Exploring the Antecedents of Consumer Confidence through Semantic Network Analysis of Online News

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Abstract
This article studies the impact of online news on social and economic consumer perceptions through the application of semantic network analysis. Using almost 1.3 million online articles on Italian media covering a period of four years, we assessed the incremental predictive power of economic-related keywords on the Consumer Confidence Index. We transformed news into networks of co-occurring words and calculated the semantic importance of specific keywords, to see if words appearing in the articles could anticipate consumers’ judgements about the economic situation. Results show that economic-related keywords have a stronger predictive power if we consider the current households and national situation, while their predictive power is less significant with regards to expectations about the future. Our indicator of semantic importance offers a complementary approach to estimate consumer confidence, lessening the limitations of traditional survey-based methods.

Keywords: consumer confidence; semantic brand score; text mining; online news.
1. Introduction

Monthly reports of the nation’s level of consumer confidence can offer a first understanding of the consumers’ sentiment and predict their spending. Consumer confidence has been traditionally associated with objective political and economic conditions, along with external factors like news media coverage. Despite the widespread attention given to surveys of consumer confidence, their reliability to provide information about the future path of household spending is still not entirely explored (Ludvigson, 2004). It has been demonstrated how the predictive power of consumer confidence surveys is influenced by factors including economic conditions, current and past political situation, as well trust in the government, and the influence of the news industry (De Boef & Kellstedt, 2004; Nguyen & Claus, 2013; Svensson et al., 2017). The media, both mainstream and digital, has the opportunity to influence how consumers feel about the economy. Barsky and Sims (2012) found that the relationship between consumer confidence and consequent activity is almost entirely reflective of the news component.

In this study, we adopt a Big Data methodology to explore the antecedents of consumer confidence, looking at the role of online discourse and its influence on consumer confidence. Our study investigates how the online news - as reported on digital newspapers and other online sources – influence consumer confidence. To this purpose, we use a methodology that relies on an indicator that calculates the importance of economic-related keywords (ERKs) as they appear on digital news media. This is a departure from the time-consuming manual content analysis of economic news that has been used in the past (Boukes et al., 2019). Our focus is on the Italian Consumer Confidence Climate index, which provides an indication of the optimism and pessimism of consumers who evaluate the Italian general economic situation and report their expectations for the future. We chose an indicator of semantic importance, called Semantic Brand Score (SBS), that calculates the relative importance of
one or more keywords as that appear in the news (Fronzetti Colladon, 2018). We selected this indicator because of its ability to forecast various outcomes, from financial markets trends (Fronzetti Colladon, Grassi, et al., 2020), to election results (Fronzetti Colladon, 2020), and tourism demand (Fronzetti Colladon, Grippa, et al., 2020). Based on methodologies drawn from social network analysis and text mining, semantic importance of keywords is calculated in terms of their prevalence, i.e. frequency of word occurrences; connectivity, i.e. degree of centrality of a word in the discourse; and diversity, i.e. richness and distinctiveness of textual associations. The approach we use in our study is different from past research that focused on the evaluation of news sentiment (e.g., Binder & Makridis, 2020; Fraiberger et al., 2018). We use a new integrated semantic index as a novel metric of semantic importance that proved to be more informative than sentiment (Fronzetti Colladon, Grassi, et al., 2020; Fronzetti Colladon, Grippa, et al., 2020) – being the latter also subject to variable error rates and reliability issues (Jussila et al., 2017). This study contributes to the discussion on the role that online media play in shaping consumer confidence. By providing an alternative method based on semantic network analysis, we investigate the antecedents of consumer confidence, in terms of current and future economic expectations.

The remainder of the paper is organized as follows. In the next section we discuss the effect that news can have on consumers’ opinions about the economy. In Section 3 we present the methodology and the design of our research. Section 4 illustrates the main results that are later discussed in Section 5.

2. Connection between News and Consumer Confidence

News coverage plays an important role in shaping current and future expectations (Casey & Owen, 2013; Damstra & Boukes, 2021; Kilian & Vega, 2011), with both digital media and mainstream media providing information that may affect people’s economic evaluations of
current and future conditions (Cascaldi-Garcia & Vukotić, 2020; S. Soroka & McAdams, 2015; S. N. Soroka, 2006). The news may have an independent influence on consumer confidence especially when people are exposed to ambiguous messages (Svensson et al., 2017), or when media coverage does not fully reflect economic conditions or when it is biased by partisanship (De Boef & Kellstedt, 2004). Damstra & Boukes (2021) investigated the impact of the real economy on economic news in Dutch newspapers and confirmed that the description of economic reality offered by the media is skewed to the negative, which in turn affects people’s economic expectations about the future, but not their current evaluations. Other studies show the role of rumors in shaping consumer response and spending (Kamins et al., 1997), while others demonstrate how the tone of economic news may influence consumer confidence, with slight difference between prospective versus retrospective economic evaluations (Boukes et al., 2019; Casey & Owen, 2013). For example, Boukes et al. (2019) found that consumers’ retrospective evaluations were not influenced by the tone in the news. Other studies explored the effect of the negativity bias on consumer confidence and demonstrated how consumers react only to bad news but not good (Nguyen & Claus, 2013). The negativity bias, well documented in social psychology, political science and economics (Baumeister et al., 2001; Lerner et al., 2015), is at the basis of this asymmetry in the response to bad versus good news: negative information tend to have a stronger impact on impressions than favorable information. Other scholars have challenged the negativity bias and the asymmetric response of consumers. In a study examining the relationship between media reporting of economic news and consumer confidence in the United States, Casey and Owen (2013) found evidence of both positive and negative asymmetries in consumer confidence.

