FACULTY OF ECONOMICS AND BUSINESS



**Identifying important consumer segments for predicting Belgian retail sales**

Master in het management

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# Abstract

Since the recent financial crisis of 2007-2008, a renewed interest in consumer confidence on consumption has occurred. The role of confidence for economic activity has increased considerably and forecasters are eager to study the information content as well as the predictive power of confidence indicators for future macroeconomic developments. Despite the popularity and attention of consumer confidence measures, the outcomes of empirical studies attempting to uncover an effect of consumer sentiment on future consumption are mixed.

This master thesis attempts to gain more insight in this effect by identifying informative and non-informative consumer segments for predicting Belgian retail sales. Besides the identification of important segments, consumer sentiment survey questions that contain most valuable information for predicting Belgian retail sales are determined in the same way.

Detailed data on the economic sentiment of consumers with different characteristics is used, such as gender, profession, income etc. instead of the use of aggregated data. Regression analysis makes it possible to investigate the predictive power of these sentiment indicators. Within this study, the group lasso method is employed to identify the important segments and questions.

For the first research question, it is observed that one sub-segment of profession and two sub-segments of employment belong to the three most important segments. In fact, employees, full-time workers and part-time workers have the most predictive power for Belgian retail sales. The second research question indicates that several survey questions demonstrate more predictive power than others, which is in accordance with Bram and Ludvigson (1998). Examples are questions about the economic situation in the past year or the financial perspectives for the upcoming year.

# 1. Introduction

The analysis of the impact of consumer attitudes on consumer consumption has been a domain of sustained interest in the macroeconomic literature. Recently, more and more attention by scholars is given to measures of consumer attitudes, referred to as consumer confidence. More specifically, the recent financial crisis of 2007-2008 can be viewed as the main driver of this renewed widespread interest, because consumer confidence had undergone a major drop during that crisis. As a result, the role of confidence for economic activity has considerably increased in that forecasters are keen to study the information content as well as the predictive power of confidence indicators for future macroeconomic developments. In fact, a growing body of evidence indicates that consumer confidence might contribute to fluctuations in economic activity. It seems that consumers’ degree of confidence has an impact on perceived upcoming uncertainty. The higher their confidence, the lower their view of uncertainty. Consequently, they would be more willing to reduce their savings and increase their expenditures.

However, the link between consumer confidence and future economic activity leads to mixed results in the literature. Whereas many researchers perceive a significant effect of consumer sentiment on actual consumption, other scholars fail to find such an impact. One reason for this contradiction is the fact that every scholar uses different intervening variables, techniques and time periods in his research. In addition, only aggregated data is used within these studies, which is seen as a critical limitation. The reason is that aggregated data summarizes economic relevant activities in a general way and loses information when translating this to consumer segments.

Due to the mixed evidence in the literature with regard to the usefulness of consumer sentiment indexes for the prediction of future spending, this experimental research attempts to gain more insight by identifying informative and non-informative consumer segments and survey questions for predicting Belgian retail sales. We use detailed data on the economic sentiment of consumers with different characteristics, such as gender, profession, etc. instead of aggregated data. To identify important segments and important questions that contain most valuable information for predicting retail sales, the group lasso method is employed. The group lasso estimator will put either all coefficients of a certain group to zero or none. By defining the groups to contain either all sentiment indicators of a certain segment, or all respondent answers to a particular survey question, it is possible to determine the most essential segments and questions respectively. Indeed, important groups are those whose coefficients are estimated as non-zero.

The present paper is structured as follows. Section 2 provides an in-depth literature review in which consumer confidence itself and its impact on future consumption are analysed. To answer the two established research questions, data from a consumer sentiment survey and from retail sales in Belgium are used, as described in section 3. In section 4, the applied method is explained. Furthermore, the main findings are described in section 5. Finally, a discussion is provided in section 6 with some limitations and implications for future research.

# 2. Literature review

## 2.1 Consumer confidence

Consumer confidence or consumer sentiment, developed within the domain of behavioral economics, can be described as consumers’ personal evaluations of the economy’s current situation and their predictions about its future forecasts. This dynamic concept shows that consumers could be optimistic about the economic situation, but they could be equally pessimistic on the moment when the economic situation turns out to be bad, such as a recession (Kellstedt, Linn & Hannah, 2015).

### 2.1.1 The view on consumer confidence

Since the 1990-1991 US recession, the view about consumer sentiment has changed. Blanchard (1993) has investigated the consumption level and the US recession of 1990-1991. He states that no obvious, objective cause for this recession exists. So he claims that it has been related to large negative consumption. In fact, Blanchard interprets this negative consumption in two ways. In the first way, this negative consumption has been the result of the anticipation by consumers towards other shocks and their effects on future income. Within the second possible interpretation, the consumption drop has been due to “animal spirits”, which are reflections on changes in short-term or long-term preferences (Blanchard, 1993). Although the reason for the drop in consumer sentiment remains unclear, this decline is considered as the explanation for the decline of consumer expenditures.

