

## Mediated uncertainty

### The negative impact of uncertainty in economic news on consumer confidence

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**Mediated uncertainty. The negative impact of uncertainty in economic news on  
consumer confidence**

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**Abstract:**

A growing body of research shows that uncertainty affects individual perceptions and preferences. However we still know little about how uncertainty in news content affects public opinion formation. Building upon literature on the processing of uncertain information and prospect theory, we argue that uncertainty in the news lowers public expectations and fosters pessimism. A time series analysis of national monthly consumer confidence data, economic indicators and an automated content analysis of economic newspaper coverage between 1996 and 2012 confirm this expectation. The analysis shows that uncertainty in economic news decreases consumer confidence, after controlling for real economic developments and the tone of the news. The effect of uncertainty cannot be explained as an asymmetrical response to ambiguous information, since uncertainty in the news did not make negative information more salient. Finally, we discuss influences of the nature of reporting on uncertainty in the news.

**Mediated uncertainty. The negative impact of uncertainty in economic news on consumer confidence**

A growing body of research shows how different aspects of information affect public opinion formation. For example, negative news is given more weight than positive news when attitudes are formed (e.g. Kahneman and Tversky 1979; Goidel and Langley 1995; Soroka 2014). Likewise, changes in economic indicators have more influence on people's attitudes than the levels of these indicators (See Soroka et al. 2015, p. 460). Such differences in information processing depending on the type of information have been found in diverse areas of public opinion formation, including political perceptions, policy evaluations and consumer confidence (e.g. Lau 1982; Ju 2008; Jerit 2009; Capellos 2010).

Our study adds to this literature by addressing the underexplored influence of *uncertainty* in the news on public opinion. We know from decision theory that uncertainty and ambiguity lead to lower expected utility (Ellsberg 1961). Research on the influence of uncertainty on political perceptions has focused on internal uncertainty, showing that subjective feelings of uncertainty negatively affect candidate evaluations (e.g. Alvarez and Franklin 1994; McGraw et al. 2003).

Still, less is known about the effect of uncertainty *in the information* to which the public is exposed: How does uncertainty in the news affect public opinion? In other words, we shift the focus from the effect of internal uncertainty to the effect of external uncertainty. In this paper, we argue that the public becomes pessimistic about the future when it is confronted with uncertainty in the media reporting. This is relevant to study, because uncertainty has news value and journalistic routines may lead to an overemphasis of uncertainty (e.g. Friedman et al. 1999; Jaworski et al. 2003). We explore whether uncertainty

has an independent effect on expectations about the future or affects expectations by making negative information more salient.

The impact of uncertainty in the news on national public opinion is studied in the context of economic news and consumer confidence. Few indicators of public opinion have as much real world impact as monthly consumer confidence data (Graber 1982). The influence of economic perceptions goes beyond the economic domain, since it can also affect the popularity of politicians (MacKuen et al. 1992) and even election outcomes (Hetherington 1996). Previous studies have shown that media matter for aggregated consumer confidence. Since different economic indicators may simultaneously indicate that the economy is improving and deteriorating, uncertainty is an important aspect of economic news.<sup>1</sup> This makes the economy a suitable case to study the impact of uncertainty on public opinion.

The paper proceeds as follows. First we discuss the effect of uncertain information and subjective feelings of uncertainty on expectations and perceptions and extrapolate this to public opinion formation. We then discuss the role of uncertainty in economic news and hypothesize about its effect. Automated content analysis was used to measure monthly fluctuations in uncertainty of economic news in Denmark between 1996 and 2012. Using time-series analysis we show that the uncertainty in national economic news negatively affected consumer confidence, after control for real economic developments and the tone of the news. Finally, we discuss influences of the nature of reporting on uncertainty in the news.

### **Uncertainty and public opinion formation**

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<sup>1</sup> To give an example, following the financial crisis in 2007 media described the state of the national economy as characterized by ‘high uncertainty’, ‘very high uncertainty’ and even ‘historically high uncertainty’.

Uncertainty can be defined as “the absence of definite expectations” (Katona 1960, p. 56). Uncertainty can be a subjective feeling, but it can also be present in the information one is confronted with. Uncertainty of information implies a certain degree of incompleteness of information (Smithson 2008), more specifically limited or no knowledge about the probability of certain outcomes (Bracha and Weber 2012, p. 5). In a similar vein, Daniel Ellsberg (1961, p. 657) speaks of the ambiguity of information, which he describes as the “nature of one’s information concerning the relative likelihood of events.” Uncertainty should be distinguished from the related concept of risk (Knight 1948). Risk refers to negative outcomes with known probability. For risky situations one can forecast the likelihood of a negative outcome, while for uncertain situations there is little or no basis for predictions.

Previous research has shown that uncertainty fosters pessimism (Smithson 2008, p. 208). Although some people are prone to ambiguity, most individuals are ambiguity-averse (Einhorn and Hogarth 1986). People prefer a bet with known odds over a bet with unknown odds, even when the odds are unfavorable. This has come to be known as Ellsberg’s paradox (Ellsberg 1961). One of the explanations for Ellsberg’s paradox is that people assign additional weight to the possibility that worst outcome will occur when faced with uncertainty. Thus, uncertainty lowers expectations. Testing this in the, Ilut and Schneider (2012) confirmed this in the context of economic decision making. Research in political psychology also shows that uncertainty has negative consequences. When people feel uncertain about the positions and traits of a candidate, they evaluate that candidate more negatively (Alvarez and Franklin 1997; McGraw et al. 2003).