Empirical studies have demonstrated how alternative methods based on textual analysis are more reliable and could complement and reduce the limitations of survey-based methods
to describe current economic conditions and better predict a household's future economic activity. For instance, a study on the accuracy of Swiss opinion surveys to capture public sentiments on a variety of issues found that the amount of survey bias differs considerably with regard to the policy areas involved, being the strongest on issues related to immigration, the environment, and certain types of regulation (Funk, 2016).

Recently, Song and Shin (2019) applied sentiment analysis to South Korean news articles using a lexicon approach, and demonstrated how news articles can be an effective source for building alternative economic indicators able to complement traditional Consumer Confidence Indices. News data is not only cheaper to acquire: its advantages, compared to monthly national surveys, include the ability to observe consumer trends at a more granular level, with more data points, and with the ability to capture the social and economic impact of specific issues through a broader perspective (Chadha & Wells, 2016). Additional empirical evidence confirms the complicated relationship between consumer and news reported by the media. Through an investigation of the association between consumer confidence and consumer spending for durable goods, Ahmed and Cassou (2016) found that news has definitely important implications for confidence during economic expansions, though it is generally not important during economic recessions.

Contributing to this stream of research, we use a novel indicator of semantic importance to evaluate the possible impact of news on consumers’ confidence.

3. Research Design

3.1. Consumer Confidence Index survey and selection of keywords

Consumer confidence climate is a monthly economic indicator that measures the degree of optimism perceived by consumers regarding the overall state of the economy and their financial situation, evaluated through their saving and spending habits. Its value is high when
consumers spend more and save less, and low when consumers save more and spend less. Its trend normally increases when the economy expands, and decreases when the economy contracts, reflecting the outlook of consumers with respect to their ability to find and retain good jobs according to their perception of the current state of the economy and their personal financial situation.

In Italy, the Consumer Confidence Climate survey is composed of a set of questions designed to assess the perceived optimism/pessimism of consumers around the Italian economic situation and their expectations for the future. Survey participants provide their opinion about future unemployment, current and future households’ financial situation, current and future possibility of savings, current opportunities for durable goods purchases, and current family budget. The answers to nine questions are aggregated and the result is reported in a seasonally adjusted index (ISTAT, 2020). The Consumer Confidence Climate can be broken down in four sub-indices released by the Italian Institute of Statistics (ISTAT). These indices are the Economic Climate, the Personal Climate, the Current Climate, and the Future Climate. The Economic Climate considers consumers’ current assessment and future expectations about the Italian general economic situation and their view on future unemployment. The Personal Climate considers the households’ financial situation, savings, durable good major purchases, and family budget. The Current Climate considers the current Italian economic situation, current households’ financial situation, current savings, durable goods and family budget. Finally, the Future Climate includes questions related to the foreseen future of the Italian general economic situation, the households’ financial situation, unemployment expectations, and savings.

We downloaded the target series data from the Italian National Institute of Statistics (ISTAT) website (https://www.istat.it).
From the Consumer Confidence Climate survey, we extracted 27 economic keywords that were recurring in the survey’s questions. We then included other relevant keywords that matched the economic literature as well as the independent assessment of three economics experts. The inclusion of external experts to validate the selection of keywords is aligned with the methodology used in similar studies (Fabbri et al., 2018).

Translated from Italian, these keywords are: home, rent, income, pensions, savings, credit, loans, interest rate, prices, market, job, competition, economy, public sector, politics, institutions, basic necessities, global, family, trust, discomfort/distress, consumer, education degree, purchase, car, PC, holidays. We also considered their synonyms and, drawing from past research (Fronzetti Colladon, Grassi, et al., 2020; Humphreys & Wang, 2018), we considered additional sets of keywords related to the economy or to the Covid emergency, which include singletons - i.e. individual words - like Covid and lockdown.

The use of computational methods of content analysis to calculate consumer confidence helped overcome the sampling and coding limitations of traditional content analysis. Computational methods have been recognized as unable to understand human communication and language in all its richness and complexity (Lewis et al., 2013). In line with recent approaches to semantic analysis (Fabbri et al., 2018; Sjøvaag & Stavelin, 2012), we blended computational methods and more traditional approaches to analyze online text, drawing on algorithmic measures for systematically gathering news data.

Telpress International B.V., a company that collects online news from multiple web sources, including mainstream media sites and blogs, provided access to the online news data. The final sample was comprised of more than 1,808,000 news articles, published between January 2, 2017 and August 30, 2020.
3.2. A new index of importance for economic keywords

The Semantic Brand Score (SBS) is a measure of semantic importance that combines methods of social network analysis and text mining. It is applied to (big) textual data to evaluate the importance of one or more ‘brands’, or more in general, words or groups of keywords (Fronzetti Colladon, 2018). Its analytical power extends beyond commercial brands. A brand may refer to commercial products, personal brands, a company’s core values or concepts related to societal trends (Fronzetti Colladon, 2020). The SBS indicator is composed of three dimensions: prevalence, diversity and connectivity. Prevalence measures how frequently an economic related keyword is used in the online discourse. The SBS index builds upon the relationships among words in any given text. The more a keyword appears in a set of online news, the more readers will remember and recognize that word, which could ultimately influence their opinions and behaviors. The importance of a keyword depends on multiple factors, including its frequency of occurrence in online news and its association to other keywords in the text.

