variables; ** Correlation is significant at the 0.01 level (2-tailed).

As previously mentioned, collinearity problems are expected between the variable ln_Modern retail and ln_GDP. As Table 9 indicates, ln_Modern retail exceeds the >0.8 pairwise correlation threshold (Judge et al., 1988) with ln_GDP. Furthermore, the estimation of the regression equations led to the following VIF values for ln_Modern retail: 10.54 in Eq (1), 10.54 in Eq (2), 1.91 in Eq (3), 2.28 in Eq (4), and 2.28 in Eq (5). Given the high pairwise correlation and the high VIF values, ln_Modern retail is omitted from the regression analysis. The perfect correlation of Emerging and Developed is due to the fact that these are dummy variables with opposite values of each other and thus will be ignored. The researcher tried to use country dummies instead of regional dummies, this however led to numerous violations of VIF > 10 threshold.

The testing of heteroscedasticity by means of the Bruesch-Pagan test indicated the following values: Eq (1): $\chi^2 = 1302.89$ (Prob > $\chi^2 = 0.0000$), Eq (2): $\chi^2 = 1881.53$ (Prob > $\chi^2 = 0.0000$), Eq (3): $\chi^2 = 992.90$ (Prob > $\chi^2 = 0.0000$), Eq (4): $\chi^2 = 1262.78$ (Prob > $\chi^2 = 0.0000$), and Eq (5): $\chi^2 = 1293.89$ (Prob > $\chi^2 = 0.0000$). This test was significant for all equations and thus indicating heteroscedasticity problems. To accommodate for this the regression equations are instead estimated with robust standard errors.

4.2 Results of the regression equations

For all of five of the equations the same base dummies will be used in the regression models. Western Europe will be used as the base level for regions as prior research shows that evidence of private label sensitivity exists for countries in this region (Lamey et al., 2007). For the category dummies sauces, dressings and condiments will be used as the base category as this category exhibits the most observations.

4.2.1 Private label share and private label share sensitivity

Firstly, regression equation 1 is estimated, the output is provided in table 10.

Variable	β	T	P-value	VIF
Constant	1.804	3.93	0.000	
ln_GDP	.548	12.49	0.000	13.85
Emerging	.506	1.09	.278	335.46
ln_GDP*Emerging	-.186	-3.89	0.000	289.41
Control variables				
Africa	.986	9.26	0.000	2.26
Asia	-.468	-7.76	0.000	5.98
Central America	.132	1.72	0.085	2.75
Eastern Europe	-.528	-11.09	0.000	4.58
North America	-.451	-14.22	0.000	1.10
Oceania	-.690	-20.73	0.000	1.10
South America	-.021	-0.30	0.764	4.13
Baked goods	-.529	-10.29	0.000	1.79
Breakfast cereals	-.028	-0.51	0.607	1.68
Dairy products	-.183	-3.20	0.001	1.67
Edible oils	.711	15.53	0.000	1.67
Processed fruit and vegetables	.860	17.17	0.000	1.55
Processed meat and seafood	.521	9.70	0.000	1.58
Ready meals	.676	11.89	0.000	1.74
Rice pasta and noodles	.730	15.81	0.000	1.76
Snacks	-.315	-6.45	0.000	1.79
Soups	-.488	-8.58	0.000	1.59
Spreads	.422	8.41	0.000	1.75
	N=9219; F=550.39; R ² =.514			

Table 10: Output of regression equation 1 including control variables

Table 10 clearly indicates regional differences as the results are positive or negative and mostly significant. This indicates that the regions differ from the base case Western Europe. Similarly, differences are present for the different grocery categories as the results are either positive or negative and mostly significant. This suggest that there are differences between the base case Sauces, dressings and condiments and the other categories. Firstly, ln_GDP is positive and significant (.547; p=0.000) indicating that private label share in developed countries is sensitive to business cycles in a pro-cyclical manner, not supporting hypothesis 1. This means that in developed countries a 1 % change in GDP causes a 0.547 % change in private label share. Furthermore, ln_GDP*Emerging is significant and negative (-.186; p=0.000) indicating that private label sensitivity in developed countries is significantly different from private label share sensitivity in emerging countries. The private label sensitivity for emerging countries is the sum of ln_GDP and ln_GDP*Emerging. Which provides the following calculation .548 + (-.186) = .362, indicating that private label shares in emerging countries are pro-cyclical to business cycles. However, this does not provide a significance. The sensitivity for emerging countries is estimated again in equation 2. In this equation, ln_GDP is positive and significant (.362; p=0.000),

confirming that the private label sensitivity in emerging countries is indeed pro-cyclical with a coefficient of .362. The coefficient indicates that in emerging countries a 1 % change in GDP leads to a .362 % change in private label share. This does not support hypothesis 3 as private label share sensitivity in emerging countries hypothesized be counter-cyclical. Furthermore, private label share is more sensitive in developed countries thus not supporting hypothesis 4. The R^2 for both equation 1 and equation 2 is .514⁵. Please see Table 14 in Appendix A for the output of equation 2.

4.2.2 Private label asymmetry

Table 11 reports the results of equation 3, equation 4 and equation 5 (control variables omitted). Please see appendix A for all the regression results (including control variables) for equation 3, equation 4, and equation 5.

Variable	equation (3)				equation (4)				Equation (5)			
	β	T	P-value	VIF	β	T	P-value	VIF	β	T	P-value	VIF
Constant	7.536	191.41	.000		7.574	208.75	.000		5.702	81.88	.000	
Emerging					-1.872	-30.64	.000	6.28				
Developed									1.872	30.64	.000	6.28
Contraction	-.002	-0.06	.953	1.10	-.165	-4.47	.000	2.07	.162	2.50	.004	2.34
Contraction*Emerging					.327	4.38	.000	2.29				
Contraction*Developed									-.327	-4.38	.000	2.39
Expansion	-.273	-8.95	.000	1.24	-.408	-11.80	.000	2.68	-.113	-2.52	.002	2.33
Expansion*Emerging					.295	5.21	.000	3.75				
Expansion*Developed									-.295	-5.21	.000	2.57
Control variables												
	N=9219; F=530.02; R^2 =.430				N=9219; F= 508.71; R^2 adjusted=.496				N=9219; F=393.04; R^2 =.495			

Table 11: Output of regression equation 3, equation 4, and equation 5

In Table 11, Equation 3 tests asymmetry of private label share sensitivity for all countries. Contraction is insignificant thus indicating that private label share is not significantly higher or lower during contractions than during stability. Expansions is negative and significant (-.273; $p=0.000$). This result indicates that private label sensitivity is counter-cyclical during expansions only: private label shares are significantly lower during expansions but not significantly higher during contractions. If a countries, economy is in a state of expansion instead of stability private label share changes -.273%. The effect of expansions increases (-.436; $p=0.000$) when a more stringent cut-off point is used to determine the state of the economy as expansions (66th percentile rather than the 50th percentile). This result indicates increased private label share sensitivity during

⁵ As specified in section 4.1, the equations are estimated with robust standard errors. The procedure with robust standard errors does not report a R^2 adjusted; only R^2 is given.

more pronounced expansions. During a more stringent expansions private label share changes $-.436\%$. The effect decreases ($-.168$; $p=0.000$) when a less stringent cut-off point is used to determine the state of the economy as expansions (33rd rather than the 50th percentile), but it remains significant. This suggests decreased private label sensitivity during weaker expansions resulting in a $-.168\%$ change. Contractions have no discernible impact on private label shares. However, when a more stringent cut-off point is used to determine the state of the economy as contractions (66th percentile rather than the 50th percentile), contraction becomes significant and negative ($-.118$; $p=0.021$). This indicates that private label sensitivity is pro-cyclical during severe contractions only and results in a $-.118\%$ change of private label share. Furthermore, these results indicate that private label share sensitivity for all countries is asymmetric as the effect of Contraction ($.002$; $p=0.953$) is not equal to the effect of Expansion in absolute terms ($-.273$; $p=0.000$). The R^2 for equation 3 is $.430$.