This evidence has led researchers to analyze the link between consumer sentiment data and consumer expenses in more detail (Vuchelen, 2004). In this way, Batchelor and Dua (1998) have been driven to investigate the role of more qualitative indicators like consumer confidence, as economic analysts were incapable of forecasting the US downturn. They conclude that the 1990-1991 recession could have been predicted more accurately by having included information on consumer confidence, since an enormous drop in confidence occurred. In other words, they emphasize the contribution of this factor for the improvement of economic forecasts. It is worth mentioning, however, that sentiment does not automatically have to be seen as the reason for the occurrence of a recession, it could simply anticipate or go along with a downturn (Throop, 1992). Moreover, even though the scope of the recession of 1990-1991 has been relatively moderate, some experts do believe that consumers became worried due to the spread of negative news reports as a result of which consumption decreased. So it is quite clear that the manner in which media represent fluctuations in economic conditions does have an impact on consumers’ perceptions (Starr, 2012).

Surprisingly though, consumer sentiment still tends to be a variable that is not well comprehended. For this reason, using consumer sentiment is seen as somewhat risky by certain skeptical researchers. As a result, mixed outcomes arise about the usefulness of consumer sentiment, leading to two different visions about the information content of this variable. Where the first perspective perceives consumer sentiment as an uncomplicated factor that solely reveals the responses from a survey, the second perspective maintains that consumer sentiment can be perceived as an intermediate factor that is influenced by other variables than purely economic and financial ones. In particular, this factor integrates the subjective mood of buyers as well, causing complications to the clarification of consumer sentiment by the already known economic and financial variables. This last vision is in conformity with Katona’s view (Vuchelen, 2004).

### 2.1.2 The reason of using consumer confidence data

So it is quite obvious that some agreement exists that consumer sentiment could have an impact on consumer expenditures. Nonetheless, the significance of confidence is being underestimated by the literature. In order to improve the quality of consumption forecasts, analysts could include psychological factors such as confidence, next to other economic and financial variables like interest rates for example. In this way, a renewed attention has occurred to include confidence in economics since the recent financial and economic crisis (de Bondt & Schiaffi, 2015). In particular, consumer confidence has undergone a major drop during that crisis. As a result, the role of confidence for economic activity has considerably increased in that analysts are eager to examine the predictive power and the information content of confidence indicators (Horvath, 2012).

### 2.1.3 The method of measurement

George Katona can be viewed as one of the first academics that made use of surveys as a measurement for consumer sentiment in the 1950s. Because of his pioneer work, in which he claimed to link economics to psychology, other countries as well were able to measure consumers’ willingness to consume by means of detailed consumer surveys. Katona’s theory of willingness to buy makes the crucial difference between a household’s ability and its willingness to buy, both of which determine consumers’ expenditures. While ability implies objective elements like received income or possessions, willingness involves subjective parameters such as a state of mind or an attitude. Nevertheless, his theory stipulates that the buying behavior of consumers both depends on objective and subjective conditions. The interaction between these two indicates the possibility of independent changes between the factors. So even if consumers’ ability would not change, consumption could still fluctuate because of changing attitudes of consumers (Roos, 2008). Katona claims that political and economic happenings could have an impact on these attitudes, as a result of which they could be related to economic factors quite unpredictably (Throop, 1992).

The fundamental distinction between ability and willingness demonstrates the bias between the beliefs of noneconomists about economically relevant activities on the one hand and economists’ modern economic theory on the other hand. The first group, like politicians or analysts, reasons that economic changes are directed by psychological or subjective factors. By contrast, the second group ignores subjective variables, as it attempts to clarify economic fluctuations in terms of real objective variables (Roos, 2008). Roos (2007) mentions that their contrasting visions of this globe differ for the sphere of economy, as well as for other domains. Even though it may seem rather irrelevant to consider nonexperts’ economic beliefs, these nonprofessionals are often privileged to decide about economically important policy issues like tax policy for example. Nonetheless, their beliefs about the economy are not well known by experts.

In accordance with Katona’s theory, Roos’ empirical investigation (2008) reveals that the subjective determinant ‘willingness to buy’ has an influence on actual consumption behavior, distinct from income considerations. In other words, future spending can be forecasted by the expected change in households’ willingness to consume in certain European countries, even after controlling for the expected income change. Throop (1992) agrees that consumers’ willingness seems to be an unpredictable independent factor, which has an impact on future expenditure. Nevertheless, it is worth mentioning that objective elements still play a significant role in economic behavior, next to subjective aspects. Consumers can be seen as quite rational individuals with limited resources for consumption, but are nonetheless influenced by their emotions and attitudes (Roos, 2008).