Individual-level studies on the effects of subjective feelings of uncertainty have given insight into the mechanisms which lead to lower expectations and pessimism. Although we will not test these mechanisms, this literature can help us formulate expectations about the effect of uncertainty in the news on public perceptions.

As a first explanation, Patt and Weber (2014) have pointed to fear as the emotion that explains why uncertainty leads to pessimism. Camerer and Weber (1992, p. 330) argue that “not knowing important information is upsetting and scary.” Uncertainty is not only associated with the “pessimistic” emotion fear, but also with the optimistic emotion hope. However, the association with fear is stronger (Smith and Ellsworth 1985, p. 827). Following this reasoning, we expect that uncertainty in the news lowers public expectations. When people read about uncertainty in the news they will become uncertain and fearful which makes them pessimistic.

The alternative explanation for the lowered expectations due to uncertainty would be that people give more weight on negative outcomes compared to positive outcomes when they feel uncertain. This is in line with prospect theory (Kahneman and Tversky 1979), according to which people are averse to loss when they have to make decisions *under uncertain circumstances* (see also Soroka 2014). According to Ellsberg (1961), the extra weight to worse-case scenarios is the result of deliberate decision making (Tiedens and Linton 2001). This deliberation and reasoning may be triggered by the uncertainty of the situation. People put more effort into assessing the validity of information under uncertain conditions (Baas et al. 2012). Following this reasoning, we expect that uncertainty in the news lowers public expectations because people place more weight on negative information when they are exposed to uncertain information.

In the next section we translate these expectations into hypotheses about the effect of uncertainty in economic news on consumer confidence.

### **Consumer confidence and mediated uncertainty**



Consumer confidence is an area of public opinion where people can be expected to become pessimistic when faced with uncertain information. Consumer confidence (or consumer sentiment) refers to the optimism or pessimism with which people think about their personal finances and the overall economy. Consumer confidence can refer to the current as well as the future state of the economy. In this paper, we are primarily interested in the impact of uncertainty in the news on expectations about the future economy. Studies at the individual and aggregate level have shown that the tone of economic news affects consumer confidence, especially when the tone is negative (e.g. Blood and Philips 1995; Wu et al. 2004; Soroka 2006; Boomgaarden et al. 2011; Hollanders and Vliegenthart 2011; Kleijnijenhuis et al. 2014; Soroka et al. 2015).

With few exceptions, previous research on the effects of economic news on consumer confidence has largely ignored uncertainty. Similar to our line of reasoning, Goidel and Langley (1995, p. 326) suggested that negative news has the most impact on economic evaluations when “economic signals are mixed and subsequently, subject to a variety of interpretations.” Svensson et al. (2015) have shown that individuals who are exposed to ambiguous information become uncertain and fearful, which in turn makes them pessimistic.

Research on the relation between economic news and the real economy has shown that economic news is not a direct reflection of the economy, since media routines shape the picture of the economy presented in the news (e.g. Wu et al. 2004; Soroka 2006). Similarly, media routines may have an impact on the attention to uncertainty in economic news, which is more than just the absence of certainty.<sup>2</sup> Uncertainty in news about the macro-economy refers to media coverage that is ambiguous about the state of the economy or expresses doubt about the future direction of the economy. Journalists actively introduce uncertainty in their

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<sup>2</sup> Stocking and Holstein (1993, p.186) make this point for ignorance.

news reports by using words like ‘may’ or ‘suggests’ (Stocking 1999, p. 35; Hansen and Blom 2014), by using an uncertainty frame (Olausson 2009), by highlighting controversies (Zehr 2000, p. 98) or presenting conflicting information (Svensson et al. 2015).

The media do not only report the uncertainty and controversies among experts, but also *manufacture* doubt (Stocking and Holstein 2009) by overemphasizing uncertainty (Ashe 2013). The professional goals of the journalists may lead to an overemphasis of uncertainty. Journalists have to balance the goal of explaining complex issues to non-expert audiences and presenting novel perspectives on the one hand, with accurately representing scientific debate and guarding themselves from criticism of being biased on the other hand (Stocking and Holstein 1993, p. 199; Stocking 1999). In certain cases, this might lead to emphasizing the uncertainty around claims about future trends and new developments. Uncertainty might also be emphasized because it can be a way to attract audiences and sell newspapers. According to Friedman et al. (1999, p. xii), journalist “are very active in uncertainty coverage”, because controversy and debate have news value (see also Jaworski et al. 2003). In sum, the media *manufacture uncertainty*.

This mediated uncertainty is expected to have a negative influence on consumer confidence *above and beyond* the influence of the real economic developments and the tone of economic news. Uncertainty in the news is expected to have a direct negative effect on expectations about the economy and to trigger asymmetric responses.