In order to generate networks from texts and calculate the SBS index, we used the SBS BI web application (Fronzetti Colladon & Grippa, 2020). We then used the computing resources of the ENEA/CRESOCO infrastructure to build the textual networks (Ponti et al., 2014). The first step of the computational process was to apply common text pre-processing routines (Perkins, 2014) – such as tokenization, removal of stop-words and removal of word affixes, known as stemming (Porter, 2006). The second step was to build a social network of words for each time period considered in the analysis. Texts were then transformed into networks of co-occurring words and relationships were studied through social network analysis (Wasserman & Faust, 1994). Figure 1 illustrates an example of output visualized using the following sentence attributed to Adam Smith (in The Theory of Moral Sentiments): “The same principle, the same love of system, the same regard to the beauty of order, of art and
contrivance, frequently serves to recommend those institutions which tend to promote the public welfare”. In order to improve readability, we labeled nodes before stemming and we set the co-occurrence threshold to maximum three words.

Figure 1. Example of semantic network analysis.

Diversity is a dimension of the SBS index that considers the relationship of economic keywords with the other words in the text. This is related to the construct of brand image (Keller, 1993), and to the idea that, when associations are more unique and in a high number, the keyword is more important (Fronzetti Colladon, 2018; Grohs et al., 2016). We operationalized diversity through the following formula, based on the metric of distinctiveness centrality (Fronzetti Colladon & Naldi, 2020):

\[
Diversity (i) = \sum_{j=1}^{n} \log_{10} \left( \frac{(n-1)}{g_j} \right) I(w_{ij} > 0)
\]

In general, we consider a graph G, made of n nodes (words) and E edges (word links), associated to a set of connection weights W. In the formula, \(g_j\) is the degree of node j, which
is one of the neighbors of node $i$ (the one for which diversity is calculated). $I(w_{ij} > 0)$ is an indicator function that is equal to 1 when the edge connecting nodes $i$ and $j$ exists, i.e. when $w_{ij} > 0$, and is equal to 0 when this edge is missing.

The last dimension of the SBS, connectivity, is measured as the weighted betweenness centrality of the ERKs terms (Brandes, 2001; Freeman, 1979) and represents the ‘brokerage power’ of the economic keywords, or how much each keyword can serve as a bridge to connect other terms and topics in the discourse (Fronzetti Colladon, 2018). The connectivity formula is based on the analysis of the shortest paths connecting each pair of nodes (Wasserman & Faust, 1994):

$$\text{Connectivity} (i) = \sum_{j<k} \frac{d_{jk}(i)}{d_{jk}}$$

where $d_{jk}$ is the number of shortest network paths connecting nodes $j$ and $k$ (calculated using edge weights) and $d_{jk}(i)$ is the number of that paths that include the node $i$.

Because the SBS is a composite indicator calculated by summing the standardized scores of prevalence, diversity and connectivity, we carried out standardization considering all the words in the corpus for each specific timeframe.

### 3.3. Granger Causal Relationships between keywords and Consumer Confidence

The Consumer Confidence series have a monthly frequency, whereas our predictor variables are weekly data series. In order to use the leading information coming from ERKs, we transformed the monthly time series into weekly data points using a temporal disaggregation approach (Dagum & Cholette, 2006). The primary objective of temporal disaggregation is to obtain high frequency estimates under the restriction of the low
frequency data, which exhibit long term movements of the series. Considering that the Consumer Confidence surveys are administered during the first 15 days of the month, we performed a temporal disaggregation ensuring that the first value of the weekly series were consistent with the monthly series. To obtain weekly values we applied a cubic spline interpolation (Chow & Lin, 1971; de Jong, 1989; Vaseghi, 2001). Figure 2 illustrates the disaggregated series we obtained.
Figure 2. Temporal disaggregation of consumer confidence series

To measure whether the SBS indicators offered relevant information to anticipate our economic variables, we performed Granger Causality tests. In general, a time series is said to Granger-cause another time series if the former has incremental predictive power on the
latter. Accordingly, Granger causality provides an indication about whether one event or variable occurs prior to another. Additionally, we looked at the cross-correlation of the target series with our predictors (ERKs series), to see if they were in phase (positive signs of cross-correlation), or out of phase (negative sign) (Haugh, 1976; Wu, 2007).

Figure 3 describes the research design (or methodology) approach we followed, starting with the identification of the Economic related keywords (singletons or word sets); calculation of the semantic score or SBS to measure the keyword’s importance; and finally the application of Granger causality methods to predict the consumer confidence indicators.

![Figure 3. Research Design Framework](image)

4. Results

In this section, we discuss the signs of cross-correlation and the results of the Granger causality tests used to identify the indicators that could anticipate the consumer confidence components (see Table 1). In line with past research (e.g., Breitung & Candelon, 2006; Bruns et al., 2014), we selected the number of lags dynamically using the Bayesian Information Criteria. The models indicate that 61% of the semantic importance series of ERKs Granger-
cause the *Personal* component of the Consumer Climate index, while only 34% Granger-cause the *Future* component and 27% the Current component. This is not surprising if we consider that average consumers have a much better grasp of their own personal situation as they respond to the questions, while they might be less informed about economic cycles. What is interesting is that this representation of the current situation comes from online news, which report what is currently happening more than depicting future scenarios – and this may directly impact on consumers’ opinions and economic choices.