## 2.2 Predictive power

The assumption that consumer sentiment might contribute to fluctuations in economic activity has been investigated by a growing number of studies. In fact, the degree of confidence affects perceived uncertainty about the future. The higher consumers’ confidence, the lower the perception of uncertainty. As a result, they would be more willing to diminish their precautionary savings and increase their spending (de Bondt & Schiaffi, 2015). By contrast, pessimistic consumers would save their money by postponing their consumption until a later moment in time (Gelper, Lemmens & Croux, 2007). It is important to emphasize here that spending can only be predicted by confidence in the short run, because confidence is a relatively changing variable. So the view of continuously confident consumers does not exist (Al‐eyd, Barrell & Davis, 2009).

It is noticeable that the results in the literature seem to be mixed. Whereas many researchers find an effect of consumer sentiment on actual consumption, some studies do not provide evidence of this direction.

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### 2.2.1 Evidence of impact

First, Carroll et al. (1994) observe that lagged consumer sentiment has considerable predictive power in forecasting variations in household expenditures. Likewise, the findings of Matsusaka and Sbordone (1995) confirm the statement above, claiming that Granger causality is running from consumer sentiment to aggregate output. Similarly, the analysis of Bram and Ludvigson (1998) shows a positive relation between consumer sentiment and future changes in consumer spending. Nonetheless, their research reveals that the structure of a particular survey influences the degree of forecasting power, such as differences in the survey questions and in sample sizes. As a result, the Conference Board’s Consumer Confidence Index serves as a better predictor for total personal consumer spending than the University of Michigan’s Consumer Sentiment Index for the reason that it leads to more accurate forecasts. Moreover, the results of the research of Howrey (2001) indicate the statistically significant effect of confidence on future growth of GDP. Additionally, Ludvigson (2004) concludes as well that consumer sentiment measures have predictive power for future consumption.

Furthermore, the empirical analysis of Taylor and McNabb (2007) demonstrates that consumer confidence indicators do have a role in forecasting the probability of economic downturns, which are distinct turning points in the business cycle. This means that a certain increase in consumer confidence is able to make it less likely that a significant decline in economic activity will occur. Besides their findings, they emphasize their proposition of adding confidence indicators to macroeconomic models and forecasts. In the same way, Wilcox’s research (2007) reveals that consumer sentiment indexes are able to diminish errors of consumption forecasts. Not only expenditures on durables, but also expenditures on non-durables and services are forecasted more accurately. In contrast, the results of Adrangi and Macri (2011) indicate that consumer confidence seems to contain predictive power in the short and long run period for expenditures, solely on durable goods. No significant relationship was found between consumer confidence and consumption expenditures on services and non-durables. In addition, Qiao, McAleer, and Wong (2009) underline the usefulness of consumer attitudes in forecasting consumption in the United States. Equally, Starr (2012) discovers that shocks to consumer sentiment and news shocks have a slight significant effect on consumer consumption. News shocks can be defined as unreasonably portrayed positive or negative changes in economic conditions by the media, in contrast to real quantitative measures of economic conditions.

More recently, Dées and Brinca (2013) find out that consumer confidence is able to explain household consumption in the euro area and the United States, especially during periods of sizable confidence shocks in household survey indicators such as a financial crisis. A quite similar experiment is conducted by de Bondt and Schiaffi (2015). The outcomes of their study show that current real GDP growth is always influenced by confidence, in both the euro area and the United States. In other words, confidence is of importance for economic growth in good and bad times, regardless of the phase of the business cycle. In addition, despite the possible overvaluation of the usefulness of confidence indicators, Bruno (2014) confirms its predictive power. Finally, Bruestle and Crain (2015) emphasize the effectiveness of the use of consumer confidence in predicting future spending more accurately. Nonetheless, they reveal that superior models exist to use consumer sentiment as a measure for forecasts.

### 2.2.2 Evidence of no impact

Besides the empirical studies above that show evidence of a significant predictive relationship between measures of consumer confidence and future economic developments, some researchers do not uncover this link. In some studies, the region determines the outcomes concerning the relationship between these two variables. In fact, the study of Fan and Wong (1998) uncovers that consumer confidence indexes in Hong Kong have little or no value in predicting consumption growth, unlike the American or British situation. Likewise, Garrett, Hernández-Murillo and Owyang (2005) have tested how well consumer sentiment could predict retail sales growth at the state level, in contrast to the national level. The results of their research reveal that sentiment measures are not able to predict state-level retail sales growth in an accurate way, contrary to the significant effect at the national level.