The results of equation 4 in Table 11 show that, Private label sensitivity in developed countries is pro-cyclical during contractions as Contraction is negative and significant ($-.165$; $p=0.000$). If the state of the economy in developed countries is classified as contraction then private label share changes $-.165\%$. More stringent criteria to determine the economy to be in state of contraction (66th percentile rather than the 50th percentile) marginally decreased ($-.151$; $p=0.002$) the pro-cyclical effect of contractions. More severe contractions result in a $-.151\%$ change of private label share. A less stringent criteria to determine contractions (33rd percentile rather than the 50th percentile) decreased ($-.096$; $p=0.003$) the effect of contractions but remains negative and significant. When less strong contractions are taken into account private label share changes $-.096\%$. Contraction * emerging is significant and positive ($.327$; $p=0.000$) indicating that the impact for contractions is different in emerging countries as opposed to developed countries. The private label share sensitivity in emerging countries during contractions is provided by the sum of Contraction and Contraction * emerging. This gives the following coefficient for private label sensitivity in emerging countries: $-.165 + .327 = .162$. However, this does not provide a significance. Therefore equation 5 is estimated and shows that contraction is significant and positive ($.162$; $p=0.004$), confirming that private label sensitivity in emerging countries is indeed $.162$ and significantly counter-cyclical during contractions. During contractions private label share in emerging countries changes $.162\%$. More stringent cut-off point to determine the state of economy to be contractions (66th rather than 50th percentile) led to increased private label

sensitivity (.190; $p=0.000$) during contractions in emerging countries. More severe contractions in emerging countries result in a .190% change in private label share. Private label shares in developed countries are more sensitive to contractions as opposed to emerging countries.

Expansion is significant and negative (-.408; $p=0.000$) meaning that private label sensitivity in developed countries is counter-cyclical during expansions. This results in a -.408% change in private label share. However, this effect decreases (-.284 $p=0.000$) if a less stringent cut-off point is used (33rd percentile rather than the 50th percentile), resulting in -.284% change in private label share. A more stringent cut-off point (66th percentile rather than the 50th percentile) leads to an increased (-.602; $p=0.000$) counter-cyclical effect during contractions. More severe contractions in developed countries result in a -.602% change in private label share. Expansion * emerging is significant and positive (.295; $p=0.000$) indicating that the impact of expansions is different for emerging countries as opposed to developed countries. Private label sensitivity during expansions for emerging countries is provided by the sum of Expansion and Expansion * Emerging. Showing that private label sensitivity in emerging countries is counter-cyclical as $-.408 + .295 = -.113$. However, there is no significance provided for this coefficient. Due to this equation 5 is estimated. In this equation, expansion is significant and negative (-.113; $p=0.002$) resulting in a -.113% change in private label share in emerging countries during expansions. Confirming the effect found in equation 4, meaning private label share is counter-cyclical in emerging countries. A more stringent criteria to determine the state of the economy to be expansions (66th rather than the 50th percentile) increased (-.240; $p=0.000$) the counter-cyclical effect of private label sensitivity in emerging countries. This indicates that stronger expansions results in a -.240% change in private label share in emerging countries. In sum, Private label share is countercyclical during expansions in both types of countries, but is more sensitive in developed countries.

Private label sensitivity is asymmetric in developed countries. The sensitivity of private label shares during contractions (-.165; $p=0.000$) is smaller as opposed to the sensitivity during expansions (-.408; $p=0.000$) in absolute terms supporting hypothesis 2. Furthermore, the results indicate that private label shares sensitivity in emerging countries is asymmetric as well. As the private label share sensitivity during contractions (.162; $p=0.012$) is different from expansions (-.113; $p=0.012$) in absolute terms, supporting hypothesis 5. Both emerging and developed countries show asymmetric private label sensitivity to business cycles, the effects however are not

equal in absolute terms. This supports hypothesis 6, as asymmetric sensitivity is different in developed countries versus emerging countries. The R^2 for both equation 4 and equation 5 is .496.

4.3 Summary of the results

This section provided the outcomes for the different regression equations. Table 12 further summarizes the most important results from this section.

Concept	Developed countries	Emerging countries
Business cycle sensitivity (ln_GDP)	.547 %	.362 %
Sensitivity during expansions	-.408 %	-.113 %
Sensitivity during contractions	-.165 %	.162 %

Table 12: Overview of elasticities for developed and emerging countries.

The results clearly indicate differences in sensitivities with regard to the states of business cycles and between developed and emerging countries. Furthermore, the results indicate that developed countries are most sensitive to all concepts. The results also showed that private label share sensitivities are asymmetrical in both developed and emerging countries.

4.4 Robustness checks

To test whether the conclusions so far are robust or instead depend upon specific observations or model specifications, several changes and variations of the models and data have been used in order to check whether the outcomes changed.

As was shown in section 3.2, the maximum values of some of the grocery categories are extreme when compared with other categories and the mean in general. For instance, ready meals (92.20%), processed meat and seafood (80.90%), and processed fruits and vegetables (72.70%). In order to test whether these extreme values influenced the results of the regression equations, the top 5% of observations with the largest private label share are discarded. This did change the results of the regression equations. However, the signs and significances remained the same as in the equations presented in section 4.2. Please see appendix B.1 for the complete results of the models without the top 5% of observations.

The researcher also estimated the models with *growth* of private label share instead of *levels* of private label share. A growth model is estimated in order to test whether this yielded the same results as the models in levels as used in this thesis. Moreover, growth models have been used by other studies (e.g. Lamey et al., 2007; Lamey et al., 2013). The estimation of a growth model however leads to insignificance of most of the coefficients and a very small R^2 . Typically, R^2

values for growth models are much than the R^2 values of the same models in levels (Carpenter & Hanssens, 1994). Please see Appendix B.2 for a complete overview of the results for the growth models.

As another robustness check, a trend variable (i.e., $\ln(\text{trend})$) was included in the model to control for a positive trend in private label shares. Table X in Appendix Y demonstrates that almost all yearly averages of private label share for the respective regions, developed countries, emerging countries and the sample in general are subject to growth. Please see Appendix B.3 for a complete overview of the models including \ln_Trend . Some coefficients however became insignificant due to the inclusion of \ln_Trend . It thus seems that the trend variable picks up some of the variation in the other explanatory variables.

As specified in section 4.2 the regression equations are estimated with Western Europe and sauces, dressings and condiments as base dummies. To test the robustness of the effects, the same equations are estimated with North America and soups as base dummies. The use of different base categories did not change the outcomes of the regression equations, except for the control variables of course. The complete overview of the regression results with North America and Soups as base dummies can be found Appendix B.4.

Chapter 5: Conclusions and recommendations

5.1 Conclusion and discussion

This study investigates the relation between private label share and business cycles on a global scale and how this relationship is different for emerging and developed countries. The study is characterized by the following research question: *“What is the effect of business cycles on private label share and does this relationship differ between emerging and developed countries and with regard to economic expansions and contractions?”* Section 4.3 briefly summarizes the results from the empirical analysis. Based on an extensive review of the literature in chapter 2, a total of 6 hypotheses are developed to answer the research questions. Table 13 provides an overview of the hypotheses and whether or not the hypotheses are supported by the empirical results of this study.