Among the most significant concepts strongly associated with the consumers’ confidence in the future we find keywords such as: educational degree, purchasing ability, and European programs to support Italy during the recession (e.g. Troika, Sure).

Among the political and institutional keywords mostly associated to a perceived deterioration of consumers’ economic conditions we found *Politics*, *European Union* and the *National Retirement System*/*INPS* (see their negative signs in Table 2).

It is also not surprising to observe a strong negative granger causality between the importance of the Covid keyword and the consumer assessment of the economic situation. This means that the more relevant and pervasive the Covid word is within the online discourse, the more negative is the consumers’ assessment and expectations about the Italian economic situation, with a negative view on future employment.

Another interesting result is the strong negative granger causality between the keywords *educational degree, unemployment, purchase*, and the Climate’s Future component, describing the expectations on the Italian economic situation, households’ financial situation, unemployment expectations, and savings. This means that, when education becomes a prominent concept in the online discourse, consumers react less optimistically about the future situation, likely indicating a reduced trust in the ability of education and degree holding to change future outlooks. Similarly, there seems to be a more pessimistic response
from consumers when the news reports frequently and consistently about purchasing ability and fighting unemployment. This is aligned to the other result showing a negative granger causality between the media reporting on the national retirement system and the current and future personal situation. If we consider that the unemployment rate in Italy from 2016 to 2020 went from 11.7% to 9.3%\(^1\), this pessimistic view is consistent with the inception and spread of an economic downturn, partially ascribed to the Covid-19 pandemic. This result seems to confirm the negativity bias: when the present looks good, people feel more optimistic about the current and future economy (Nguyen & Claus, 2013).

In summary, the results from Table 1 suggest that 27\% of the selected keywords Granger-cause the aggregate Climate. This is the same percentage of keywords resulting significant while evaluating Granger causality for the Current dimension of the survey. Our tests indicate that a higher number of keywords could impact on how consumers perceive the Future situation, but the most important impact seems to be on the Personal climate (with 61\% significant Granger causality tests).