*H1. Uncertainty in macro-economic news decreases consumer confidence.*

*H2. Uncertainty in macro-economic news increases asymmetric responses to information by making negative information more salient.*

## Research design

We test the influence of uncertainty on consumer confidence with a time-series analysis of aggregated Danish media data, national consumer confidence data, and indicators of the Danish economy between August 1996 and December 2012.<sup>3</sup> Danish broadsheets are read by a broad part of the population (Hallin and Mancini 2004) and have since the 1990s given broad attention to business news (Kjær and Langer 2005). The prominence of economy in the news and the wide reach of the broadsheet newspapers make Denmark a suitable case to study the influence of economic news on aggregated consumer confidence.

We expect prospective consumer confidence to be influenced by lagged levels of uncertainty. First of all because expectations about the future economy are so called “sticky expectations” (Doms and Morin 2004), they have a large degree of stability: it takes time for people to process new information and update their expectations. Therefore we expect lagged rather than contemporary uncertainty to have an effect. While this is our expectation about the timing of the effect of uncertainty, we start with a general model and then test the specifications, since imposing restrictions a priori may lead to biased estimates and invalid inferences (De Boef and Keele 2008, p. 190). We also followed their advice and choose to test our hypotheses with an Error Correction Model, which has the advantage that short-term and long-term effects can be distinguished.<sup>4</sup> In the general Error Correction Model both concurrent changes and lagged levels of the independent variables are included. We test the following Error Correction Models:

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<sup>3</sup> August 1996 was chosen as a starting point due to the availability of Danish newspapers in the online database Infomedia.

<sup>4</sup> In addition, we tested our hypotheses with Autoregressive Distributed Lag models, which lead to the same conclusions.

$$\begin{aligned} \Delta \text{Consumer confidence} = & \alpha_1 + \text{Consumer confidence}_{t-1, k} + \Delta \text{Economic Indicators}_t + \\ & \text{Economic Indicators}_{t-1} + \Delta \text{Tone}_t + \text{Tone}_{t-1} + \Delta \text{Uncertainty}_t + \text{Uncertainty}_{t-1} + \varepsilon_1 \end{aligned} \quad (1)$$

$$\begin{aligned} \Delta \text{Consumer confidence} = & \alpha_1 + \text{Consumer confidence}_{t-1, k} + \Delta \text{Economic Indicators}_t + \\ & \text{Economic Indicators}_{t-1} + \Delta \text{Tone}_t + \text{Tone}_{t-1} + \Delta \text{Uncertainty}_t + \text{Uncertainty}_{t-1} + \\ & \text{Tone}_{t-1} \times \text{Uncertainty}_{t-1} + \varepsilon_2 \end{aligned} \quad (2)$$

$$\begin{aligned} \Delta \text{Consumer confidence} = & \alpha_1 + \text{Consumer confidence}_{t-1, k} + \Delta \text{Economic Indicators}_t + \\ & \text{Economic Indicators}_{t-1} + \Delta \text{NegativeTone}_t + \text{NegativeTone}_{t-1} + \Delta \text{PositiveTone}_{t-1, k} \\ & \text{PositiveTone}_{t-1} + \text{Uncertainty}_{t-1} + \text{NegativeTone}_{t-1} \times \text{Uncertainty}_{t-1} + \\ & \text{PositiveTone}_{t-1} \times \text{Uncertainty}_{t-1} + \varepsilon_3 \end{aligned} \quad (3)$$

Equation 1 tests whether uncertainty in macro-economic news affects consumer confidence after controlling for the influence of the lagged dependent variable, the actual economy and tone of economic news. These controls were included since tone and real world economic developments affect consumer confidence in both lagged levels and concurrent changes (e.g., Soroka et al. 2015). Equation 2 includes an interaction term between tone and uncertainty in order to test hypothesis 2. If uncertainty in the news indeed makes negative information more salient, the effect of tone should be stronger when uncertainty in the news is high. As a stronger test for hypothesis 2, Equation 3 looks at the moderating effect of uncertainty on the impact of negative and positive information separately. If uncertainty indeed makes negative information more salient than positive information, the interaction effect between uncertainty and negative news should be larger than the interaction with positive news.

Following common practice and due to availability of consumer confidence data, we use months as unit of analysis (e.g. Soroka 2006; Hollanders and Vliegenthart 2011). See descriptions of the data in Table 1.<sup>5</sup>

-Table 1 about here-

### *Operationalization*

The dependent variable *Consumer confidence* is based on aggregated monthly data collected by Statistics Denmark, who ask a random selection of the Danish population about their perceptions of and expectations to the national and personal economy. Our analysis is based on a standard prospective consumer confidence measure, since we expect uncertainty in the news to affect expectations about the future. The measure is based on four questions: (1) How do you think the national economic situation will be in a year compared with today? (2) How do you think the level of unemployment will be in a year compared with today? (3) How do you think your household's financial situation will be in a year compared with today? (4) Over the next 12 months, how likely is it that you will save any money? The first two questions measure sociotropic consumer confidence; the last two measure egotropic consumer confidence.<sup>6</sup> The four questions are combined in one prospective consumer confidence scale using the following formula:  $(\text{question1} - \text{question 2} + \text{question3} + \text{question 4})/4$ .

