Inflation Expectations, Perceptions and News Media: Regional Differences in Switzerland*

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Abstract

This paper studies newspaper inflation reporting and its effects on inflation expectations and perceptions in Switzerland. We create a standard quantitative inflation news measure and a novel qualitative measure of inflation sentiment for newspapers written in two national languages. To study the effects of news on inflation expectations and perceptions, we first check for the existence of a negativity bias in inflation news reporting. Second, we exploit the language barrier in Switzerland to analyse the effects of inflation media shocks on regional inflation expectations and perceptions. We highlight three findings. First, we find no evidence of a negativity bias in French and German-written newspapers. Second, both the quantitative and qualitative news significantly affect expectations and perceptions. Third, we document socio-demographic differences in the effect of news across the language border.

JEL Codes: C32, E31, D84

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1 Introduction

Since the Covid-19 crisis, inflation rates have reached historical heights in many countries around the entire globe. Theoretically and empirically, inflation expectations are an important driver of inflation. For households, expectations are strongly linked to inflation perceptions (Weber et al. 2022). Survey evidence shows that households draw their information about the current price levels from their personal shopping experience as well as social media and news from television and newspapers (Blinder and Krueger 2004; Kumar et al. 2015; Cavallo, Cruces, and Perez-Truglia 2017; D'Acunto et al. 2021).

This paper focuses on the latter aspect. Using a comprehensive data set of newspaper articles in Switzerland, we study the inflation news coverage and its effects on households' inflation expectations and perceptions. First, we construct a quantitative inflation news measure and a novel inflation news sentiment for newspapers written in two of the national languages in Switzerland, French and German.[1] Second, we follow an empirical approach developed by Gambetti, Maffei-Faccioli, and Zoi (2023), henceforth GMZ, using a Threshold Structural Autoregression (TSVAR) to study differences in inflation news reporting. Third, we exploit the language barrier in Switzerland as a quasi-natural experiment to analyse how news reporting affects households' inflation expectations and perceptions.

Since the onset of the Covid-19 crisis, inflation rates in Switzerland have steadily increased, reaching a peak of 3.5% in August 2022. While this may seem relatively low compared to other countries such as the United States, which saw an inflation rate of 8.2% during the same period, this level of inflation is the highest that Switzerland has experienced in the past 25 years, and is comparable only to the levels observed during the financial crisis.

We start by discussing the two inflation news measures and descriptive results. The quantitative inflation news measure is defined as the difference of the number of articles reporting an inflation increase minus the number of articles reporting an inflation decrease. This measure is inspired by GMZ and Soroka (2006). The difference of articles reporting an increase versus decrease of inflation reflects the prevailing tone of inflation reported in newsarticles. We show that this measure correlates well with the actual inflation rate for news articles in both languages, French and German.

The quantitative inflation news measure, however, is not a sentiment-based indicator. A decrease (increase) in the inflation rate is not necessarily assessed as good (bad) by newspapers, as argued in Soroka (2006). We highlight this in an example. Switzerland

[1]Switzerland has four national languages: German, French, Italian and Romansh which are reported by 62.3%, 22.8%, 8% and 0.5% of the population in Switzerland as their main language, respectively. Respondents could report up to 3 main languages. 23.1% reported a different main language (Federal Statistical Office 2022a).

experienced a rather strong inflation decrease after 2015 where the inflation rate plunged into negative territory. During this time, newspapers in both languages reported in a negative way about the level of the inflation rate, even warning about the risk of a deflationary spiral. To better assess the sentiment of news reporting, we construct a novel qualitative inflation news measure to explore differences in sentiment news reporting and its effects on households' expectations and perceptions.

This qualitative news measure is the positive or negative sentiment derived from the same set of articles using a state-of-the-art Natural Language Processing (NLP) Model. The model, called BERT and short for Bidirectional Encoder Representations, was originally developed at Google by Devlin et al. (2018a). It has been used extensively for various NLP tasks, including sentiment analysis (see, among others, Nemes and Kiss (2021), Lee (2020)). We fine-tune this model on a set of 1000 self-annotated inflation articles for each language and show that this measure captures different information than the quantitative news measure of inflation.