\(^1\) [https://www.statista.com/statistics/531010/unemployment-rate-italy/](https://www.statista.com/statistics/531010/unemployment-rate-italy/), accessed April 16, 2021.
| ERK series                  | Climate Coef. | Climate Sign | Personal Coef. | Personal Sign | Economic Coef. | Economic Sign | Current Coef. | Current Sign | Future Coef. | Future Sign |
|-----------------------------|---------------|--------------|----------------|---------------|----------------|---------------|---------------|--------------|--------------|--------------|
| Covid                       | 0.16          | -            | 2.24           | -             | 5.83*          | **            | 0.36          | -            | 0.26         | -            |
| Lockdown                    | 0.09          | -            | 2.23           | -             | 0.22           | -             | 0.38          | -            | 0.05         | -            |
| Unemployment                | 2.54          | -            | 5.86*          | -             | 1.41           | -             | 1.02          | -            | 3.05*        | -            |
| Quantitative easing         | 2.65          | +            | 3.70*          | +             | 1.36           | +             | 1.12          | +            | 2.58*        | +            |
| Economic crisis             | 0.50          | -            | 3.87*          | -             | 0.24           | -             | 0.38          | -            | 0.85         | -            |
| Interest rate               | 4.06*         | -            | 6.54*          | +             | 1.63           | +             | 3.61*         | +            | 2.73*        | +            |
| Monetary politics           | 3.48*         | -            | 6.04*          | +             | 1.92           | +             | 2.99*         | +            | 3.23*        | +            |
| European Community          | 0.82          | -            | 3.07*          | -             | 0.82           | -             | 0.86          | +            | 1.36         | -            |
| Financial Markets           | 0.95          | +            | 2.51           | +             | 0.97           | +             | 1.72          | +            | 1.18*        | +            |
| EU                          | 1.68          | -            | 10.33          | -             | 0.40           | -             | 6.72*         | -            | 0.91         | -            |
| Unions                      | 0.08          | -            | 1.93           | +             | 0.81           | -             | 0.57          | -            | 0.12         | -            |
| Strikes                     | 0.24          | -            | 1.98           | +             | 0.25           | +             | 0.54          | +            | 0.06         | +            |
| Deficit                     | 0.73          | +            | 5.16*          | +             | 0.57           | +             | 1.75          | +            | 0.44         | +            |
| Taxation                    | 0.23          | +            | 2.02           | +             | 1.21           | +             | 0.48          | +            | 0.49         | +            |
| Btp-bot                     | 4.10*         | +            | 7.41*          | +             | 2.55           | +             | 6.08*         | +            | 3.15*        | +            |
| Prices                      | 2.01          | -            | 4.51*          | +             | 1.52           | -             | 3.39*         | +            | 1.04         | +            |
| Italian stock exchange      | 3.80*         | +            | 6.28*          | +             | 1.82           | +             | 6.19*         | +            | 2.46         | +            |
| Bank of Italy               | 2.08          | +            | 4.41*          | +             | 0.72           | +             | 0.88          | +            | 1.78         | +            |
| smartworking                | 0.55          | -            | 2.29           | -             | 0.84           | -             | 0.84          | -            | 0.21         | -            |
| Junkbond                    | 2.05          | +            | 6.04*          | +             | 1.41           | +             | 1.07          | +            | 2.66         | +            |
| House                       | 2.66*         | -            | 1.94           | +             | 2.86*          | -             | 0.71          | +            | 2.64*        | -            |
| Purchase                    | 3.88*         | -            | 6.26*          | +             | 1.45           | -             | 3.57*         | +            | 3.90*        | -            |
| Rent                        | 0.42          | -            | 2.00           | -             | 0.60           | -             | 0.40          | -            | 0.74         | -            |
| Car                         | 1.92          | +            | 1.94           | +             | 3.22*          | +             | 1.21          | +            | 1.24         | +            |
| Incomes                     | 0.93          | +            | 2.00           | +             | 1.77           | +             | 1.94          | +            | 0.81         | +            |
| Employee loans              | 1.78          | +            | 7.35*          | +             | 1.02           | -             | 1.37          | +            | 2.25         | +            |
| Loan                        | 2.00          | -            | 6.74*          | -             | 1.51           | -             | 4.57*         | -             | 1.97         | -             |
| Family                      | 2.90*         | -            | 5.32*          | +             | 2.78*          | -             | 5.84*         | +             | 2.67         | +             |
| Trust                       | 5.35*         | +            | 2.08           | -             | 3.98*          | +             | 0.39          | +             | 2.15         | +             |
| Discomfort                  | 3.29*         | +            | 6.88*          | +             | 1.32           | +             | 3.88*         | +             | 2.76*        | +             |
| Job                         | 0.16          | +            | 2.12           | +             | 0.23           | +             | 0.77          | +             | 0.12         | +             |
| PC                          | 1.68          | -            | 2.09           | -             | 0.42           | -             | 1.76          | -             | 0.13         | -             |
| Politics                    | 1.55          | +            | 6.90*          | -             | 0.53           | +             | 5.21*         | +             | 1.28         | +             |
| Public Sector               | 3.18*         | +            | 7.97*          | +             | 3.55*          | +             | 3.37*         | +             | 4.32*        | +             |
| Economy                     | 0.58          | -            | 2.94*          | -             | 0.33           | -             | 0.58          | -             | 0.80         | -             |
| Education Degree            | 6.64*         | -            | 5.65*          | -             | 3.64*          | -             | 1.30          | -             | 7.45*        | **            |
|                    | Value | Causal Relationship | Value | Causal Relationship | Value | Causal Relationship | Value | Causal Relationship |
|--------------------|-------|---------------------|-------|---------------------|-------|---------------------|-------|---------------------|
| Consumers          | 0.81  | +                   | 3.72* | +                   | 0.88  | +                   | 2.10  | +                   | 1.27  | +                   |
| Needs              | 1.13  | +                   | 3.31* | +                   | 2.54  | +                   | 1.34  | +                   | 1.85  | +                   |
| Global             | 2.78* | +                   | 6.54* | -                   | 2.01  | +                   | 3.09* | +                   | 3.96* | +                   |
| Institutions       | 0.35  | -                   | 2.01  | -                   | 1.61  | +                   | 0.47  | -                   | 1.28  | +                   |
| Retirement Pension | 0.08  | +                   | 2.31  | +                   | 0.22  | +                   | 0.46  | +                   | 0.08  | +                   |
| Saving             | 1.08  | +                   | 6.47* | +                   | 0.47  | +                   | 3.62* | +                   | 0.94  | +                   |
| Vacation           | 0.10  | +                   | 2.00  | +                   | 0.23  | -                   | 0.70  | -                   | 0.06  | +                   |
| Competition        | 3.34* | +                   | 8.58* | +                   | 1.88  | +                   | 4.51* | +                   | 5.02* | +                   |
| Spread             | 3.81* | +                   | 2.41  | +                   | 3.54* | +                   | 1.17  | +                   | 4.46* | +                   |
| Rating             | 2.69  | +                   | 2.84* | +                   | 3.78* | +                   | 1.45  | +                   | 2.75* | +                   |
| Euro-group         | 1.18  | -                   | 5.07* | +                   | 1.10  | -                   | 0.93  | +                   | 1.75  | -                   |
| Coronabond         | 2.62  | -                   | 6.75* | +                   | 1.91  | -                   | 1.16  | +                   | 3.68* | -                   |
| Eurobond           | 2.49  | -                   | 6.29* | +                   | 1.96  | -                   | 1.15  | +                   | 3.42* | -                   |
| European Stability Mechanism | 2.09 | +                   | 6.25* | +                   | 1.43  | +                   | 1.09  | +                   | 2.76* | +                   |
| Sure               | 1.53  | -                   | 3.44* | +                   | 2.40  | -                   | 0.35  | +                   | 3.97* | -                   |
| European Investment Bank | 2.64 | +                   | 7.58* | +                   | 1.15  | +                   | 1.34  | +                   | 3.10* | +                   |
| Oil                | 0.99  | +                   | 2.24  | +                   | 0.93  | +                   | 0.88  | +                   | 0.51  | +                   |
| Gold               | 3.90* | +                   | 2.10  | +                   | 4.85* | +                   | 0.98  | +                   | 4.30* | +                   |
| Troika             | 4.25* | -                   | 5.79* | +                   | 4.33* | -                   | 1.57  | +                   | 6.42* | -                   |
| Euro               | 0.08  | +                   | 2.09  | +                   | 0.74  | +                   | 0.44  | +                   | 0.08  | +                   |
| Italian public retirement system | 1.80 | -                   | 9.63* | -                   | 0.84  | -                   | 3.38* | -                   | 2.41  | -                   |
| GDP                | 0.47  | -                   | 2.55  | +                   | 0.45  | -                   | 0.51  | +                   | 0.37  | +                   |
| Confindustria (National Industrial association) | 1.66 | -                   | 2.21  | -                   | 0.96  | -                   | 0.40  | -                   | 1.31  | -                   |

*p < .10; **p < .05; ***p < .01.