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<sup>5</sup> Stationarity was checked with the augmented dickey fuller test and KPSS test, which showed that the series included in the analysis are stationary.

<sup>6</sup> The monthly score for each question is a weighted aggregate of the answers of the respondents and can in theory range from -100 to +100.

*Uncertainty in economic news* was measured with dictionary-based automated content analysis (see for example Doms and Morin 2004; Soroka 2006; Hollanders and Vliegthart 2011 for a similar approach). The advantage of automated content analysis is that large amounts of data can be analyzed, which is necessary given the long time span of the analysis. While human coders are better at classifying individual articles, automated content analysis can classify content characteristics on an aggregate level (e.g., Young and Soroka 2012). We analyzed the three most read Danish broadsheet newspapers (*Politiken*, *Jyllands-Posten* and *Berlingske*), which are expected to give a good indication of the overall economic coverage in the mainstream media, since they can be considered newspapers of record. Instead of taking a sample, all articles on Danish macro-economy in the three newspapers were analyzed.

Uncertainty in Danish macro-economic news was measured in two steps. *First*, we developed a search-string to identify articles about the Danish macro-economy. These were operationalized as articles that refer directly to the state of the national economy or report on the main indicators and sectors of the Danish economy to describe the state of the national economy. We started the development of the search string with a string including all 41 search terms used in thirteen previous studies on macro-economic news. Through an iterative process, we fine-tuned the search string until satisfactory levels of “precision” (% of identified articles that fit our definition) and “recall” (% of relevant articles the search string identified) were reached (Stryker et al. 2006). The final search string used to identify macro-economic news had a recall of 74% and a precision of 94%.<sup>7</sup> As a check of the external

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<sup>7</sup> Search terms: ((econ\* OR conjunt\*) AND (Danish OR Denmark) in headline, subheading or first paragraph) OR ((econ\* OR conjunt\*) AND (Danish OR Denmark) in whole article

validity, the number of articles identified with the search string was compared to the yearly attention to the economy in Danish radio news between 1996 and 2003 (Green-Pedersen and Mortensen 2013).<sup>8</sup> The number of articles about the national economy in the three newspapers was positively and significantly correlated with attention to the economy in Danish radio news, which supports the external validity of the search string. Using this search string, a total of 7,877 articles about the Danish macro-economy were found.

As a *second* step in measuring uncertainty in Danish economic news, we automatically coded these articles using a translated uncertainty dictionary developed by Loughran and McDonald (2011) to measure uncertainty in the context of finance. After translation, the uncertainty dictionary consisted of 243 terms, which indicate “uncertainty, with emphasis on the general notion of imprecision rather than exclusively focusing on risk” (Loughran and McDonald 2011, p. 45), such as *perhaps, confusing, possibly, indeterminable, may, maybe, might, unforeseen, rumor* or *speculate*. For each month we analyzed how many of these terms were mentioned in macro-economic news. The monthly uncertainty measure

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AND (deflation, “price drop”, inflation, recession, crisis, depression, downturn, decline, shrink, improvement, upswing, grow\*, employment, “consumer spending”, “consumer confidence”, “housing market”, “disposable income”, competitiveness, (creditwor\*NOT bank) (“balance of trade” AND (deficit, surplus))in heading, subheading or first paragraph) OR (housing\* in heading, subheading or first paragraph AND “mortgage statistics” in whole article).

<sup>8</sup> The data in the Danish Policy Agenda Project were collected by Christoffer Green-Pedersen and Peter Bjerre Mortensen with support from the Danish Social Science Research Council and the Research Foundation at Aarhus University. For further details, see [www.agendasetting.dk](http://www.agendasetting.dk).

used in our study is the average number of uncertainty words per article about the Danish macro-economy in the three newspapers.<sup>9</sup>

*The monthly aggregate tone* of Danish macro-economic news was measured in a similar way, based on translated dictionaries consisting of 2,066 terms indicating a negative tone and 291 words indicating a positive tone in financial news (Loughran and McDonald 2011). The number of positive terms is considerably lower than the number of negative terms, since it is harder to identify words that only have a positive meaning in a financial context (Loughran and McDonald 2011, p. 45). In line with De Boef and Kellsted (2004) and Goidel and Langley (1995), we subtracted the number of positive terms from the number of negative terms to calculate the monthly tone of economic news.<sup>10</sup> In addition, we split the overall tone measure into negative and positive tone. Monthly negative and positive news were operationalized as the share of negative and positive words respectively, compared to all words in articles about the Danish macro-economy in the three newspapers.

Loughan and McDonald previously validated the dictionaries. As an additional external validity check we compared the results of the automated tone coding with hand-coded economic news articles, following the approach by Young and Soroka (2012). Native Danish speakers coded each of these coded 232 articles as either having (1) a negative evaluation of the general economic climate, (2) a positive evaluation or (3) no evaluation.

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<sup>9</sup> The number of words indicating uncertainty/number of articles about economy\*100. The monthly number of words indicating uncertainty in the three newspapers load on one factor.

<sup>10</sup> The aggregate tone per month = (number of positive terms – number of negative terms)/total number of words\* 100. The monthly tone is aggregated across the three newspapers, since factor analysis showed that the monthly tone for these three newspapers loads on one factor.