We proceed by analysing newspaper inflation reporting using a TSVAR. In more detail, we study the dynamic responses of the quantitative and qualitative inflation news measure to unexpected positive and negative changes in the inflation rate. We do this for two reasons.

First, we want to analyse whether newspapers written in French and German report in a systematically different way about an inflation increase or decrease. Such differences are referred to as negativity bias in newspapers, where newspapers tend to over-report negative outcomes (inflation increase) over positive (inflation decrease) to attract more attention from news-readers (Soroka 2006, GMZ). We find no evidence that such a negativity bias is present in Swiss newspapers written in French and German. Furthermore, we find no systematic differences in the quantitative and qualitative news measure across regions. These results will be helpful in interpreting the effects of news on inflation expectations and perceptions (more on that below).

Second, we use the TSVAR to identify media shocks that are unrelated to the current inflation dynamics but affect the inflation news reporting. For the identification, we exploit the high frequency of the newspaper data. We then aggregate these shocks such that they match the quarterly frequency of our survey data to study the effects of news on inflation expectations and perceptions. Arguably, Swiss newspapers written in French and in German report about the same national inflation rate. We assume that households living in the French-speaking part of Switzerland mostly consume news written in French and those in the German-speaking part news written in German. This allows us to exploit regional differences in news reporting to investigate how the media shocks affect households' expectations and perceptions while controlling for household characteristics as well as time fixed-effects.

We find that the quantitative news measure has a small but significant effect on inflation expectations and perceptions. When relatively more news about an inflation increase versus an inflation decrease are published, inflation expectations and perceptions increase. This effect is mostly significant during times when inflation goes up. For the qualitative sentiment measure, we find that the effect is countercyclical to the current inflation environment. When inflation is positive, a more positive assessment of inflation in news reduces expectations and perceptions, whereas when inflation is negative, a positive sentiment lifts up expectations and perceptions.

Furthermore, we document differences in the effect of news across the language border and age. We find that both the quantitative and qualitative media shocks have a significantly higher effect for households living in the German-speaking part compared to the households living in the French-speaking part. While our results from the TSVAR rule out that this effect is due to systematically different news reporting across regions, it is possible that other unobserved characteristics may explain this result. For example, Jost (2018) found that households in the German-speaking part have a significantly higher level of inflation aversion than households in the French-speaking part, which may make them more receptive to news about inflation.

Alternative explanations could be that differences in shopping experience (on a regional and cross-border level) might drive these results or that households directly observe different inflation rates in their cantons. However, Kluser (2023) found no evidence of regional price discrimination for one of the largest Swiss retailer and inflation rates in France and Germany are very similar. In addition, the official cantonal inflation rates of the three biggest Swiss cities, Basel, Zürich and Geneva are much the same. Therefore, it is unlikely that differences in shopping experience or inflation rates drive the effect of news across the language border.

With respect to age, we find some evidence that the effect of the quantitative and qualitative media shock is stronger for relatively elderly households compared to younger households. This is in line with studies that show elderly people spend more time on reading news in newspapers than younger people (see, for example, Lee and Delli Carpini (2010) and Federal Office of Communications (2016)). An alternative explanation for the higher effect across age is that they pay more attention to inflation news due to their higher inflation exposure through their savings (Doepke and Schneider 2006) or consumption expenditures (Basso, Dimakou, and Pidkuyko 2023).

These results are policy relevant. As news affects households' expectations and perceptions, it may have several real effects. First, well-anchored inflation expectations increase the effectiveness of monetary policy (Lamla and Lein 2014; Nautz and Strohsal 2015). Second, inflation expectations may be self-fulfilling (Leduc, Sill, and Stark 2007). Third, our results

provide guidance for policy communication. While we find a significant number of articles mentioning the Swiss National Bank in the analysed news, the higher effect among elderly households suggests that policy makers should exploit various communication channels to reach all types of households. Fourth, we provide a new inflation sentiment measure that tracks how newspapers assess inflation for newspapers written in both French and German. This measure may be valuable for policy institutions to summarise how inflation is assessed by the news media in Switzerland.