**Table 1.** Granger causality tests and cross correlation signs of ERKs series and Consumer Climate (and its four components).
Table 2 provides a breakdown of the nine questions and offers a more granular view of the impact of ERKs on the adjusted consumer confidence index. Of those nine questions, five are associated to the current situation – either of the household or the country – and four are associated to future expectations for the country and the consumers themselves. The importance of some keywords seems to be more impactful when associated to the single questions, than to the aggregate climate measures presented in Table 1. In particular, all the keywords are strongly significant and improve predictability of the households economic situation index. Moreover, keywords related to Covid-19 seem to be highly predictive of consumers’ current and future evaluation on the household economic situation, as well as of future unemployment.

Consistently with the results of Table 1, ERKs seems to have a stronger impact on current evaluations than on future expectations. This is aligned with the current debate in the literature on consumer confidence, as it is still not clear whether surveys provide information about the future path of household spending, or whether they merely reflect current or past events (Ludvigson, 2004).
| ERK series | Evaluation of the Economic situation in Italy | Evaluation of the household economic situation | Evaluation of the household budget | Current Opportunities for Savings | Current Opportunities of Purchasing Durable Goods | Expectation on the economic situation of Italy | Unemployment Expectations | Expectations on the household economic situation | Future Possibilities for Savings |
|-----------|---------------------------------------------|---------------------------------------------|---------------------------------|-------------------------------|---------------------------------------------|---------------------------------------------|--------------------------|---------------------------------------------|-------------------------------|
| Covid     | 0.52                                        | 7.16***                                    | 0.11                            | 1.48                          | 0.05                                        | 0.47                                        | 8.87***                   | 6.41***                                    | 0.56                           |
| Lockdown  | 0.8                                         | 7.31***                                    | 0.19                            | 1.53                          | 0.01                                        | 0.07                                        | 5.51***                   | 5.07***                                    | 0.44                           |
| Unemployment | 0.75                                         | 6.57***                                    | 0.58                            | 2.53                          | 4.93**                                      | 3.08*                                       | 0.99                      | 2.88*                                      | 2.07                           |
| Quantitative easing | 0.9                                         | 8.14***                                    | 0.12                            | 1.74                          | 1.04                                        | 2.81*                                       | 0.23                      | 0.4                                        | 0.91                           |
| Economic crisis | 0.53                                         | 6.62***                                    | 0.13                            | 5.15***                       | 0.02                                        | 0.48                                        | 0.19                      | 0.09                                       | 2.41                           |
| Interest rate | 4.21**                                      | 6.89***                                    | 0.14                            | 3.63**                       | 2.44                                        | 0.82                                        | 0.54                      | 0.4                                        | 6.2**                          |
| Monetary politics | 4.89***                                    | 8.84***                                    | 0.3                             | 2.02                          | 1.78                                        | 2.58                                        | 0.7                       | 0.33                                       | 1.52                           |
| European Community | 1.05                                        | 6.57***                                    | 0.17                            | 4.52***                       | 2.89*                                       | 1.08                                        | 0.39                      | 0.26                                       | 1.02                           |
| Financial Markets | 1.02                                        | 7.97***                                    | 0.14                            | 1.68                          | 3.15*                                       | 0.67                                        | 0.76                      | 0.07                                       | 0.28                           |
| EU        | 2.42                                        | 5.93***                                    | 4.21**                          | 4.11**                       | 1.94                                        | 0.13                                        | 0.37                      | 0.14                                       | 10.01***                       |
| Unions    | 1.41                                        | 6.96***                                    | 5.88**                          | 1.59                          | 0.19                                        | 0.56                                        | 0.35                      | 0.76                                       | 0.94                           |
| Strikes   | 1.21                                        | 7.24***                                    | 0.78                            | 1.56                          | 0.71                                        | 0.08                                        | 0.09                      | 0.57                                       | 0.29                           |
| Deficit   | 0.85                                        | 6.2***                                     | 0.58                            | 2.15                          | 0.55                                        | 0.08                                        | 2.17                      | 0.35                                       | 0.94                           |
| Taxation  | 1.93                                        | 5.55***                                    | 0.29                            | 2.96*                         | 0.14                                        | 1.71                                        | 0.07                      | 0.07                                       | 0.37                           |