Furthermore, Garner (1991) concludes that the link between consumer confidence indexes and economic forecasting is rather weak. Additionally, Al‐eyd et al. (2009) emphasize the relatively limited role and information content of confidence indicators. Finally, Horvath (2012) claims that sentiment indicators are weak predictors of future spending, even though a clear correlation between these indicators and GDP growth exists.

As a summary, it is quite obvious that lots of research about consumer sentiment has been conducted. What makes it quite challenging to achieve a well-defined or general conclusion from the literature is the fact that every scholar utilizes diverse intervening variables, differing techniques and other periods of time. In addition, only aggregated data is used within these studies, which is an important limitation. In this present paper, detailed data on the economic sentiment of consumers with different characteristics, such as gender, profession, income, etc. is used. As the majority of studies confirm that consumer sentiment appears to have a statistically significant effect on consumption, this research aims to investigate this assumption in more detail.

# 3. Data

Detailed data on the economic sentiment of consumers with different characteristics (gender, profession, net household income,…) is used. A consumer sentiment survey with 12 questions is provided from the National Bank of Belgium, which can be found in the appendix. Consumer sentiment is based on the answers to these survey questions about the present and future financial position of households, the present and future economic condition, and the supposition of making large purchases. For each question, a balance of opinion indicator is calculated, which is the difference between the percentage of respondents with positive responses and the percentage reporting negative answers. So if the number of positive responses equals the number of negative responses, the balance of opinion for the question will be zero. Likewise, the balance of opinion will be greater than zero if more favourable than unfavourable answers occur. As response variables, monthly retail sales data from Belgium, running from January 1990 until May 2008, are chosen from Eurostat. These data points are seasonally and calendar adjusted data.

## 3.1 Segments

The six main segments involve income, profession, employment, education, age and gender. Each main segment consists of several sub-segments, with a total of 21 sub-segments. The first segment income exists of first income quartile, second income quartile, third income quartile and fourth income quartile. Secondly, profession comprises the self-employed, employees, skilled workers, unskilled workers, and people with other activities. Thirdly, employment includes full-time workers, part-time workers, and the unemployed. Within the fourth segment education, a distinction can be made between education primary school, education secondary school, and higher education. The fifth segment exists of ages between 16 and 29, between 30 and 49, between 50 and 64, and older than 65 years old. Finally, the last segment gender consists of the difference between men and women.

The 12 survey questions are given to each sub-segment, resulting in 252 sentiment indicators. These 252 observations are combined in one high-dimensional dataset. All these monthly time series are observed over 221 months (*T*= 221), i.e. from January 1990 till May 2008. Additionally, the 252 time series are grouped into blocks per sub-segment. This way, it is possible to investigate the difference in predictive power between the different segments. The first research question examines therefore whether some segments have more predictive power than other segments.

## 3.2 Questions

Within the consumer survey questionnaire, questions 6 and 7 can both be seen as an aggregate measure of households’ willingness to buy (Roos, 2008). Question 6 says: *“Major purchases such as furniture, electrical and electronic devices (for example a TV, a washing machine, a computer) or other durable* *goods, do you think now is a favorable or unfavorable moment for people to make such purchases, or nor favorable nor unfavorable?”* Within this question, two elements are of importance. Firstly, these purchases include exclusively durable goods. Throop (1992) and Adrangi and Macri (2011) mention that purchases of consumer durables are clearly affected by consumer sentiment, while no link exists between sentiment and spending on non-durables and services. Furthermore, durable goods can be more easily postponed, in comparison with non-durables. This makes it clear that consumers have diverse reasons for buying all these different goods (Gelper et al., 2007). Secondly, this question surveys whether or not it is a good moment to buy major household items. Apparently, the timing of a purchase plays a more vital role for consumers than the actual decision of buying.

Related to question 6 is question 7: *“Major purchases like furniture, electrical and electronic devices (for example a TV, a washing machine, a computer) or other durable* *goods, what do you (including your household) expect to spend over the next 12 months, compared to what you have spent over the last 12 months?”* Compared to the previous question, this query investigates consumers’ personal willingness to buy. Moreover, not a level but an expected change in their willingness to spend is inspected (Roos, 2008). Financial distress could play a part in this question, as Throop (1992) declares that consumers would decrease their expenditures on durables as soon as financial distress is more likely to occur.