Our paper broadly relates to three different strands of literature. First, it contributes to the literature in political science and economics about news reporting of economic events. Most findings in this literature document a negativity bias, i.e., negative news receive a relatively higher coverage than positive news (see, for example, Goidel and Langley (1995), Fogarty (2005), Soroka (2006), Soroka (2012)). However, for unemployment news coverage in the United States, GMZ find that the negativity bias disappears when taking into account the non-linearity in the unemployment rate response to economic shocks itself. Using the approach of GMZ, we are the first to explore the news coverage of inflation and find no evidence for the negativity bias in Switzerland for newspapers written in French and German.

Second, our paper belongs to a literature that studies the role of information for expectations and perceptions. Motivated by increasing empirical evidence about the rejection of the full-information rational expectation (FIRE) model, there is a growing body of literature studying different sources of information economic agents use and how they affect their economic decisions, perceptions and expectations.[2] For instance, recent survey evidence finds that shopping experience is an important driver of inflation perception and expectations (Cavallo, Cruces, and Perez-Truglia 2017; D'Acunto et al. 2021). For newspapers, Larsen, Thorsrud, and Zhulanova (2021) find that news media coverage plays an important role in the expectation formation process. Moreover, households update their expectations more often during periods of high news coverage, for example during recessions (Carroll 2003; Doms and Morin 2004). Switzerland provides an interesting framework to study the effects of media to inflation expectations and perceptions. While Swiss newspapers report about the same national inflation rate, households in the different language regions are likely to consume news in the language predominant in their region. This assumption allows us to be more restrictive in our econometric set-up than the above mentioned studies by including time fixed-effects. To the best of our knowledge, we are the first to exploit this language barrier to study how inflation news reporting affect inflation expectations and perceptions.

Third, our paper contributes to the literature that studies cultural aspects of economies

[2]For the rejection of the FIRE, see, for example, Mankiw, Reis, and Wolfers (2003), Coibion and Gorodnichenko (2015), Bordalo et al. (2020), Kohlhas and Broer (2019) or Angeletos, Huo, and Sastry (2020).

and its link to economic outcomes. For example, a high inflation aversion is often attributed to Germany due to its experience of hyperinflation in 1923 (Cukierman 1992; Hayo 1998; Issing 2005; Beyer et al. 2008; Ehrmann and Tzamourani 2012). In Switzerland, Eugster et al. (2017) and Jost (2018) both exploit the language border to study how culture affects unemployment and monetary policy preferences, respectively. Jost (2018) document that households in the French-speaking part have a significantly lower inflation aversion than households in the German-speaking part. We show that news has a significantly higher effect for households in the German-speaking part of Switzerland compared to those in the French-speaking part. Potentially, this difference in the effect of news is linked to the different level of inflation aversion across the language border.

The rest of the paper is organized as follows. In section 2, we describe the newspaper article data used and construct the quantitative and qualitative inflation news measure. In Section 3, we check for the existence of a negativity bias in inflation news reporting and systematic differences across regions. Section 4 discusses the household survey used for inflation expectations and perceptions. In Section 5, we analyse how media shocks affect inflation expectations and perceptions. Section 6 provides several robustness checks. Finally, Section 7 concludes.

2 Newspaper Articles Data

In this section, we outline the newspaper articles data and how we derive the quantitative and qualitative news measures of inflation. Moreover, we provide some descriptive results.

2.1 Selection of Articles

To retrieve newspaper articles in Switzerland written in German and French we use a novel database, called "Swissdox". Swissdox is an online media database that aims to provide the broadest possible coverage of the Swiss media landscape (Swissdox 2022). The database contains more than 20 million news articles. In this study, we focus on the largest regional media outlets in the French-speaking and German-speaking part of Switzerland that have the longest time coverage in the database. For newspapers written in German, we include articles from *Berner Zeitung, Tages Anzeiger, Blick* and *20 Minuten*.[3] French-written newspapers encompass articles from *Le Temps, 24 heures, Tribune de Genève, 20 minutes* and *Le Matin*.

[3]Note that we exclude the German-written Neue Zürcher Zeitung (NZZ) from the main analysis in this paper. Swissdox classifies NZZ as a national newspaper. As one of our assumption is that households in the French (German) speaking part consume only French (German) written newspapers, we prefer to focus on more regional newspapers and believe leaving out the NZZ is a more prudent approach for this.