| Btp-bot   | 3.36*                                       | 5.94***                                    | 0.13                            | 1.48                          | 5.37**                                      | 1.39                                        | 2.68                      | 0.32                                       | 1.86                           |
| Prices    | 2.55                                        | 5.9***                                     | 1.47                            | 3.35**                       | 6.32**                                      | 0.67                                        | 1.4                       | 0.07                                       | 0.3                            |
| Italian stock exchange | 3.51*                                      | 7.84***                                    | 0.26                            | 3.5*                         | 2.3                                         | 0.92                                        | 0.74                      | 0.41                                       | 2.4                            |
| Bank of Italy | 0.54                                        | 7.09***                                    | 0.3                             | 1.63                          | 2.44                                        | 1.04                                        | 0.05                      | 1.37                                       | 1.38                           |
| smartworking | 2.39                                        | 6.89***                                    | 1.82                            | 1.69                          | 0.15                                        | 0.21                                        | 2.41                      | 0.11                                       | 0.36                           |
| Junkbond  | 0.71                                        | 7.2***                                     | 0.52                            | 1.72                          | 3.08*                                       | 3.59*                                       | 0.26                      | 0.88                                       | 1.27                           |
| House     | 0.61                                        | 7.11***                                    | 0.73                            | 1.59                          | 0.29                                        | 3.21**                                      | 0.06                      | 0.13                                       | 0.21                           |
| Purchase  | 2.33                                        | 7.2***                                     | 0.27                            | 1.54                          | 3.71*                                       | 2.26                                        | 0.24                      | 1.41                                       | 8.04***                        |
| Rent      | 3.18**                                      | 7.03***                                    | 0.12                            | 1.7                           | 0.24                                        | 0.76                                        | 0.28                      | 0.11                                       | 0.99                           |
| Car       | 7.59***                                     | 6.99***                                    | 2.16                            | 3.46*                          | 0.02                                        | 0.91                                        | 0.96                      | 0.63                                       | 1.08                           |
| Incomes   | 2.63                                        | 5.58***                                    | 0.4                             | 2.01                          | 3.06*                                       | 0.53                                        | 0.19                      | 0.95                                       | 0.73                           |
| Employee loans | 0.59                                        | 7.04***                                    | 0.34                            | 1.94                          | 2.94*                                       | 2.94*                                       | 0.11                      | 0.88                                       | 1.58                           |
| Category               | Loan  | 2.82*  | 5.7*** | 1.01 | 1.62 | 1.82 | 0.59 | 0.27 | 0.25 | 3.73* |
|------------------------|-------|--------|--------|------|------|------|------|------|------|-------|
| Family                 | 5.47**| 6.46***| 3.06*  | 1.87 | 1.58 | 0.74 | 2.57 | 2.22 | 6.56**|
| Trust                  | 4.26**| 7.4*** | 0.65   | 2.56 | 1.76 | 3.06*| 3.96**| 0.45 | 0.47 |
| Discomfort             | 0.76  | 7.35***| 0.22   | 3.8* | 2.1  | 2.27 | 0.11 | 0.5  | 1.14 |
| Job                    | 1.13  | 7.61***| 0.21   | 2.58 | 0.02 | 0.08 | 0.58 | 0.1  | 1.42 |
| PC                     | 3.02* | 6.94***| 4.03** | 1.48 | 0.06 | 0.92 | 1.39 | 0.14 | 1.65 |
| Politics               | 1.58  | 8.6*** | 1.14   | 2.78*| 2.31 | 0.12 | 0.05 | 0.55 | 4.81**|
| Public Sector          | 2.58  | 6.9*** | 0.78   | 1.49 | 7.1***| 6.17**| 0.74 | 0.46 | 1.99 |
| Economy                | 0.58  | 8.47***| 0.28   | 1.81 | 0.62 | 0.22 | 0.11 | 0.17 | 2.34 |
| Education /Degree      | 0.59  | 5.95***| 0.33   | 5.92***| 4.74**| 6.49***| 2.35 | 2.29 | 1.14 |
| Consumers              | 0.62  | 5.95***| 1.56   | 1.53 | 1.48 | 1.36 | 0.25 | 0.75 | 0.2  |
| Needs                  | 2.08  | 6.41***| 0.5    | 1.48 | 2.18 | 2.52 | 0.98 | 0.15 | 0.94 |
| Global                 | 0.53  | 5.72***| 0.47   | 3.73*| 3.01*| 3.59*| 0.55 | 0.71 | 0.94 |
| Institutions           | 0.81  | 6.92***| 0.42   | 1.51 | 3.76*| 2.1  | 0.34 | 0.37 | 0.89 |
| Retirement Pension     | 0.61  | 5.78***| 0.26   | 5.58***| 0.33 | 0.14 | 0.15 | 0.38 | 0.18 |
| Saving                 | 0.54  | 5.95***| 0.32   | 1.57 | 0.5  | 0.56 | 1.37 | 0.62 | 1.33 |
| Vacation               | 3.34* | 5.59***| 2.63   | 1.51 | 0.18 | 0.57 | 0.31 | 3.23*| 4.17**|
| Competition            | 0.89  | 7.22***| 1.02   | 4.56**| 2.28 | 1.78 | 1.69 | 1.8  | 4.4** |
| Spread                 | 2.32  | 6.3*** | 0.11   | 1.77 | 0.29 | 2.78*| 6.08**| 0.49 | 0.23 |
| Rating                 | 3.32**| 6.02***| 0.27   | 5.08***| 0.01 | 1.4  | 4.46**| 1.24 | 0.22 |
| Euro-group             | 0.52  | 5.63***| 0.19   | 1.48 | 1.73 | 2.2  | 0.74 | 1.23 | 0.37 |
| Coronabond             | 0.68  | 6.96***| 0.46   | 1.67 | 3.51*| 5.02**| 0.34 | 1.24 | 1.8  |
| Eurobond               | 0.66  | 6.63***| 0.55   | 1.63 | 3.06*| 5.01**| 0.37 | 1.4  | 1.61 |
| European Stability Mechanism | 0.68 | 7.15***| 0.55   | 1.72 | 3.1* | 3.85*| 0.24 | 0.89 | 1.31 |
| Sure                   | 0.69  | 6.57***| 1.68   | 1.52 | 1.53 | 7.14***| 0.12 | 1.44 | 0.91 |
| European Investment Bank | 0.53  | 7.19***| 1.1    | 2.71 | 1.73 | 2.87*| 0.78 | 2.7  | 0.53 |
| Oil                    | 0.67  | 5.9*** | 3.16*  | 1.62 | 1.78 | 0.5  | 1.23 | 0.36 | 0.7  |
| Gold                   | 4.27**| 5.85***| 2.74*  | 3.69*| 6.78**| 4.36**| 2.22 | 0.53 | 0.19 |
| Troika                 | 1.39  | 6.99***| 1.35   | 1.54 | 4.64**| 8.02***| 2   | 2.51 | 1.03 |
| Euro                   | 0.64  | 6.53***| 0.42   | 3.07*| 0.12 | 0.83 | 0.23 | 0.09 | 0.29 |
Table 2. Granger causality tests between ERKs series and single survey questions.