Additionally, question 10 analyses the expected future income change of households. It says: *“What do you expect of the financial position of your household over the next 12 months?”* While this question should measure the ability, the previous question ought to measure the willingness to consume. That’s why it is important to verify that the answers on both questions reveal different information so that the statement of the essential difference between ability and willingness would be valid. In particular, Roos’ analysis (2008) reveals that changes in consumption could be predicted by aggregate information from consumers’ expected change in their willingness to spend, contrary to their expected financial position.

Finally, question 2 specifies what households anticipate about the evolution of the economic position of their country as a whole (Roos, 2008): *“How do you think the general economic situation in Belgium will develop over the next 12 months?”*.

Comparing this questionnaire with the well-known Michigan Survey, it is clear that question 6 is a present condition question in which respondents are asked to evaluate the current state of economy. Questions 2 and 10, by contrast, can be seen as expectations questions in which they need to answer statements about expected changes in business conditions and in their financial situation (Bram & Ludvigson, 1998).

The University of Michigan’s Survey consists of a number of questions about households’ evaluations of the current and upcoming economic conditions for themselves and the national economy (Wilcox, 2007). Wilcox (2007) mentions the different capacities of the separate survey questions to enhance the predictions of consumption expenditures. Whereas the Michigan survey contains five specific questions to be asked, the questionnaire in this dissertation uses 12 questions. Next to the 4 already mentioned questions above, i.e. question 2, question 6, question 7 and question 10, eight other questions are of importance. In contrast to question 2, question 1 asks respondents about the Belgian economic situation of the past year. While question 3 measures their assessment of the price development of the past 12 months, question 4 examines their evaluation of the price development for the upcoming 12 months. Furthermore, question 5 tests the household’s estimation of the development of unemployment in Belgium for the next year. In addition, question 8 looks at the household’s assessment of the evolution of their own financial situation from the past 12 months, whereas question 9 asks respondents to describe their current own financial situation in the best possible way. Within question 11, respondents are asked about their saving perspectives for the upcoming year. Finally, question 12 requests respondents to determine if it is currently a good period for savings, given the overall economical situation. Overall, the second research question attempts to examine whether some of these survey questions have more predictive power than others.

# 4. Method

Regression analysis makes it possible to investigate the predictive power of the sentiment indicators for Belgian retail sales. Since the number of sentiment indicators (*p*= 252) exceeds the time series length (*T*= 221), the standard least squares method is not computable. To cope with the high dimensionality of the dataset, we use the group lasso (least absolute shrinkage and selection operator) method, proposed by Yuan & Lin (2006), in which a regularization penalty is added to the least squares objective function to make estimates computable. Moreover, the group lasso method is used to identify important segments. The 252 sentiment indicators are divided into *G*= 21 groups, one for each segment. One group consists of all the 12 questions of a particular segment.

We consider the following regression model for $y\_{t}$, the Belgian retail sales at time 1 ≤ *t* ≤ *T*,

 $y\_{t} = α+ \sum\_{g=1}^{G}x\_{gt}^{t} β\_{g}+e\_{t}$ ,

where α is a constant term, the error term $e\_{t}$ is assumed to be normally distributed, $e\_{t}$ ~ *N* (0, σ2), and $ β\_{g}$ is an ng vector containing the coefficients of group g. Let $x\_{gt}$ ∈ ℜng denote the vector of ng= 12 time series containing the 12 sentiment indicators of group g.

The group lasso estimator is defined as

$ \hat{β}=argmin\_{β}\frac{1}{2n}\sum\_{t=1}^{T}(y\_{t}-\sum\_{g=1}^{G}x\_{gt}^{t} β\_{g})^{2}+λ \sum\_{g=1}^{G}\left‖ β\_{g}\right‖ $,

where λ > 0 is a sparsity parameter and $\left‖ .\right‖$ is the Euclidean norm. The group lasso estimator will put either all elements of $ \hat{β}\_{g}$ to zero or none. We identify the important groups as those groups for which $ \hat{β}\_{g}$≠ **0**, and unimportant groups for which$ \hat{β}\_{g}$= **0**. Finally, we choose the sparsity parameter λ in such a way that about half of the groups are identified as being important.

In the same way, the group lasso method is used to identify important questions. There are 12 questions and 21 answers for each question. In total, 252 answers are divided into 12 groups, where each group consists of one answer of each segment.

# 5. Results

## 5.1 Segments

The nine important segments that have predictive power for forecasting Belgian retail sales are first income quartile, fourth income quartile, self-employed, employees, skilled workers, full-time workers, part-time workers, higher education and women.

Within the segment of income, two sub-segments are found to contain predictive power for Belgian retail sales. While the first and the fourth income quartile can be identified as important segments, the second and the third income quartile are perceived as irrelevant categories. In other words, consumers in the highest and the lowest quartile seem to possess more explanatory power than consumers in the middle of the income quartile.