For all newspapers, we focus on printed articles.

We first clean the text of the articles, remove the most frequent stopwords and apply lemmatization to the remaining words. After that, we follow closely GMZ to select articles that indicate an inflation increase or decrease. For this, we search for economic articles that contain the words inflation or prices. If these words are preceded or followed by indicators of an increase or decrease in the distance of five-words, the article is classified as inflation increase or inflation decrease, respectively.[4] Appendix A provides a detailed description of all words considered for both languages and provides an overview of the articles collected using wordclouds. In this paper, and similar to GMZ, we do not distinguish whether the articles write about past, current and/or future inflation. For newspapers written in German, we find a total of 10,520 articles and 13,407 articles for newspapers written in French.

2.2 Quantitative News Measure

The quantitative news measure is defined as the difference between the number of articles writing about an increase of inflation and those that report a decrease of inflation. An article is counted as an article writing about a decrease of inflation if the article mentions a decrease more often than an increase of inflation.[5]

The quantitative news measure is an indicator about the prevailing information of inflation in the newspaper at a specific point in time. If the number of articles indicating an increase (decrease) in inflation dominates the number of articles writing about a decrease (increase) in inflation, the indicator takes on a more positive (negative) value.

Over the entire sample period, we observe 8,180 German-written articles that write about an inflation increase and 2,340 that write about an inflation decrease. For French-written articles, we have 7,646 and 5,761, respectively. Overall, we identify more articles to write about an inflation increase relative to an inflation decrease for German-written articles.