Intercoder reliability between the coders was .73 (Krippendorff's alpha) (Svensson et al. 2015). According to the human coders, 74 articles had a negative tone, 116 articles had no evaluation (neutral) and 42 articles had a positive tone. As a test of the validity of the dictionary-based coding, we automatically coded the negativity, positivity, uncertainty and tone for each of these three groups of articles. The comparison of the hand-coding and automated coding supports the validity of the dictionaries (all tests ANOVA with Tukey b post hoc test,  $p < .05$  (one-sided)). Automatically coded negativity is significantly higher in the group of articles that was hand-coded as negative, than in the other two groups of hand-coded articles. There are significantly more positive terms in the articles that were hand-coded as positive than in the other two sets of articles. Uncertainty is not related to the tone of the articles: there are no significant differences in uncertainty across the three groups of articles. The mean tone of the negative articles is significantly lower than the mean tone of articles that were classified by the coders as neutral or positive. The difference in tone between positive and neutral articles is significant at  $p = .06$ . This shows that the tone measure can differentiate between negative, neutral and positive articles at an aggregate level. As is the case for the tone coding with several other word lists (see Young and Soroka 2012, p. 218), the mean tone score for the neutral articles is not 0, but -.67. As a consequence of negative terms being overrepresented compared to positive terms, the mean score for neutral articles is lower than 0. Since tone is included to explain developments in consumer confidence across months, the raw scores are of little importance. Nevertheless, to increase the interpretability of the data, we corrected for the overall low scores by adding .67 to the tone score.

Finally we looked closely at potential overlap between the dictionary of uncertainty and the dictionary measuring tone, in particular negativity. At the article level, uncertainty is not significantly correlated with either tone or negativity. The monthly aggregated

uncertainty and negativity-scores are significantly correlated ( $r=.17, p<.05$ ). When monthly uncertainty and negativity for the three outlets are included in a factor analysis, uncertainty in the three newspapers loads on a different factor than negativity in the three newspapers. In the original world lists by Loughran and McDonald (2011) 40 of the terms in the uncertainty dictionary are also in the negativity dictionary. In the translated dictionary we used 46 terms in the uncertainty dictionary are also in the negativity dictionary. These terms account for only 5% of the words which were identified as uncertain in the automated content analysis. Comparison of the uncertainty dictionary to the negativity dictionaries AFINN (in Danish, Nielsen 2011) and the General Inquirer (in English) showed an overlap of respectively 22 and 35 terms. Similarity is larger with the negativity world list in Lexicoder (Young and Soroka 2012), where there is overlap for 32 unique terms and 45 variations of these terms. 27 of the uncertainty words which were also in the Lexicoder word list were classified as belonging to words which indicate ‘degree of evidence’ according to Roget’s Thesaurus. This strengthened us in our conviction that these terms indeed indicate uncertainty. We conclude from these comparisons that uncertainty is a different construct than negativity, although not fully independent.

*The actual state of the economy* was controlled for by including Composite Leading Indicators collected by the OECD. This measure is a monthly aggregate of several indicators of the development of the national economy.<sup>11</sup> Previous studies of economic news have used

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<sup>11</sup> The CLI for Denmark is an aggregated measure of the following economic indicators: (1) total volume of retail sales, (2) new passenger car registration, (3) employment figures, (4) production figures, (5) official discount rates, (6) deflated money supply, (7) petrol exports, (8) consumer confidence. The data were downloaded from the OECD website, accessed September 19, 2013, <http://www.oecd.org/std/leading-indicators>. The analysis used the

similar indicators to control for real-world economic developments (e.g. Blood and Philips 1995; Soroka et al. 2015).

## Results

Figure 1 shows the monthly development of prospective consumer confidence and of uncertainty in news about the Danish macro-economy between 1996 and 2012. The goal of this study is to find out whether uncertainty in economic news affects consumer confidence, rather than explaining how real world developments and journalistic routines shape the level of uncertainty in the news. Nevertheless, it is insightful to see when uncertainty makes it into the news, especially in relation to the economic boom and bust periods that Denmark went through between 2003 and 2012. At the beginning of 2004, at the start of the economic house there was a sharp increase in uncertainty in the news, when Berlingske for example wrote in an Op-ed that “Uncertainty requires caution” (6 December 2003). After a brief period, the level of uncertainty dropped again. At the peak of economic growth in 2007 uncertainty was at the lowest, with an average of 3 words indicating uncertainty per article. In 2008 when Denmark entered a recession, uncertainty increased sharply again, with headlines like “Uncertainty: large uncertainty about property values” (Berlingske, 19 November 2008). In 2009, while the Danish economy had still not improved, uncertainty decreased again. Uncertainty in the news fluctuated heavily between 2009 and 2011. During these years the

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amplitude adjusted CLI, which the OECD describes as “the most straightforward way to present the CLI”. Consumer confidence is also an aspect of the CLI, which means that in our study consumer confidence is partly determined by its own past. Since the CLI is only included as a control variable, we did not correct for this. If anything, it makes the test of the hypotheses more conservative.

tone of economic news remained negative (Van Dalen et al. 2015). These developments seem to suggest that uncertainty in the news is more volatile than the tone of the news and increases when the economy is undergoing change, even when change is positive. In times of change the journalists might impose uncertainty in the news as a way to gain more interest from the audience or as a way to taking some reservations about where the economy is heading (like “The economy is improving – maybe” (Jyllands Posten, 2 April 2009). Claims about uncertainty in the economy are often attributed to external sources, like “Investment organization: Be prepared for an uncertainty fall” (Jyllands Posten, 19 August 2006), or “OECD report: Uncertainty about Danish growth” (Jyllands Posten, 12 May 2004). However, this does not necessarily mean that mediated uncertainty reflects real world uncertainty, since journalists might pick these sources to introduce uncertainty into the news.