The type of profession also seems to be an indicator for Belgian retail sales, as three of the five sub-segments are identified as being important. Whereas the self-employed, employees and skilled workers do have incremental predictive power, unskilled workers and people with other activities do not contain information for predicting Belgian retail sales. This means that customers with a higher occupation are more essential to predict retail sales, compared to consumers with a lower career.

Likewise, within the segment of employment, two relevant sub-segments are detected. Full-time and part-time workers contain the most incremental predictive power for retail sales. The unemployed, however, do not have any power to predict Belgian retail sales. This outcome is comparable to the previous segment, in that consumers with work opportunities are more crucial for economic forecasts than consumers without work opportunities.

Furthermore, only one significant sub-segment of education is identified, which is higher education. Education on primary and secondary school do not contain any predictive power to predict Belgian retail sales. As a conclusion, the level of education is a vital indicator for the ability to forecast retail sales.

Similarly, gender is an important indicator of predicting Belgian retail sales, as women have more incremental predictive power compared to men. This means that the difference between men and women does have an impact. Finally, the segment age does not matter, as none of the sub-segments have any forecasting power.

By analyzing the segments in more detail, it is observable that one sub-segment of profession and two sub-segments of employment belong to the three most important segments. In fact, employees, full-time workers and part-time workers seem to have the most predictive power for Belgian retail sales. In this case, it is noticeable that these categories are more work-oriented segments.

Overall, as two of the three sub-segments of employment are part of the most essential segments, employment can be perceived as the most predictive one. The latter is thus the segment that contains most valuable information to forecast Belgian retail sales.

## 5.2 Questions

The six most predictive questions for Belgian retail sales are Q1: economic situation past 12 months, Q4: price development upcoming 12 months, Q5: development unemployment next 12 months, Q8: evolution own financial situation past 12 months, Q10: financial perspectives upcoming 12 months, and Q12: currently a good period for savings.

Two of the six crucial questions handle about the past year, whereas three questions concern the upcoming year. Bram and Ludvigson (1998) call these expectations questions, as consumers must answer statements about expected changes in the future. Only one question handles about the current economic situation, which is called a present condition question (Bram & Ludvigson, 1998).

It is interesting to notice a contradiction of the predictive power of questions with the same content, between two different time periods. In fact, the first question about the economic situation of the past 12 months exhibits more predictive power than question two that asks respondents’ assessment of the economic situation for the upcoming 12 months. By contrast, question 4 asking about the price development for the upcoming year seems to be more predictive than question 3, which asks about the price development for the past year. In other words, no consistency exists between the past and the future, as both periods can be predictive depending on the question used. In addition, the question that asks respondents about the evolution of their own financial position over the last 12 months (question 8) is more predictive than the question that asks them to describe their current financial position (question 9). Hence, the question about the past has more potential than the one about the present to predict Belgian retail sales.

Moreover, differences in predictive power exist between questions with different content, but within the same time perspective. For the current period, it seems that question 12 that gauges if now is a good period for savings has more forecasting power than question 6 that asks respondents if now is a good period for large purchases. Nonetheless, for the future, question 10 that asks respondents about their financial perspectives over the next 12 months is more predictive than question 11 that examines consumers’ evaluation of their saving perspectives over the next 12 months. So it is obvious that saving can be seen as a predictive indicator for the present, but not for the future.

Furthermore, Roos (2008) observed that question 10 ought to measure the ability to buy, while question 7 should measure the willingness to buy. Consequently, both questions should result in different outcomes, containing different information. The results of this research confirm that the information content is quite different, because question 10 has more predictive power than question 7. In this way, the assertion of a crucial difference between ability and willingness seems to be valid.

Additionally, the index of consumer confidence in the University of Michigan Index of Consumer Sentiment is based on five questions that belong to a larger survey. Those survey questions are similar to five questions of this consumer questionnaire, i.e. questions 2, 5, 6, 8 and 10. It is thus visible that only three of the six important questions correspond with the questions used in the Michigan survey, i.e. question 5, 8 and 10. The other two questions from the Michigan survey do not contain predictive power in this case.

Overall, the results demonstrate that some survey questions possess more predictive power than others, which is in accordance with Bram and Ludvigson (1998). These researchers conclude that questions about consumers’ private financial position contain more predictive power than questions asking about current purchasing conditions. In this case, questions 8 and 10, which handle about the financial position of households, are more predictive than question 6 in which is examined whether now is a good time for purchases. Furthermore, Bram and Ludvigson (1998) declare that questions asking about the current or about the upcoming period possess more explanatory power than questions in which a comparison is made between the current and the past period. In this way, they conclude that question 8 contains practically no predictive power, as it asks about respondents’ current situation in comparison with their past situation. Unlike their outcome, question 8 does have predictive power in this study.