Hypotheses	Outcome
H1: Private label share sensitivity in developed countries is counter-cyclical	Not supported
H2: Private label share sensitivity in emerging countries is counter-cyclical	Not supported
H3: Private label share sensitivity in emerging countries is greater than in developed	Not supported
H4: Private label share sensitivity in developed countries is asymmetric	Supported
H5: Private label share sensitivity in emerging countries is asymmetric	Supported
H6: Asymmetric private label share sensitivity in emerging countries is different from developed countries	Supported

Table 13: Overview of the hypotheses and the respective outcomes

Based on previous research with regard to the relationship of private labels and business cycles the researcher expects that private label share in both emerging and developed countries is sensitive to business cycles in a counter-cyclical manner. However, private label share sensitivity to business cycles in both emerging countries and developed countries is pro-cyclical and thus hypothesis 1 and hypothesis 2 are rejected. This is an interesting result and is different from what is argued and found in Lamey et al. (2007) and Lamey et al. (2012). A possible explanation for this could be that this study uses more recent and addresses more countries. The dataset used in Lamey et al. (2007) is from 1971–2003 and spans four different countries in Europe and North America. The dataset used in Lamey et al. (2012) spans 20 years (1985–2005) and originates from the United States. Whereas, this study includes more recent data (2004–2017) and 40 instead of 4 developed countries and 33 emerging countries.

The literature indicates several reasons as to why emerging countries would exhibit increased private label share sensitivity. For instance, increased magnitude and duration of contractions and more conservative budgeting during said contractions (Dutt & Padmanabhan, 2011). Unexpectedly, private label sensitivity is greater in developed countries. This means that private label share is more robust to business cycles in emerging countries and thus hypotheses 3 is rejected. This could be because consumers in emerging markets are more risk averse and are thus more hesitant to try different brands. In emerging countries, due to lower incomes and decreased spending budgets there is less room to experiment with new brands as this bears financial risks for the consumer (D'Andrea, Ring, & Stengel, 2006; Mandhachitara et al., 2007). Another explanation could be increased brand loyalty towards familiar products in emerging countries as opposed to developed countries; this however could be an avenue for future research.

Many studies have indicated that consumer behavior is different for contractions and expansions. Consumers tend to decrease spending budgets or switch to cheaper alternatives such as private labels. In line with this the researchers expects private label success to be different during contractions and expansions. The empirical research indicates that there are large differences between expansions and contractions and thus confirms this school of thought. Private label share sensitivity for all countries is asymmetrical during contractions and expansions. Contractions have no discernible impact on private label share, whereas during expansions the effects are counter-cyclical. This result is in line with previous findings by Lamey et al. (2007) stating that private label share behaves differently during expansions and contractions thus further increasing empirical generalizability of this theory. The results further indicate that private label share sensitivity is asymmetric in developed countries. During both contractions and expansions private label shares decreases. The effects of expansions however are greater than the effects of contractions. Furthermore, hypothesis 4 is supported by the empirical analysis. The private label share sensitivity to business cycles is different in emerging countries. During times of contractions private label share increases whilst during times of expansions private label share decreases. Resulting in a counter-cyclical sensitivity during contractions and expansions. The private label sensitivity is asymmetric during contractions and expansions in emerging countries and therefore hypothesis 5 is supported.

The results clearly indicate that there are clear differences between developed and emerging countries with regard to the sensitivities of private label shares to economic contractions and expansions. Moreover, hypothesis 6 proposed that the asymmetry of private label sensitivity is different in emerging countries as opposed to developed countries. The results confirm that the impacts of contractions and expansions are not equal for developed and emerging countries. Private label share in developed countries again is more sensitive to both contractions and expansions. Again, the differences in the magnitude of sensitivity could be due to increased consumer loyalty or the risk averse nature of consumers in emerging countries.

5.2 Academic implications and contributions

Whereas previous researchers were primarily concerned with a small sample of developed countries (Hoch and Banjeri, 1993; Lamey et al., 2007; Lamey et al., 2012; Lamey, 2014; Dube et al., 2017), this study investigated the effects of business cycles on private label share on a global scale. Previous findings by Lamey et al. (2007) and Lamey et al. (2012) are not echoed in this study. Whereas they found that private label share behaves counter-cyclical to business cycles this study revealed pro-cyclical effects. This indicates that the private label market has changed since the beginning of this century. This study as a first indicated that business cycles indeed effect private label share in emerging countries and that these effects are smaller as opposed to developed countries. This, to the best of the researchers' knowledge, had not yet been indicated by empirical research and thus filling an important gap in academic literature. It is important to note that private label success behaves inherently different in emerging countries as opposed to developed countries and that therefore these markets are very different from one another. This suggests differences in consumer choice between the two types of countries. In addition, this study also indicates that the effects of contractions and expansions are rather different in magnitude and are not equal to one another, which further confirms the conclusions of Lamey et al. (2007) that effects are different for contractions and expansions.

5.3 Managerial implications

Notwithstanding the notion that this is an academic thesis, the implications are indeed also useful for retail managers. The results clearly indicate that private labels in emerging countries require different strategies from private labels in developed countries. Whilst retail managers do not have any influence on business cycles this study does provide insights that could help retail managers

to deal with said business cycles. In order to secure a better bottom line results retail managers often consider scaling down on product innovations (Axarloglou 2003) and advertising budgets (Picard 2001). However, increased innovation spending during contractions is directly linked to increased profitability and market share in times of expansion (Hillier and Baxter 2001). Furthermore increasing spending, in contrary to the managers' intuition could decrease the negative effects of economic expansions on private labels. Moreover, private labels are much less successful in categories with increased levels of product innovations (Quelch and Harding, 1996; Steenkamp and Dekimpe, 1997). In addition to this, increased advertisement spending in times of contractions leads to added value in the subsequent year (Frankenberger and Graham 2003). To put it differently, it is important for private label managers to keep these notions in mind. Potentially increased advertising and innovation spending during on private labels during contractions could mitigate the negative effects of expansions in both developed and emerging countries.

Moreover, this study presents evidence that both private label shares and their sensitivity are dependent on business cycles and behave different in emerging countries as opposed to developed countries. Sheth (2011) argued that each emerging country requires multiple strategies, as the market is very diverse (e.g. tier I cities and tier II cities⁶ and rural vs urban). Further emphasizing the need for a local adaption strategy rather than a global strategy. Private label managers should not make the mistake of copying successful private label strategies from Western Europe into emerging regions such as South America. Private label managers thus should not make the mistake to treat a geographical region as one-market and should rather address market-specific differences. Furthermore, consumers in emerging countries infer quality based on product price, and thus are more likely to judge private label products as lower quality. Private label managers should actively seek and follow a strategy that positively comments on the product quality. Such as emphasizing that indeed high-quality suppliers are used, making the suppliers visible, use cues such as quality labels, and emphasize that products are tested against the highest quality standards. However, managers should always aim to improve objective product quality by collaborating up with strong suppliers and increased quality control (Geyskens, 2018)⁷.

⁶ Tier I,II, and III cities refer to a classification determined by companies based on informal measurement of several factors such as infrastructure, safety and economic development (Cartus, 2010)

⁷ Source from Blackboard, Tilburg University; course Marketing Channel Management, (Not publicly accessible).