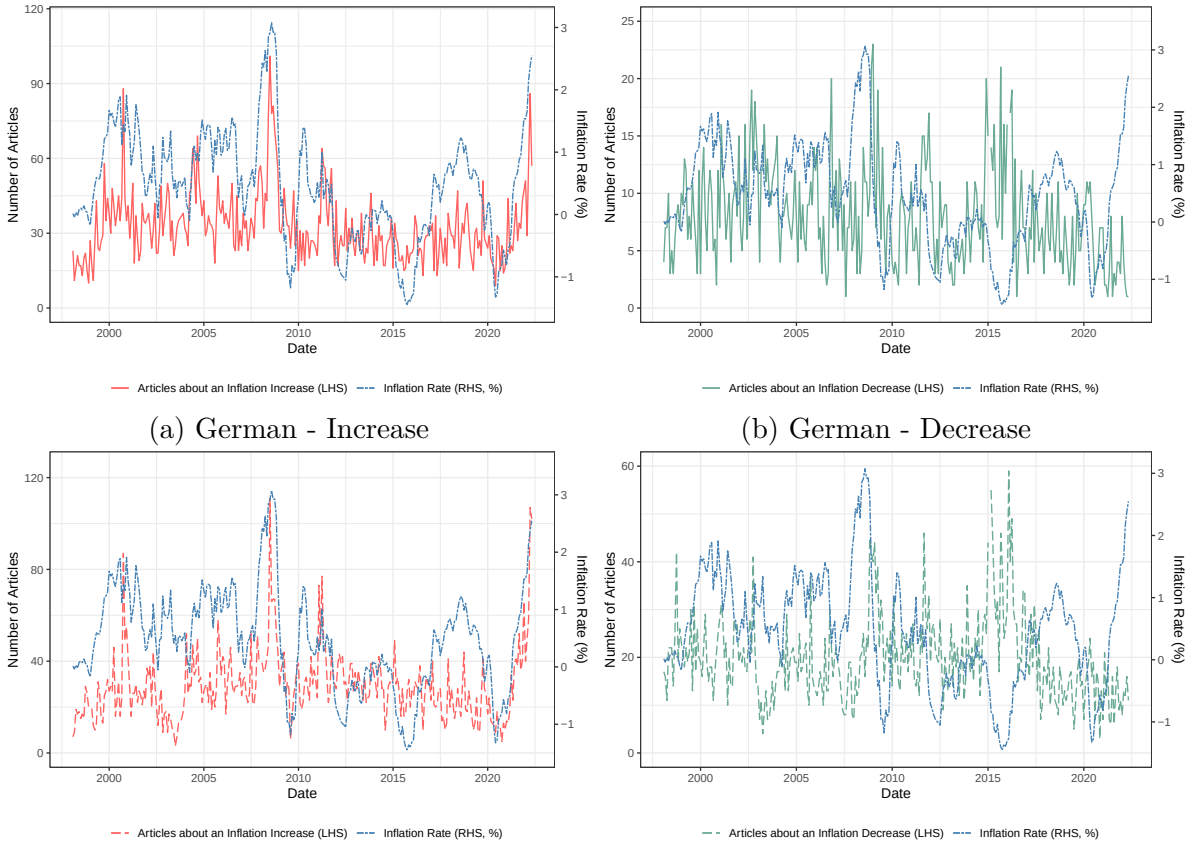
2.3 Descriptive Results

Figure 1 plots the time series of news articles reporting an inflation increase or a decrease together with the observed inflation rate for each language separately. Panel 1a plots the inflation rate and the number of articles that report an inflation increase. In general, the number of articles reporting an inflation increase in German-written newspapers increases

[4]Note that the results are very similar using a different word distance.

[5]Note that, similar to GMZ, we could also only consider articles that write exclusively about increases or decreases of inflation. The results are robust to this alternative definition. However, to increase the total number of articles considered in this analysis we preferred sticking to this measure.

when inflation rises. The reporting of articles about an inflation increase peaked during the financial crisis with 101 articles published in June 2008.



(a) German - Increase

(b) German - Decrease

(c) French - Increase

(d) French - Decrease

Figure 1: Articles writing about an Inflation Increase and Decrease

Notes: On the left-hand side, the panels show the number of articles that write about an inflation increase (left-hand scale) together with the actual observed inflation rate (right-hand scale) for both newspapers written in German and French, respectively. The observed inflation rate is the change in percentage compared to the same month in the previous year. On the right-hand side, the panels show the number of articles writing about an inflation decrease (left-hand scale) together with the observed inflation rate (right-hand scale) for both newspapers written in German and French, respectively.

Panel 1b plots the inflation rate together with the number of articles writing about an inflation decrease. During the financial crisis, the maximum articles mentioning an inflation decrease was 21 in December 2009. The highest number of articles published in a given month was reached in January 2015 with 37 articles, which was during a period of relatively strong negative inflation in Switzerland.

Panel 1c and 1d plot the same indices for all articles from French-written newspapers. In general, the reporting of inflation increase and decrease follows the evolution of the inflation rate. One exception is the period between January 2003 to December 2003, with unusually

low levels of articles writing about inflation increase or decrease. This is due to a reporting issue in the Swissdox database. For this reason, we will discard this time period from our sample for both, the German articles and the French articles.

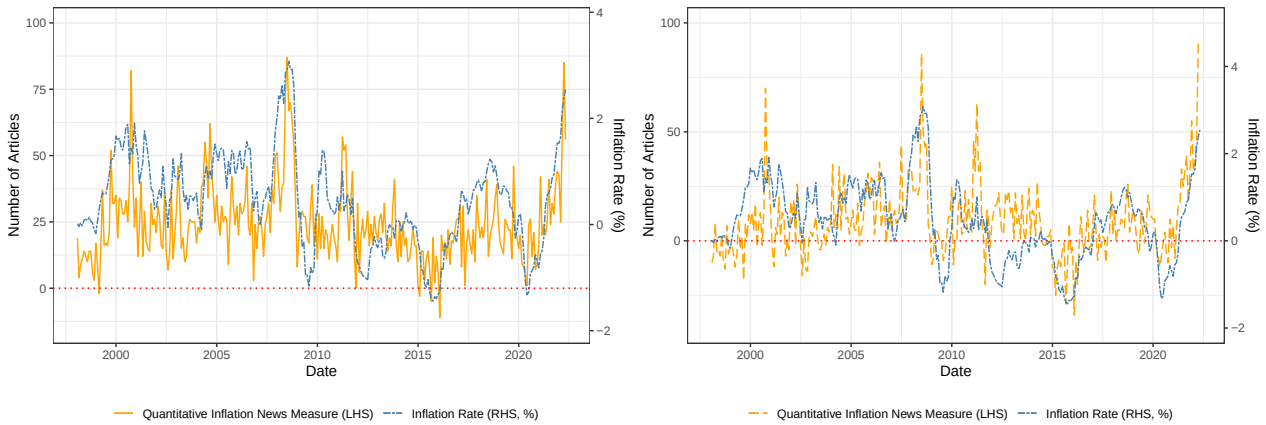
Figure 2 plots the quantitative inflation news measure for both languages. This measure is the difference between the number of articles writing about an increase minus the number of articles writing about a decrease of inflation. When this measure increases, there are relatively more articles published that report an inflation increase versus an inflation decrease. Therefore, it summarises the prevailing information about inflation for newspapers written in German and French.