# 6. Discussion

Due to mixed evidence in the literature with regard to the usefulness of consumer sentiment for the prediction of future spending, this dissertation attempts to identify important consumer segments and survey questions for predicting retail sales in Belgium, by means of the group lasso method. This method is employed to cope with the high dimensionality of the used dataset. To identify the crucial segments and questions, the group lasso estimator is observed, which puts either all coefficients of a certain group to zero or none of them. Only non-zero groups are identified as important groups.

For this purpose, a consumer sentiment survey from the National Bank of Belgium is used, which is answered by Belgian consumers. This dataset contains information about consumer confidence in the economical environment. Sentiment indicators are accessible for diverse classes of consumers’ income, profession, employment status, education, age and gender. As response variables, monthly retail sales data from Belgium, running from January 1990 until May 2008, are chosen from Eurostat.

In what follows, the main findings are discussed. The results of the first research question suggest that nine important segments have more predictive power than other segments. Of these nine segments, the three most important segments seem to be employees, full-time workers and part-time workers, which all belong to work-oriented categories. In total, employment contains most predictive power for Belgian retail sales, whereas age cannot be identified as an important segment. For the other important segments, it seems that consumers with a higher education, a higher profession and with work opportunities are more crucial for predicting Belgian retail sales, compared to consumers with a lower education, a lower profession or without work opportunities. This implies that the degree of predictive power depends on the degree of status and responsibility of consumers on the workplace.

The outcomes of the second research question suggest that some survey questions do contain more predictive power than others, which is in accordance with Bram and Ludvigson (1998). In fact, six survey questions have more forecasting power for retail sales in Belgium. First of all, an opposition exists of the predictive power of questions with the same information content between two different time periods, which implies that the past as well as the future can be predictive periods, depending on the used information content of the question. Likewise, differences in predictive power occur between questions with different information content within the same time period, which means that the differing information content of the questions can both be predictive, depending on the period used. Moreover, the statement from the literature of the fundamental distinction between the ability and the willingness to buy seems to be accurate, as both questions result in different outcomes, which is in accordance with Roos (2008).

Furthermore, it is recommended to consider some limitations within this study. Firstly, the questionnaire contains 12 established questions. However, the study could result in other outcomes by increasing the number of questions or by modifying the content of the questions. The use of uniquely retail sales data from Eurostat seems to be another limitation. In this way, it would be interesting to make use of other datasets as well, such as production, prices, income and living conditions, etc.

Finally, some implications for future research are suggested to further deepen our understanding on the usefulness of consumer sentiment indicators. First of all, only aggregated data is used within the studies from the literature, which is seen as a critical limitation. In this master thesis, however, detailed data on the economic sentiment of consumers with different characteristics is used. Consequently, it could be interesting for other researchers to use disaggregated instead of aggregated data in further research. Secondly, the insights of this study could be examined in more elaborate future research. In other words, this master thesis could be considered as exploratory research, as the outcomes of the two research questions could not be compared with many results from the literature.

# 7. Appendix

## 7.1 Questionnaire (consumer research)

Q1: Do you think that the general economic situation in this country over the last 12 months:

 (i) has become clearly better; (ii) has become a little better; (iii) has stayed the same; (iv) has become a little worse; (v) has become clearly worse

Q2: How do you think the general economic situation in Belgium will develop over the next 12 months? The situation:

 (i) will become clearly better; (ii) will become a little better; (iii) will stay the same; (iv) will become a little worse; (v) will become clearly worse

Q3: And the consumer prices? Do you think that these prices over the past 12 months:

(i) have risen strongly; (ii) have risen moderately; (iii) have risen weakly; (iv) have stayed nearly the same; (v) have fallen

Q4: What do you expect for the next 12 months? Compared to the last 12 months, do you think that the consumer prices:

(i) will rise more strongly; (ii) will rise with the same amount; (iii) will rise less strongly; (iv) will stay the same; (v) will fall

Q5: How do you think the unemployment in Belgium will develop over the next 12 months? The amount of unemployed people will:

(i) rise clearly; (ii) rise a little; (iii) stay the same; (iv) fall a little; (v) fall clearly

Q6: Major purchases such as furniture, electrical and electronic devices (for example a TV, a washing machine, a computer) or other durable goods, do you think now is a favorable or unfavorable moment for people to make such purchases, or nor favorable nor unfavorable?

(i) favorable; (ii) nor favorable nor unfavorable; (iii) unfavorable

Q7: Major purchases such as furniture, electrical and electronic devices (for example a TV, a washing machine, a computer) or other durable goods, what do you (including your household) expect to spend over the next 12 months, compared to what you have spent over the last 12 months?