| National Retirement System/INPS | GDP | National Industrial Association |
|---------------------------------|-----|---------------------------------|
| 0.58                            | 0.79| 0.96                            |
| 6.77***                         | 6.78***| 5.64***                         |
| 0.6                             | 0.12| 1.01                            |
| 1.84                            | 1.77| 3.23*                           |
| 2.69                            | 0.56| 0.28                            |
| 2.13                            | 0.31| 1.07                            |
| 0.06                            | 0.06| 0.07                            |
| 0.49                            | 0.08| 0.27                            |
| 5.46**                          | 0.53| 0.19                            |

* p < .10; ** p < .05; *** p < .01.
5. Discussion and Conclusions

In this study, we investigated some possible antecedents of consumer confidence through semantic network analysis of online news – showing that media communication can indeed influence consumers’ feelings about the state of the economy. Figure 4 shows the economic-related keywords that can have a major role in influencing consumer confidence (those with the most significant Granger-causality scores, as presented in Section 4).

![Figure 4. Most significant Granger causality results.](image)

Through a granular analysis of the dimensions of consumer confidence, we found that the extent to which the news impact consumers’ economic perception changes if we consider people’s current versus prospective judgments. ERKs seem to impact more the Personal climate, i.e. consumers’ perception of their current ability to save, to purchase durable assets and in general to feel economically stable. In addition, we find a disconnect between the ERKs impact on the current and future assessments about the economy, which is aligned with other studies (Mazurek & Mielcová, 2017; Mourougane & Roma, 2003). While the Consumer Confidence Index has been often considered a suitable predictor of economic growth and a good indicator of consumers’ optimism on the state of the current economy, the
short-term estimations may show deviations from long-term trends, likely caused by nonsystematic shocks.

Lastly, keywords associated to national or European political decisions seems to lead to more uncertainty and pessimisms. This is consistent with other empirical evidences demonstrating how the conduct of politics – in our case both at a National and European level - plays a role in determining how consumers feel about the future of the economy in both the long and short run (De Boef & Kellstedt, 2004). The higher prominence and predictive power of political keywords, both as it refers to economic and noneconomic concerns, has been considered in past research among the key determinants of consumers’ perception of the future of the economy (Nadeau et al., 1999; S. Soroka & McAdams, 2015).

These results are aligned to previous studies showing how exposure to uncertain information makes people feel uncertain and more pessimistic about their future (Svensson et al., 2017; Van Dalen et al., 2017). When keywords were associated to clear financial concepts (e.g. gold, or monetary policy), people’s reaction was more positive. When keywords were associated to political discussions or concepts like rent, role of Europe, or retirement, people’s reaction was more negative. Interestingly, the keyword “gold” had an impact on determining consumer confidence in six of the nine questions: Evaluation of the Economic situation in Italy; Evaluation of the household economic situation; Evaluation of the household budget; Current Opportunities for Savings; Current Opportunities of Purchasing Durable Goods and Expectations on the economic situation of Italy. A possible explanation is that financial institutions during economic downturns – like the 2018 and 2019 recession in Italy - tended to increase their holdings of gold as reserve assets, which was perceived positively by consumers. As demonstrated by a study commissioned by the IMF (Roache & Rossi, 2009), macroeconomic announcements have a significant impact on both the price of gold and consumer confidence.
Even if exploratory in nature, our study suggests that news has definitely important implications on consumer confidence also during economic recessions, not only during economic expansion as suggested by recent research (Ahmed & Cassou, 2016). Overall, our models confirm the important role played by the media in shaping current judgements and future expectations (Svensson et al., 2017), and the impact that national and European politics have on shaping these assessment (De Boef & Kellstedt, 2004).

This paper investigates the antecedents of consumer confidence through an analysis of the importance of economic related keywords as reported on online news. After mining online Italian news over a period of four years, we find that most of the selected keywords impact how consumers perceive their personal economic situation.

The methodology we use in this paper makes use of a new indicator of semantic importance applied to economic related keywords, which promises to offer a complementary approach to estimate consumer confidence, lessening the limitations of traditional survey-based methods. We contribute to the literature on consumer confidence and news by illustrating the benefits of adopting a big data approach to describe current economic conditions and better predict a household's future economic activity.

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