5.4 Limitations and future research

Whilst it is clear that there are extensive differences between emerging and developed countries and between contractions and expansions, the underlying factors have not been investigated. Future research could shine light upon these factors. As with all studies, this study did have some limitations that need to be addressed. Whilst this study focussed on emerging and developed countries, United Nations distinguish a third group namely, economies in transition. It could be very interesting to further investigate whether effects of business cycles are inherently different in comparison to emerging and developed countries. This research did not control for retailer actions during business cycles. For instance, changes in retail prices, advertisement, or other marketing actions could influence the private label shares. This provides an avenue for future research where marketing conduct is taken into account such as in Lamey et al. (2012), where innovations of national brands, advertising and promotions of national brands and private labels were taken into account. Whilst this study analysed more than 9200 observations across 12 categories and 73 countries, the data originated from two different datasets. Unfortunately, the two datasets were no exact match and ultimately the categories were merged based on inferences made by the researcher. Whilst a value-weighted mean was preferred, this was not possible due to absence of market value figures of the first dataset. Moreover, the results could be subject to potential flaws due to wrongful inferences of the researcher or measurement differences between the datasets. As it is the case with national brands, private labels are more and more available in different quality and price tiers. This research did not consider the different quality/price tiers of private labels and thus does not examine whether or not this could be of influence on the results. Future research should aim to provide insight into the differences for private label tiers in terms of sensitivity to business cycles. This research give not insight into sensitivities for specific geographical regions and/or grocery categories. However, for managers it would be very interesting to see the effect of business cycles on individual grocery categories and geographical regions. Similarly, the geographical regions or even specific countries deserve attention, as the effects can be different for each of them. Lastly, this study has emphasized that emerging countries and developed countries are inherently different. Thus, future research should aim to understand the underlying factors for the decreased sensitivity in emerging countries. For instance, are decreased sensitivities in emerging due to increased brand loyalty towards known brands or is this due to for instance monetary concerns.

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Appendix

Appendix A: Complete output of the regression equations including control variables

	Equation (2)			
Variable	β	T	P-value	VIF
Constant	2.310	10.98	.000	
ln_GDP	.362	15.80	.000	13.85
Developed	-.506	-1.09	.278	335.46
ln_GDP*Developed	.186	3.89	.000	378.06
Control variables				
Africa	.986	9.26	.000	2.26
Asia	-.468	-7.76	.000	5.98
Central America	.131	1.72	.085	2.75
Eastern Europe	-.528	-11.09	.000	4.58
North America	-.451	-14.22	.000	1.10
Oceania	-.690	-20.73	.000	1.10
South America	-.021	-0.30	.764	4.13
Baked goods	-.529	-10.29	.000	1.79
Breakfast cereals	-.028	-0.51	.607	1.68
Dairy products	-.183	-3.20	.001	1.67
Edible oils	.711	15.53	.000	1.67
Processed fruit and vegetables	.860	17.17	.000	1.55
Processed meat and seafood	.521	9.70	.000	1.58
Ready meals	.676	11.89	.000	1.74
Rice pasta and noodles	.729	15.81	.000	1.76
Snacks	-.315	-6.45	.000	1.79
Soups	-.488	-8.58	.000	1.59
Spreads	.422	8.41	.000	1.75
N=9219; F=562.03; R ² =.513				

Table 14: Output of regression equation 2 including control variables

	Equation (3)			
Variable	β	T	P-value	VIF
Constant	7.536	191.41	.000	
Contraction	-.002	-0.06	.953	1.10
Expansion	-.273	-8.95	.000	1.24
control variables				
Baked goods	-.511	-9.17	.000	1.79
Breakfast cereals	.033	0.55	.582	1.68
Dairy products	-.124	-2.00	.045	1.67
Edible oils	.724	13.87	.000	1.67
Processed fruit and vegetables	.880	15.42	.000	1.55
Processed meat and seafood	.539	9.15	.000	1.58
Ready meals	.752	12.32	.000	1.74
Rice pasta and noodles	.747	14.09	.000	1.76
Snacks	-.330	-5.80	.000	1.79
Soups	-.377	-6.17	.000	1.75
Spreads	.442	7.87	.000	1.75
Africa	-1.367	-15.42	.000	1.69
Asia	-2.152	-62.52	.000	1.61
Central America	-1.984	-40.06	.000	1.19
Eastern Europe	-1.385	-43.11	.000	1.58
Northern America	-.384	-11.83	.000	1.10
Oceania	-.646	-16.86	.000	1.12
South America	-1.960	-46.19	.000	1.43
N=9219; F=530.02; R ² =.430				

Table 15: Output of regression equation 3 including control variables

Equation (4)				
Variable	β	T	P-value	VIF
Constant	7.574	208.75	.000	
Emerging	-1.872	-30.64	.000	6.28
Contraction	-.165	-4.47	.000	2.07
Contraction*emerging	.327	4.38	.000	2.29
Expansion	-.408	-11.80	.000	2.68
Expansion*emerging	.295	5.21	.000	3.75
Control variables				
Baked goods	-.533	-10.00	.000	1.79
Breakfast cereals	0.120	0.21	.831	1.68
Dairy products	-.143	-2.49	.013	1.67
Edible oils	.714	14.89	.000	1.67
Processed fruit and vegetables	.893	16.99	.000	1.55
Processed meat and seafood	.565	10.30	.000	1.58
Ready meals	.723	12.39	.000	1.74
Rice pasta and noodles	.753	15.69	.000	1.76
Snacks	-.302	-5.92	.000	1.79
Soups	-.460	-7.85	.000	1.59
Spreads	.439	8.54	.000	1.79
Africa	.395	3.80	.000	1.89
Asia	-.532	-9.06	.000	4.62
Central America	-.214	-2.87	.004	2.31
Eastern Europe	-1.040	-37.85	.000	1.80
Northern America	-.355	-10.52	.000	1.11
Oceania	-.589	-15.16	.001	1.15
South America	-.235	-3.37	.000	3.36
N=9219; F=508.71; R ² =.495				

Table 16: Output of regression equation 4 including control variables

Equation (5)				
Variable	β	T	P-value	VIF
Constant	5.702	81.88	.000	
Developed	1.872	30.64	.000	6.28
Contraction	.162	2.50	.004	2.34
Contraction*developed	-.327	-4.38	.000	2.39
Expansion	-.113	-2.52	.002	2.33
Expansion*developed	-.295	-5.21	.000	2.57
Control variables				
Baked goods	-.533	-10.00	.000	1.79
Breakfast cereals	.012	0.21	.826	1.68
Dairy products	-.143	-2.49	.009	1.67
Edible oils	.714	14.89	.000	1.67
Processed fruit and vegetables	.893	16.99	.000	1.55
Processed meat and seafood	.565	10.30	.000	1.58
Ready meals	.723	12.39	.000	1.74
Rice, pasta, and noodles	.753	15.69	.000	1.76
Snacks	-.303	-5.92	.000	1.79
Soup	-.460	-7.85	.000	1.59
Spreads	.439	8.54	.000	1.75
Africa	.395	3.80	.000	1.89
Asia	-.532	-9.06	.000	4.62
Central America	.214	-2.87	.004	2.31
Eastern Europe	-1.040	-37.85	.000	1.80
Northern America	-.355	-10.52	.000	1.11
Oceania	-.589	-15.16	.000	1.15
South America	-.235	-3.37	.000	3.36
N=9219; F=508.71; R ² =.496				

Table 17: Output of regression equation 5 including control variables

Appendix B: Robustness checks

B.1 Output of the regression equations without top 5% of observations for private label share