Prospective consumer confidence shows an inverse relation with uncertainty in the news (zero-order correlation  $r = -.22, p < .05$ ). Between 2003 and 2007 when Denmark experienced sustained economic growth, consumer confidence kept rising, peaking in July 2007. After November 2007 when Denmark entered several years of economic contraction and stagnation, consumer confidence dropped sharply. Despite several upturns, consumer confidence did not reach the same levels as before the start of the economic downturn. While the development of consumer confidence is clearly related to the development of the real world economy, it diverges from the general economic climate at times. In 2008 and 2011, when uncertainty in the news was high, consumer confidence was significantly lower than the economic climate would predict.<sup>12</sup> A Granger causality test showed that uncertainty granger

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<sup>12</sup> This was confirmed in a time-series analysis where consumer confidence was determined by its own past, the state of the economy and the tone of the news plus dummy variables for 2008 and 2011. The year-dummies had a significant negative effect.

causes consumer confidence ( $F(2, 190) = 3.44, p < .05$ ). The reversed effect is weaker and only significant at  $p < .1$  ( $F(2, 190) = 2.98$ ).<sup>13</sup>

-Figure 1 and Table 2 about here-

Table 2 supports the influence of uncertainty in macro-economic news on consumer confidence.<sup>14</sup> As expected, consumer confidence is explained by its past as well as real world economic developments (Model 1). Concurrent changes and lagged values of the tone of economic news have a significant influence on consumer confidence, in line with previous research.<sup>15</sup> When both lagged uncertainty in economic news and concurrent change in uncertainty are included, neither variable is significant (Model 2). When change in uncertainty is excluded from the model (Model 3) lagged uncertainty has a significant effect. The model has a better fit (AIC, HQC and SBC) than the model where both change and lagged uncertainty are included. Excluding lagged uncertainty from the model and keeping

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<sup>13</sup> Two lags of both variables were included in the Granger causality test, since this is the minimum number of lags for models without autocorrelation.

<sup>14</sup> Breusch-Godfrey and Ling Box Q statistics show that all regression models are free of autocorrelation.

<sup>15</sup> Granger causality test revealed bidirectional causality between Composite Leading Indicators and consumer confidence. Therefore we do not to conclude that concurrent changes in CLI influences consumer confidence. Consumer confidence does not granger cause tone, thus we are more confident in the effect of concurrent changes in tone on consumer confidence. The same applies to negativity in Models 4 and 5.

change in uncertainty improves the model less, and change in uncertainty is only significant at  $p < .1$  (results not shown).

Model 4 tests the effect of uncertainty when negative and positive tone are included in the model separately instead of combined into one tone measure. Model 4 shows that lagged negative tone and change in negative tone decrease consumer confidence. Neither positive tone nor change in positive tone have a significant effect, confirming that the response to economic news is asymmetric. Similar to Model 2, when uncertainty and change in uncertainty are included together, neither is significant. Again, the model improves when we only include lagged levels of uncertainty (Model 5).<sup>16</sup> When change in uncertainty is included instead of lagged levels of uncertainty, the fit of the model is lower and change in uncertainty has no significant effect (results not shown). Thus, we conclude that consumer confidence reflects lagged levels of uncertainty in economic news rather than concurrent change in uncertainty (see discussion).

If journalists include on average one more term indicating uncertainty per news article, consumer confidence will drop by one third of a point in the month after. The long-run multiplier for uncertainty is  $-.79$ . This means that a one standard deviation increase in uncertainty will in the long run decrease consumer confidence by 1 point, which is about 3.5% of the range of consumer confidence in the period of investigation. We conclude that hypothesis 1 is supported.

Additional tests were done to check the robustness of this result. First we included the visibility of economic news as an extra control variable in the models. Visibility of economic

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<sup>16</sup> Lagged levels of positive tone and change in positive tone are excluded from Model 6, since including either individually showed no significant effect on consumer confidence and led to a worse fit of the model.

news was operationalized as the monthly number of articles about the Danish macro-economy. Visibility did not change the impact of uncertainty on consumer confidence. Second, we included the unemployment rate, price index, and production index to control for the current state of the economy. After including these indicators, the effect of lagged uncertainty remained significant. Finally, following Doms and Morin (2004) we tested the model with differently specified months, which also confirmed that consumer confidence is explained by uncertainty in the previous month.<sup>17</sup> All models are available upon request.<sup>18</sup>

-Table 3 about here-

To test whether uncertainty in economic news triggers an asymmetric response to economic news, we first test equation 2, which includes an interaction between uncertainty and tone

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<sup>17</sup> Consumer confidence data are collected in the first two weeks of each month, while the content analysis is done for the whole month. Thus, when we include concurrent changes, consumer confidence is partly explained by news that is presented after consumer data are collected. The results are confirmed in a model with several lags of uncertainty and with a model where a month is defined as running from the 16<sup>th</sup> until the 15<sup>th</sup>.