 (i) much more; (ii) a little more; (iii) about the same; (iv) a little less; (v) much less

Q8: According to you, has the financial position of your household over the last 12 months:

(i) become clearly better; (ii) become a little better; (iii) stayed the same; (iv) become a little worse; (v) become clearly worse

Q9: How could you describe the current financial position of your household in the best possible way?

(i) a great deal can be saved; (ii) a little can be saved; (iii) a balance exists between income and expenses; (iv) the savings-account must be used; (v) debts must be made

Q10: What do you expect of the financial position of your household over the next 12 months? It will:

(i) improve clearly; (ii) improve a little; (iii) stay the same; (iv) deteriorate a little; (v) deteriorate clearly

Q11: Over the next 12 months, do you think that you will be able to save money?

(i) yes, absolutely; (ii) yes, maybe; (iii) probably not; (iv) absolutely not

Q12: Given the overall economic situation, do you think that now is a favorable or unfavorable period for savings?

(i) very favorable; (ii) considerably favorable; (iii) rather unfavorable; (iv) very unfavorable

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# 9. Seminary report

*Opgave: gedetailleerd beschrijven op welke manier de hoorcolleges en de seminaries hebben bijgedragen tot de creatie van de masterpaper.*

Reeds de tweede informatiesessie werden een aantal praktische zaken in verband met het opstellen van een masterproef aangehaald. Op het eerste zicht leek dit allemaal erg vanzelfsprekend, aangezien ik vorig jaar reeds een thesis heb geschreven. Nochtans werd het al snel duidelijk dat het toch wel handig was dat meerdere items werden opgefrist, zoals het belang van correcte bronvermelding bijvoorbeeld. Sommige zaken had ik echter doorheen mijn studiejaren al een aantal keer gehoord, zoals het gebruik van Limo bijvoorbeeld, waardoor mijn aandacht soms wat wegglipte.

Tijdens de sessie over wetenschappelijk schrijven werd duidelijk aangegeven dat er een cruciaal verschil bestaat tussen een probleemstelling en een onderzoeksvraag. Alvorens op een concretere manier een onderzoeksvraag op te stellen, start men vanuit een algemeen thema met de keuze van een bepaalde invalshoek waarbij men een probleemstelling formuleert en afbakent. Dit heeft mijn thesisgenoot en mij ertoe geleid om op een analytische manier te onderzoeken wat exact het probleem vormde binnen ons onderzoek en welke vragen hierbij vervolgens onderzocht konden worden.

Op dezelfde manier leek het meteen vrij logisch dat een abstract en een inleiding van elkaar verschillen. Echter, waar het verschil juist ligt, is een andere vraag. Al snel werd duidelijk dat een inleiding veel breder is, aangezien meerdere onderdelen aangehaald dienen te worden. Bij een abstract daarentegen, spelen de resultaten een centrale rol. Aangezien mijn thesis assistente het belang van een goede inleiding erg benadrukte, was het toch wel handig om de specifieke onderdelen te kennen en te weten waarin het verschilt van een abstract.

Verder werden enkele hoorcolleges over onderzoeksmethodologie gegeven. Zo was het college over econometrie om twee redenen nuttig. Ten eerste werd het door mijn promotor, Christophe Croux, gedoceerd. Ten tweede viel het binnen het domein van mijn masterproef, aangezien mijn thesisgenoot en ik een kwantitatief onderzoek hebben uitgevoerd. We hebben namelijk retail sales data van België gedurende een bepaalde periode geanalyseerd door middel van het statistische programma R. Ook al hebben wij in ons onderzoek geen gebruik kunnen maken van een specifieke analyse uit het hoorcollege, toch had een opfrissing van sommige statistische termen (zoals t, T, β, …) zeker nut in ons geval. Zo wordt in deze masterproef een regressiemodel voor retail sales gehanteerd, dat een duidelijke voorstelling geeft van wat onderzocht wordt.

Het is vanzelfsprekend dat niet elk hoorcollege over methodologie even nuttig was. Op die manier bleek het college over experimenteel onderzoek een herhaling voor mij, aangezien ik in mijn vorige masterproef reeds zo’n onderzoek had opgezet en uitgevoerd. Niets was aldus nieuw voor mij. Eveneens had ik de informatie niet nodig voor mijn huidige thesis, dus hierdoor werd het enigszins moeilijk om mijn volledige aandacht erbij te houden. Niettegenstaande kan ik over het algemeen concluderen dat de meerderheid van de hoorcolleges zeker zijn nut hebben gehad voor de realisatie van mijn masterproef.

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