Variable	Equation (1)			
	β	T	P-value	VIF
Constant	1.346	2.71	0.007	
ln_GDP	.586	12.37	0.000	14.37
Emerging	.818	1.65	0.099	347.60
ln_GDP*Emerging	-.219	-4.31	0.000	299.31
Control variables				
Africa	1.066	9.87	0.000	2.30
Asia	-.386	-6.29	0.000	6.11
Central America	.267	3.43	0.001	2.84
Eastern Europe	-.393	-7.66	0.000	4.97
North America	.364	-11.60	0.000	1.13
Oceania	-.597	-17.68	0.000	1.13
South America	.113	1.59	0.113	4.28
Baked goods	-.529	-10.25	0.000	1.78
Breakfast cereals	-.036	-0.65	0.518	1.67
Dairy products	-.188	-3.28	0.001	1.66
Edible oils	.678	14.12	0.000	1.61
Processed fruit and vegetables	.805	14.30	0.000	1.46
Processed meat and seafood	.372	6.86	0.000	1.52
Ready meals	.489	8.39	0.000	1.64
Rice pasta and noodles	.710	14.94	0.000	1.71
Snacks	-.319	-6.50	0.000	1.78
Soups	-.483	-8.46	0.000	1.58
Spreads	.477	8.25	0.000	
N=8760; F=443.04; $R^2 = .479$				

Table 18: Regression equation 1 without the top 5% of observations

Variable	Equation (2)			
	β	T	P-value	VIF
Constant	2.163	10.40	0.000	
ln_GDP	.367	16.35	0.000	3.15
Developed	-.818	-1.65	0.099	347.60
ln_GDP*Developed	.219	4.31	0.000	387.48
Control variables				
Africa	1.066	9.87	0.000	2.30
Asia	-.386	-6.29	0.000	6.11
Central America	.267	3.43	0.001	2.84
Eastern Europe	-.393	-7.66	0.000	4.97
North America	.364	-11.60	0.000	1.13
Oceania	-.597	-17.68	0.000	1.13
South America	.113	1.59	0.113	4.28
Baked goods	-.529	-10.25	0.000	1.78
Breakfast cereals	-.036	-0.65	0.518	1.67
Dairy products	-.188	-3.28	0.001	1.66
Edible oils	.678	14.12	0.000	1.61
Processed fruit and vegetables	.805	14.30	0.000	1.46
Processed meat and seafood	.372	6.86	0.000	1.52
Ready meals	.489	8.39	0.000	1.64
Rice pasta and noodles	.710	14.94	0.000	1.71
Snacks	-.319	-6.50	0.000	1.78
Soups	-.483	-8.46	0.000	1.58
Spreads	.477	8.25	0.000	
N=8760; F=443.04; $R^2 = .479$				

Table 19: Regression equation 2 without the top 5% of observations

Equation (3)				
Variable	β	T	P-value	VIF
Constant	7.477	189.95	0.000	
Contraction	0.001	0.03	0.979	1.10
Expansion	-.286	-9.22	0.000	1.24
Control variables				
Africa	-1.334	-14.93	0.000	1.16
Asia	-2.094	-60.06	0.000	1.75
Central America	-1.885	-37.44	0.000	1.23
Eastern Europe	-1.286	-38.85	0.000	1.74
North America	-.288	-9.01	0.000	1.13
Oceania	-.546	-14.04	0.000	1.15
South America	-1.878	-42.89	0.000	1.52
Baked goods	-.5102	-9.14	0.000	1.78
Breakfast cereals	.022	0.37	0.714	1.67
Dairy products	-.130	-2.08	0.038	1.66
Edible oils	.685	12.52	0.000	1.61
Processed fruit and vegetables	.816	12.70	0.000	1.46
Processed meat and seafood	.401	6.59	0.000	1.51
Ready meals	.570	9.09	0.000	1.64
Rice pasta and noodles	.725	13.26	0.000	1.71
Snacks	-.335	-5.86	0.000	1.78
Soups	-.371	-6.05	0.000	1.58
Spreads	.431	7.63	0.000	1.73
N=8760; F=425.08; $R^2 = .385$				

Table 20: Regression equation 3 without the top 5% of observations

Equation (4)				
Variable	β	T	P-value	VIF
Constant	7.521	206.84	0.000	
Emerging	-1.904	-31.12	0.000	6.06
Contraction	-.173	-4.49	0.000	2.14
Contraction*Emerging	.340	4.54	0.000	2.35
Expansion	-.450	12.49	0.000	2.75
Expansion*Emerging	.339	5.93	0.000	3.83
Control variables				
Africa	.449	4.30	0.000	1.90
Asia	-.459	-7.79	0.000	4.69
Central America	-.095	-1.27	0.205	2.36
Eastern Europe	-.931	-32.90	0.000	1.96
North America	-.256	-7.64	0.000	1.14
Oceania	-.481	-12.16	0.000	1.18
South America	-.116	-1.65	0.098	3.44
Baked goods	-.533	-9.96	0.000	1.78
Breakfast cereals	.000	0.00	0.999	1.67
Dairy products	-.148	-2.59	0.010	1.66
Edible oils	.675	13.44	0.000	1.61
Processed fruit and vegetables	.833	14.05	0.000	1.46
Processed meat and seafood	.430	7.63	0.000	1.51
Ready meals	.535	9.00	0.000	1.64
Rice pasta and noodles	.731	14.80	0.000	1.71
Snacks	-.307	-5.98	0.000	1.78
Soups	-.455	-7.72	0.000	1.58
Spreads	.428	8.27	0.000	1.73
N=8760; F=414.98; $R^2 = .459$				

Table 21: Regression equation 4 without the top 5% of observations

Equation (5)				
Variable	β	T	P-value	VIF
Constant	5.617	80.69		
Developed	1.904	31.12	0.000	6.06
Contraction	.167	2.61	0.009	2.28
Contraction*Developed	-.340	-4.54	0.000	2.33
Expansion	-.110	12.49	0.000	2.27
Expansion*Developed	-.339	-5.93	0.000	2.55
Control variables				
Africa	.449	4.30	0.000	1.90
Asia	-.459	-7.79	0.000	4.69
Central America	-.095	-1.27	0.205	2.36
Eastern Europe	-.931	-32.90	0.000	1.96
North America	-.256	-7.64	0.000	1.14
Oceania	-.481	-12.16	0.000	1.18
South America	-.116	-1.65	0.098	3.44
Baked goods	-.533	-9.96	0.000	1.78
Breakfast cereals	.000	0.00	0.999	1.67
Dairy products	-.148	-2.59	0.010	1.66
Edible oils	.675	13.44	0.000	1.61
Processed fruit and vegetables	.833	14.05	0.000	1.46
Processed meat and seafood	.430	7.63	0.000	1.51
Ready meals	.535	9.00	0.000	1.64
Rice pasta and noodles	.731	14.80	0.000	1.71
Snacks	-.307	-5.98	0.000	1.78
Soups	-.455	-7.72	0.000	1.58
Spreads	.428	8.27	0.000	1.73
N=8760; F=414.98; R ² =.459				