<sup>18</sup> Additionally we analyzed the effect of uncertainty of each of the four consumer confidence questions separately. This shows that the effect of uncertainty on consumer confidence was mainly driven by the influence on expected national unemployment, but does not decrease egotropic consumer confidence. This is in line with the impersonal impact of the media, according to which media coverage matters more for perceptions of the macro-economy (sociotropic evaluations) than for perceptions of one's own economic situation (e.g. Boomgaarden et al. 2011; Mutz 1998).

(See Model 6 in Table 3).<sup>19</sup> In line with hypothesis 2, the interaction term between tone and uncertainty is positive. However the coefficient is not statistically ( $p = 0.82$ ) or substantially significant.<sup>20</sup> Model 7 testing equation 3 shows a similar picture. There is no interaction effect of uncertainty and positive news. The interaction between uncertainty and negative news is negative, but not statistically significant ( $p = .78$ ) or substantially significant.<sup>21</sup> An F-test showed that the difference in effect size of the positive and negative interaction term was not significant ( $F(1,188)=1.42$ , n.s.). Thus, hypothesis 2 is not supported. Our analysis does not show that uncertainty in economic news increases the effect of negative information.

## Discussion

The analysis of the impact of uncertainty on public opinion formation shows that uncertainty in the news makes people pessimistic. Research on the individual level previously showed that people are generally averse to uncertainty and that uncertainty and ambiguity lead to fear

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<sup>19</sup> Uncertainty, tone, negativity and positivity have been mean-centered, as the models testing interactions would otherwise suffer from multicollinearity.

<sup>20</sup> The marginal effect of tone was positive for the whole range of mean-centered uncertainty and significant for mean-centered uncertainty values between -1.57 and 1.52 (79.6% of the months, Johnson-Neyman significance test). The change in effect size of tone from the low end to the high end of the mean-uncertainty scale was only marginal.

<sup>21</sup> The marginal effect of negative tone on consumer confidence was negative for the whole range of mean-centered uncertainty and significant for mean-centered uncertainty values between -1.02 and 1.31 (64.8% of the months, Johnson-Neyman significance test). The increase in effect size was not substantially significant.



and negative expectations. This study shows that media reports about economic uncertainty have a similar effect on consumer expectations at the national level.

We found that consumer confidence reflects lagged levels of uncertainty, but not concurrent changes in uncertainty. This is different from the effect of tone, in particular negativity. On the one hand, corroborating previous research, our study shows that consumer confidence reflects both levels and change in negativity. People react to shifting levels of negativity, which might be the result of evolutionary advantages of paying attention to new information and changes in their environment (Soroka et al. 2015, p. 460). On the other hand people react to the mere existence of uncertainty. This implies that exposure to uncertain information makes people feel uncertain, which triggers fear and pessimism, independent of whether uncertainty increased or decreased.

The different effects of change in uncertainty versus change in tone underline that uncertainty is not merely an aspect of negativity. Not only were uncertainty and negativity weakly correlated, uncertainty had an independent effect on consumer confidence, which was not due to making negative information more salient. Thus the negative effect of uncertainty cannot be explained as an asymmetric response to ambiguous information. This does not mean that there is no asymmetric responsiveness. The study did confirm that public opinion reacts more to negative than to positive news. However, contrary to our expectation, the strength of asymmetric responsiveness did not increase with higher levels of uncertainty in the news. Perhaps uncertainty does trigger asymmetric responses for some individuals, for example those with high levels of sophistication (McGraw et al. 2003). This should be the subject of future research, preferably in controlled experiments. Such experiments could include measures of subjective uncertainty and emotions like fear or sadness, to understand the mechanisms linking exposure to uncertain information and pessimism and study the

moderating role of sophistication. Our macro-level study offers limited possibilities to test these mechanisms.

Content analysis of uncertainty in economic news at a lower level of aggregation could tell us more about which part of news uncertainty is due to journalistic intervention and how much reflects uncertainties in the real economy, such as on financial markets or about policy decisions. Such a content analysis could also show whether uncertainty is more present in specific outlets like tabloid newspapers or television news. Ideally, some measure of real world economic uncertainty would have been included in the regression analysis predicting consumer confidence. When we use economic policy uncertainty in Europe as a proxy for uncertainty in the Danish economy (Baker et al. 2013), mediated uncertainty remains significant (results not shown). This suggests that mediated uncertainty is influenced by journalistic practices, role conceptions and audience demands as discussed above. There is reason to expect that uncertainty will become more present in the future, as economic journalism is becoming more like mainstream news (Kjær and Langer 2005). Economic journalism seems to follow a trend in journalism becoming more and more future-oriented (Hyde 2006) with increasing speculation about forthcoming developments (Neiger 2007). Over time journalists themselves have become more active in speculation and forecasting future events, rather than leaving this to their sources (Hansen 2015). When journalists speculate about the future, they introduce uncertainty in the news.