Table 22: Regression equation 5 without the top 5% of observations

B.2 Output of the regression equations with private label growth

Equation (1)				
Variable	β	T	P-value	VIF
Constant	1.098	842.63	0.000	
ln_GDP	.000	.076	0.444	14.09
Emerging	-.001	-0.46	0.642	354.10
ln_GDP*Emerging	.000	0.40	0.686	306.27
Control variables				
Africa	.001	3.61	0.000	2.24
Asia	.000	2.62	0.009	5.99
Central America	.000	2.91	0.004	2.78
Eastern Europe	.000	2.50	0.012	4.64
North America	.000	2.08	0.037	1.10
Oceania	-.006	-6.05	0.000	1.10
South America	.000	-1.03	0.303	4.16
Baked goods	.000	-1.84	0.066	1.79
Breakfast cereals	.000	-2.77	0.006	1.68
Dairy products	-.001	-5.41	0.000	1.66
Edible oils	.000	-4.34	0.000	1.67
Processed fruit and vegetables	.000	-4.81	0.000	1.53
Processed meat and seafood	.000	-2.71	0.007	1.57
Ready meals	.000	-6.40	0.000	1.73
Rice pasta and noodles	.000	-5.51	0.000	1.75
Snacks	.000	-5.42	0.000	1.79
Soups	.000	0.002	0.982	1.58
Spreads	.000	-1.20	0.232	1.75
N=8430; F=18.13; R ² =.029				

Table 23: Output of equation 1 with private label share growth

Equation (2)				
Variable	β	T	P-value	VIF
Constant	1.097	1674.45	0.000	
ln_GDP	.000	.076	0.045	3.34
Developed	.001	-0.46	0.642	354.10
ln_GDP*Developed	.000	0.40	0.686	397.99
Control variables				
Africa	.001	3.61	0.000	2.24
Asia	.000	2.62	0.009	5.99
Central America	.000	2.91	0.004	2.78
Eastern Europe	.000	2.50	0.012	4.64
North America	.000	2.08	0.037	1.10
Oceania	-.006	-6.05	0.000	1.10
South America	.000	-1.03	0.303	4.16
Baked goods	.000	-1.84	0.066	1.79
Breakfast cereals	.000	-2.77	0.006	1.68
Dairy products	-.001	-5.41	0.000	1.66
Edible oils	.000	-4.34	0.000	1.67
Processed fruit and vegetables	.000	-4.81	0.000	1.53
Processed meat and seafood	.000	-2.71	0.007	1.57
Ready meals	.000	-6.40	0.000	1.73
Rice pasta and noodles	.000	-5.51	0.000	1.75
Snacks	.000	-5.42	0.000	1.79
Soups	.000	0.002	0.982	1.58
Spreads	.000	-1.20	0.232	1.75
N=8430; F=18.13; R ² =.029				

Table 24: Output of equation 2 with private label share growth

Equation (3)				
Variable	B	T	P-value	VIF
Constant	1.099	26000	0.000	
Contraction	.000	0.62	0.535	1.09
Expansion	.000	-2.28	0.023	1.23
Control variables				
Baked goods	.000	-1.80	0.078	1.79
Breakfast cereals	.000	-2.42	0.016	1.68
Dairy products	.000	-5.35	0.000	1.65
Edible oils	.000	-4.29	0.000	1.67
Processed fruit and vegetables	.000	-4.88	0.000	1.53
Processed meat and seafood	.000	-2.74	0.006	1.57
Ready meals	.000	6.17	0.000	1.73
Rice pasta and noodles	.000	-5.48	0.000	1.75
Snacks	.000	-5.46	0.000	1.79
Soups	.000	0.75	0.456	1.58
Spreads	.000	-1.09	0.275	1.75
Africa	.000	3.32	0.001	1.12
Asia	.000	2.97	0.003	1.60
Central America	.000	2.08	0.038	1.19
Eastern Europe	.000	3.08	0.002	1.55
Northern America	.000	2.57	0.010	1.10
Oceania	.000	-5.75	0.000	1.12
South America	.000	-3.21	0.001	1.42
N=8430; F=19.21; R ² =.028				

Table 25: Output of equation 3 with private label share growth

	Equation (4)			
Variable	B	T	P-value	VIF
Constant	1.099	27000.00	0.000	
Emerging	0.000	-1.47	0.141	6.31
Contraction	0.000	1.21	0.225	1.99
Contraction*Emerging	0.000	-0.39	0.695	2.21
Expansion	0.000	-2.22	0.027	2.65
Expansion*Emerging	0.000	-0.04	0.967	3.75
Control variables				
Baked goods	0.000	-1.88	0.061	1.79
Breakfast cereals	0.000	-2.49	0.013	1.68
Dairy products	0.000	-5.36	0.000	1.66
Edible oils	0.000	-4.31	0.000	1.67
Processed fruit and vegetables	0.000	-4.81	0.000	1.53
Processed meat and seafood	0.000	-2.72	0.007	1.57
Ready meals	0.000	-6.22	0.000	1.73
Rice pasta and noodles	0.000	-5.49	0.000	1.75
Snacks	0.000	-5.42	0.000	1.79
Soups	0.000	0.30	0.764	1.58
Spreads	0.000	-1.10	0.272	1.75
Africa	0.000	2.82	0.005	1.87
Asia	0.000	3.00	0.003	4.61
Central America	0.000	2.50	0.013	2.33
Eastern Europe	0.000	5.66	0.000	1.74
Northern America	0.000	2.55	0.011	1.11
Oceania	0.001	-5.82	0.000	1.14
South America	0.000	-0.96	0.335	3.37
	N=8430; F=16.73; R ² =.028			

Table 26: Output of equation 4 with private label share growth

	Equation (5)			
Variable	B	T	P-value	VIF
Constant	1.099	6471.66	0.000	
Developed	0.000	1.47	0.141	6.31
Contraction	0.000	0.03	0.977	2.44
Contraction*Developed	0.000	0.39	0.695	2.49
Expansion	0.000	-1.37	0.171	2.33
Expansion*Developed	0.000	0.04	0.967	2.48
control variables				
Baked goods	0.000	-1.88	0.061	1.79
Breakfast cereals	0.000	-2.49	0.013	1.68
Dairy products	0.000	-5.36	0.000	1.66
Edible oils	0.000	-4.31	0.000	1.67
Processed fruit and vegetables	0.000	-4.81	0.000	1.53
Processed meat and seafood	0.000	-2.72	0.007	1.57
Ready meals	0.000	-6.22	0.000	1.73
Rice pasta and noodles	0.000	-5.49	0.000	1.75
Snacks	-0.001	-5.42	0.000	1.79
Soups	0.000	0.30	0.764	1.58
Spreads	0.000	-1.10	0.272	1.75
Africa	0.000	2.82	0.005	1.87
Asia	0.000	3.00	0.003	4.61
Central America	0.000	2.50	0.013	2.33
Eastern Europe	0.000	5.66	0.000	1.74
Northern America	0.000	2.55	0.011	1.11
Oceania	- 0.001	-5.82	0.000	1.14
South America	0.000	-0.96	0.335	3.37
	N=8430; F=16.73; R ² =.028			

Table 27: Output of equation 5 with private label share growth

B.3 Output of the regression equations including a trend variable

Year	General	Developed countries	Emerging countries	Africa	Asia	Central America	Eastern Europe	North America	Oceania	Western Europe
2004	8.91	13.03	3.49	5.47	3.98	2.75	4.88	14.19	7.89	19.3
2005	9.31	13.52	3.76	7.08	4.11	2.98	5.43	14.33	7.91	19.84
2006	9.69	14.02	3.98	7.77	4.3	3.12	6.01	14.22	8.55	20.32
2007	10.10	14.54	4.25	8.01	4.57	3.74	6.79	14.3	8.77	20.69
2008	12.70	18.51	5.61	11.39	5.99	5.90	8.93	16	11.77	26.85
2009	12.95	19.41	5.60	11.77	5.51	5.67	9.62	16.8	12.63	27.98
2010	13.39	20.15	5.81	13.07	5.81	5.87	10.29	16.95	13.29	28.66
2011	13.89	20.84	6.12	14.23	6.05	5.95	10.99	17.17	14.43	29.29
2012	14.30	21.53	6.29	14.52	6.29	6.01	11.69	17.11	15.3	29.92
2013	14.63	22.04	6.46	14.96	6.5	6.05	12.2	17.11	16.14	30.33
2014	14.93	22.4	6.65	13.29	6.84	6.06	12.64	17.09	16.97	30.62
2015	15.12	22.54	6.86	13.67	7.08	6.10	12.89	16.99	17.35	30.71
2016	15.17	22.66	6.82	13.97	6.77	6.12	13.09	17	17.67	30.88
2017	15.27	22.79	6.88	14.18	6.77	6.13	13.25	17.18	17.83	30.99

Table 28: Private label growth trend 2004-2017

Variable	Equation (1)			
	β	T	P-value	VIF
Constant				
ln_GDP	.373	9.21	.000	14.69
Emerging	-.569	-1.27	.204	342.80
ln_GDP*Emerging	-.086	-1.86	.063	294.37
Control variables				
ln_Trend	.301	16.80	.000	1.14
Africa	.795	7.71	.000	2.29
Asia	-.551	-.551	.000	6.01
Central America	-.013	-.013	.861	2.78
Eastern Europe	-.734	-.735	.000	4.78
North America	-.440	-.441	.000	1.10
Oceania	-.705	-.705	.000	1.10
South America	-.133	-.133	.000	4.17
Baked goods	-.541	-10.65	.000	1.79
Breakfast cereals	-.027	-0.50	.617	1.68
Dairy products	-.215	-3.80	.000	1.67
Edible oils	.704	15.80	.000	1.67
Processed fruit and vegetables	.750	14.99	.000	1.57
Processed meat and seafood	.414	7.75	.000	1.60
Ready meals	.680	12.15	.000	1.74
Rice pasta and noodles	.702	15.58	.000	1.76
Snacks	-.314	-6.46	.000	1.79
Soups	-.486	-8.77	.000	1.59
Spreads	.422	8.64	.000	1.75
N=9219; F=551.84; R ² =.537				

Table 29: Regression equation 1 including ln_Trend

Variable	Equation (2)			
	β	T	P-value	VIF
Constant	2.520	12.19	.000	
ln_GDP	.287	12.52	.000	3.46
Developed	.575	1.27	.204	342.80
ln_GDP*Developed	.086	1.86	.063	384.54
Control variables				
ln_trend	.302	-10.65	.000	1.14
Africa	.795	.71	.000	2.29
Asia	-.551	-9.60	.000	6.01
Central America	-.013	-0.17	.861	2.78
Eastern Europe	-.735	-15.85	.000	4.78
North America	-.441	-13.02	.000	1.10
Oceania	-.705	-21.26	.000	1.10
South America	-.133	-1.96	.050	4.17
Baked goods	-.541	-10.65	.000	1.79
Breakfast cereals	-.027	-0.50	.617	1.68
Dairy products	-.215	-3.80	.000	1.67
Edible oils	.704	15.80	.000	1.67
Processed fruit and vegetables	.750	14.99	.000	1.57
Processed meat and seafood	.414	7.75	.000	1.67
Ready meals	.681	12.15	.000	1.74
Rice pasta and noodles	.702	15.58	.000	1.76
Snacks	-.315	-6.46	.000	1.79
Soups	-.486	-8.77	.000	1.59
Spreads	.421	8.64	.000	1.75
N=9219; F=551.84; R ² =.531				

Table 30: Regression equation 2 including ln_Trend

Variable	Equation (3)			
	β	T	P-value	VIF
Constant	6.91	130.40	.000	
Contraction	.024	0.62	.535	1.10
Expansion	-.166	-5.56	.000	1.29
control variables				
ln_trend		17.88	.000	1.08
Baked goods	-.522	-9.60	.000	1.79
Breakfast cereals	.026	.044	.663	1.68
Dairy products	-.170	-2.76	.006	1.67
Edible oils	.716	14.22	.000	1.67
Processed fruit and vegetables	.746	13.21	.000	1.57
Processed meat and seafood	.405	6.94	.000	1.60
Ready meals	.747	12.49	.000	1.74
Rice pasta and noodles	.710	13.71	.000	1.76
Snacks	-.334	-5.93	.000	1.79
Soups	-.380	-6.43	.000	1.58
Spreads	.436	8.04	.000	1.75
Africa	-1.412	16.20	.000	1.13
Asia	-2.206	-64.23	.000	1.62
Central America	-2.034	-42.56	.000	1.19
Eastern Europe	-1.430	-45.28	.000	1.59
Northern America	-.399	-11.79	.000	1.10
Oceania	-.684	-18.50	.000	1.12
South America	-2.022	-47.83	.000	1.44
N=9219; F=523.79; R ² adjusted=.454				

Table 31: Regression equation 3 including ln_Trend

Variable	Equation (4)			
	β	T	P-value	VIF
Constant	6.923	142.30	.000	
Emerging	-1.868	-32.71	.000	6.28
Contraction	-.114	-3.08	.002	2.29
Contraction*Emerging	.273	3.68	.000	2.08
Expansion	-.263	-8.09	.000	2.76
Expansion*Emerging	.228	4.18	.000	3.76
Control variables				
ln_Trend	.356	19.93	.000	1.08
Baked goods	-.545	-10.50	.000	1.79
Breakfast cereals	.004	0.07	.947	1.68
Dairy products	-.191	-3.36	.001	1.67
Edible oils	.707	15.38	.000	1.67
Processed fruit and vegetables	.755	14.55	.000	1.57
Processed meat and seafood	.427	7.87	.000	1.60
Ready meals	.717	12.59	.000	1.74
Rice pasta and noodles	.714	15.40	.000	1.76
Snacks	-.306	-6.07	.000	1.79
Soups	-.465	-8.21	.000	1.59
Spreads	-.465	-8.21	.000	1.75
Africa	.366	3.64	.000	1.89
Asia	-.571	-10.33	.000	4.63
Central America	-.249	-3.55	.000	2.31
Eastern Europe	-1.091	-40.66	.000	1.80
Northern America	-.377	10.73	.000	1.11
Oceania	-.642	17.06	.000	1.15
South America	-.275	-4.14	.000	3.36
N=9219; F=513.37; R ² =.520				

Table 32: Regression equation 4 including ln_Trend

Equation (5)				
Variable	β	T	P-value	VIF
Constant	5.055	67.51	.000	
Developed	1.868	32.71	.000	6.28
Contraction	.159	2.47	.014	2.34
Contraction*developed	-.273	-3.68	.000	2.39
Expansion	-.035	-0.79	.428	2.36
Expansion*developed	-.228	-4.18	.000	2.58
Control variables				
ln_Trend	.356	19.93	.000	1.08
Baked goods	-.545	-10.50	.000	1.79
Breakfast cereals	.004	0.07	.947	1.68
Dairy products	-.191	-3.36	.001	1.67
Edible oils	.707	15.38	.000	1.67
Processed fruit and vegetables	.755	14.55	.000	1.57
Processed meat and seafood	.427	7.87	.000	1.60
Ready meals	.717	12.59	.000	1.74
Rice, pasta, and noodles	.714	15.40	.000	1.76
Snacks	-.306	-6.07	.000	1.79
Soup	-.465	-8.21	.000	1.59
Spreads	.434	8.78	.000	1.75
Africa	.366	3.64	.000	1.89
Asia	-.571	-10.33	.000	4.63
Central America	-.249	-3.55	.000	2.31
Eastern Europe	-1.091	-40.66	.000	1.80
Northern America	-.377	-10.73	.000	1.11
Oceania	-.642	-17.06	.000	1.15
South America	-.275	-4.14	.000	3.36
N=9219; F=513.37; R ² adjusted=.520				