Independent of how much uncertainty in economic news is manufactured by journalists and how much is a reflection of uncertainty in the economy, it is the mass media that make citizens aware of uncertainty about the future of the economy, which makes it relevant to study the effect of news content. We think the results encourage further studies of public opinion formation to address the impact of uncertainty of information. The negative impact of uncertain information can be expected to matter for politics and public opinion

formation more broadly, beyond the realm of the economy and consumer confidence. Subjective uncertainty has been shown to play a role in public opinion formation more broadly, affecting policy and candidate support (e.g. Bartels 1986; Alvarez and Franklin 1994). Similar studies would benefit from taking uncertainty in the news into account as well.

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**Figure 1: Prospective consumer confidence (grey) and uncertainty in news about the Danish macro-economy (black) Three period simple moving averages**

**Table 1: Descriptions of variables**

Variable	Mean	Standard deviation	Minimum, maximum
Consumer confidence	9.47	5.53	(-8; 21)
Uncertainty economic news	6.83	1.19	(3.14; 10.0)
Tone economic news	-0.48	.61	(-2.10; 1.41)
Negative economic news	2.87	.44	(1.76; 3.97)
Positive economic news	1.73	.28	(1.19; 2.74)
Composite Leading Indicators	99.98	1.19	(96.37; 101.96)

N=197 (August 1996-December 2012)

**Table 2: Change in Consumer confidence explained by uncertainty in economic news (August 1996-December 2012)**

	Model 1		Model 2		Model 3		Model 4		Model 5	
Constant	-112.32 **	(24.97)	-109.15**	(24.87)	-109.35**	(24.81)	-103.73**	(25.56)	-100.53**	(24.39)
Consumer Confidence t-1	-0.43**	(0.06)	-0.44**	(0.06)	-0.44**	(0.06)	-0.43**	(0.06)	-0.43**	(0.06)
Δ Economic indicators	5.14**	(1.14)	4.84**	(1.16)	4.78**	(1.14)	4.80**	(1.16)	1.12**	(0.25)
Economic indicators t-1	1.17**	(0.25)	1.16**	(0.25)	1.17**	(0.25)	1.13**	(0.25)	4.77**	(1.14)
ΔTone	1.00 *	(0.39)	1.03*	(0.40)	1.00*	(0.39)				
Tone t-1	1.36**	(0.42)	1.26*	(0.42)	1.25**	(0.42)				
ΔNegative news							-1.53**	(0.56)	-1.59**	(0.53)
Negative news t-1							-1.56*	(0.68)	-1.77**	(0.59)
ΔPositive news							0.17	(0.80)		
Positive news t-1							0.73	(1.06)		
ΔUncertainty			0.06	(0.18)			0.04	(0.18)		
Uncertainty t-1			-0.29	(0.24)	-0.36*	(0.17)	-0.29	(0.24)	-0.34*	(0.17)
Adj. R square	0.26		0.27		0.27		0.27		0.28	
AIC	961.60		961.13		959.27		963.31		957.96	
HQC	969.56		971.75		968.56		976.58		967.25	
SBC	981.27		987.36		982.22		996.09		980.91	
N	196		196		196		196		196	
Breusch-Godfrey	2.02	(p=0.16)	1.25	(p=0.27)	1.14	(p=0.29)	0.97	(p=0.33)	1.30	(p=0.26)
Ljung Box Q	0.77	(p=0.38)	0.49	(p=0.48)	0.45	(p=0.50)	0.39	(p=0.53)	0.52	(p=0.47)

Note: Unstandardized beta-coefficients with standard error between brackets. \*\*p<.01, \*p<.05,#p<.1 (two-sided t-tests)

**Table 3: Consumer confidence explained by uncertainty in economic news (August 1996-December 2012)**

	Model 6		Model 7	
Constant	-112.29**	(24.83)	-109.22**	(25.07)
Consumer Confidence t-1	-0.44**	(0.06)	-0.44**	(0.06)
Δ Economic indicators	4.73**	(1.18)	4.69**	(1.18)
Economic indicators t-1	1.17**	(0.25)	1.13**	(0.25)
ΔTone	1.00**	(0.39)		
Tone t-1	1.26**	(0.42)		
Positive news t-1			0.60	(0.82)
ΔNegative news			-1.55**	(0.54)
Negative news t-1			-1.61*	(0.64)
Uncertainty t-1	-0.36*	(0.17)	-0.32#	(0.18)
Tone t-1Xuncertainty t-1	0.05	(0.27)		
Positive news t-1Xuncertainty t-1			-0.01	(0.56)
Negative news t-1Xuncertainty t-1			-0.12	(0.45)
Adj. R square	0.27		0.27	
AIC	961.24		963.31	
HQC	971.86		976.58	
SBC	987.46		996.09	
N	196		196	
Breusch-Godfrey	1.17	(p=0.28)	0.93	(p=0.34)
Ljung Box Q	0.46	(p=0.50)	0.37	(p=0.54)

*Note:* Unstandardized beta-coefficients with standard error between brackets. \*\*p<.01, \*p<.05,#p<.1 (two-sided t-tests)