Table 33: Regression equation 5 including ln_Trend

B.4 Output of the regression equations using different base regions and categories

Variable	Equation (1)			
	β	T	P-value	VIF
Constant	.866	1.86	0.062	
Ln_GDP	.548	12.49	0.000	13.85
Emerging	.506	1.09	0.278	335.46
Ln_GDP*Emerging	-.186	-3.89	0.000	289.41
Control variables				
Africa	1.436	12.99	0.000	3.23
Asia	-.018	-0.26	0.794	10.53
Central America	.582	7.10	0.000	4.17
Eastern Europe	-.076	-1.36	0.173	9.39
Oceania	-.239	-5.62	0.000	1.92
South America	.429	5.64	0.000	6.70
Western Europe	.451	14.22	0.000	6.22
Baked goods	-.042	-0.70	0.482	2.20
Breakfast cereals	.460	7.40	0.000	2.02
Dairy products	.305	4.74	0.000	2.00
Edible oils	1.199	21.84	0.000	2.01
Processed fruit and vegetables	1.347	23.06	0.000	1.83
Processed meat and seafood	1.009	16.37	0.000	1.88
Ready meals	1.164	18.17	0.000	2.11
Rice pasta and noodles	1.217	22.05	0.000	2.15
Sauces, dressings, and condiments	.488	8.58	0.000	2.22
Snacks	.173	3.02	0.003	2.20
Spreads	.910	15.61	0.000	2.13
N=9219; F=550.39; R ² =.514				

Table 34: Regression equation 1 using North America and Soups as base case

Variable	Equation (2)			
	β	T	P-value	VIF
Constant	1.373	6.42	0.000	
Ln_GDP	.362	15.80	0.000	33.31
Developed	-.506	-1.09	0.278	335.46
Ln_GDP*Developed	.186	3.89	0.000	378.06
Control variables				
Africa	1.436	12.99	0.000	3.23
Asia	-.018	-0.26	0.794	10.53
Central America	.582	7.10	0.000	4.17
Eastern Europe	-.076	-1.36	0.173	9.39
Oceania	-.239	-5.62	0.000	1.92
South America	.429	5.64	0.000	6.70
Western Europe	.451	14.22	0.000	6.22
Baked goods	-.042	-0.70	0.482	2.20
Breakfast cereals	.460	7.40	0.000	2.02
Dairy products	.305	4.74	0.000	2.00
Edible oils	1.199	21.84	0.000	2.01
Processed fruit and vegetables	1.347	23.06	0.000	1.83
Processed meat and seafood	1.009	16.37	0.000	1.88
Ready meals	1.164	18.17	0.000	2.11
Rice pasta and noodles	1.217	22.05	0.000	2.15
Sauces, dressings, and condiments	.488	8.58	0.000	2.22
Snacks	.173	3.02	0.003	2.20
Spreads	.910	15.61	0.000	2.13
N=9219; F=550.39; R ² =.514				

Table 35: Regression equation 2 using North America and Soups as base case

Equation (3)				
Variable	β	T	P-value	VIF
Constant	6.774	125.32	0.000	
Contraction	-.002	-0.06	0.953	1.10
Expansion	-.273	-8.95	0.000	1.24
Control variables				
Africa	-.986	-10.67	0.000	2.04
Asia	-1.768	-41.13	0.000	5.89
Central America	-1.600	-28.62	0.000	2.53
Eastern Europe	-1.000	-24.01	0.000	6.05
Oceania	-.262	-5.69	0.000	1.92
South America	-1.576	-32.14	0.000	3.81
Western Europe	.384	11.83	0.000	6.25
Baked goods	-.133	-2.18	0.029	2.19
Breakfast cereals	.410	6.33	0.000	2.01
Dairy products	.253	3.79	0.000	2.00
Edible oils	1.101	18.96	0.000	2.01
Processed fruit and vegetables	1.257	20.20	0.000	1.83
Processed meat and seafood	.916	14.31	0.000	1.87
Ready meals	1.129	17.16	0.000	2.10
Rice pasta and noodles	1.124	19.09	0.000	2.14
Sauces, dressings and condiments	.377	6.17	0.000	2.21
Snacks	.047	0.76	0.450	2.19
Spreads	.819	13.34	0.000	212
N=8760; F=425.08; R ² =.385				

Table 36: Regression equation 3 using North America and Soups as base case

Equation (4)				
Variable	β	T	P-value	VIF
Constant	6.849	166.95	.000	
Emerging	-1.872	-30.64	.000	6.28
Contraction	-.165	-4.47	.000	2.07
Contraction*emerging	.327	4.38	.000	2.29
Expansion	-.408	-11.80	.000	2.68
Expansion*emerging	.295	5.21	.000	3.75
Control variables				
Africa	.750	6.98	0.000	2.78
Asia	-.177	-2.73	0.006	8.82
Central America	.141	1.79	0.074	3.62
Eastern Europe	-.684	-17.40	0.000	6.19
Oceania	-.234	-4.97	0.000	1.93
South America	.120	1.61	0.107	5.72
Western Europe	.355	10.52	0.000	6.28
Baked goods	-.073	-1.19	0.234	2.19
Breakfast cereals	.472	7.50	0.000	2.02
Dairy products	.317	4.96	0.000	2.00
Edible oils	1.174	20.82	0.000	2.01
Processed fruit and vegetables	1.354	22.49	0.000	1.83
Processed meat and seafood	1.025	16.45	0.000	1.88
Ready meals	1.183	18.19	0.000	2.11
Rice pasta and noodles	1.214	21.49	0.000	2.14
Sauces, dressings and condiments	.460	7.85	0.000	2.22
Snacks	.158	2.67	0.000	2.20
Spreads	.899	15.21	0.000	2.13
N=9219; F=414.98; R ² =.459				

Table 37: Regression equation 4 using North America and Soups as base case

Variable	Equation (5)			
	B	T	P-value	VIF
Constant	4.886	59.86	.000	
Developed	1.872	30.64	.000	2.33
Contraction	.162	2.50	.013	2.34
Contraction*Developed	-.327	-4.38	.000	2.39
Expansion	-.113	-2.52	.012	2.33
Expansion*Developed	-.295	-5.21	.000	2.57
Control variables				
Africa	.750	6.98	0.000	2.78
Asia	-.177	-2.73	0.006	8.82
Central America	.141	1.79	0.074	3.62
Eastern Europe	-.684	-17.40	0.000	6.19
Oceania	-.234	-4.97	0.000	1.93
South America	.120	1.61	0.107	5.72
Western Europe	.355	10.52	0.000	6.28
Baked goods	-.073	-1.19	0.234	2.19
Breakfast cereals	.472	7.50	0.000	2.02
Dairy products	.317	4.96	0.000	2.00
Edible oils	1.174	20.82	0.000	2.01
Processed fruit and vegetables	1.354	22.49	0.000	1.83
Processed meat and seafood	1.025	16.45	0.000	1.88
Ready meals	1.183	18.19	0.000	2.11
Rice pasta and noodles	1.214	21.49	0.000	2.14
Sauces, dressings and condiments	.460	7.85	0.000	2.22
Snacks	.158	2.67	0.008	2.20
Spreads	.899	15.21	0.000	2.13
	N=9219; F=508.71; R ² =.496			

Table 38: Regression equation 5 using North America and Soups as base case