As Soroka (2006) argues, for households, news about an inflation decrease are good news, whereas news about an inflation increase are bad news. Hence, an increase in the measure of quantitative inflation news could be interpreted as relatively more bad news versus good news. However, for inflation in Switzerland, this is not necessarily always the case. For example, the period around 2015 is described by a negative inflation and, at the same time, a decrease in economic activity. Newspapers reported negatively about the inflation decrease, warning about a deflationary spiral.[6]

If the quantitative news measure represents indeed the prevailing information on inflation, we would expect a positive correlation of this measure with the actual inflation rate. For German articles in panel 2a, the quantitative news measure tracks the evolution of the inflation rate considerably well. Over the entire sample period, the correlation between the quantitative news measure and the observed inflation rate is 0.59. A similar pattern can be observed for the French-written articles in panel 2b. The correlation between the quantitative news measure and the observed inflation rate is only slightly lower at 0.52.

Both the quantitative news measure for German and French-written newspaper show similar spikes in September 2000, the global financial crisis and during the Covid 19 crisis. The quantitative new measure for German-written articles is more often positive compared to the quantitative news measure from the French-written articles. This follows from the relatively higher number of articles published about an inflation increase compared to a decrease for German-written newspapers.

[6]For example, the title and lead of an article in the German-written newspaper 20 Minuten in December 2014 translates as follows: *"How falling prices hurt the economy - The Swiss National Bank expects inflation to fall into negative territory in 2015. Even if falling prices seem positive - they do not always have good consequences."*, (Frommberg 2014).



(a) Newspapers written in German (b) Newspapers written in French

Figure 2: Quantitative Inflation News Measure

Notes: In the left panel, the figure shows the quantitative inflation news measure (right-hand scale) of news calculated as the difference between the number of articles writing about an inflation increase minus the number of articles writing about an inflation decrease using only newspapers written in German, together with the observed inflation rate (right-hand scale). The left panel shows the same time series of quantitative inflation news measure using newspapers written in French (left-hand scale) together with the actual inflation rate (right-hand scale).

2.4 Qualitative Inflation News Measure

As mentioned by GMZ, the quantitative inflation news measure is not a sentiment measure. It summarizes the prevailing information about inflation by counting the articles that write about an inflation increase compared to those that write about an inflation decrease, but this information does not necessarily reflect the sentiment attached to inflation in the news articles (i.e., whether newspapers assess inflation to be positive or negative).

There is a growing literature that exploits text information from newspapers that extract the general economic sentiment and how this sentiment effects macroeconomic outcomes, such as consumer confidence or consumption (see, for example, Shapiro, Sudhof, and Wilson (2022) or Starr (2012)). However, to the best of our knowledge, no such sentiment indicator has been created with a model specifically trained on inflation articles.

For this reason, we develop the qualitative inflation news measure which represents the sentiment of the inflation news articles. To derive this sentiment, we use a state-of-the-art NLP model called BERT developed at Google by Devlin et al. (2018a). Their seminal contribution is a model that generates context-aware embeddings for words and documents. In contrast to alternative NLP models that process text only in one direction (either from left to right or right to left), BERT uses a bidirectional approach.

Context aware embeddings are achieved by pre-training the model on two specific tasks

called Masked Language Modelling (MLM) and Next Sentence Prediction (NSP), respectively. In MLM, some percentage of the input text is masked at random. The goal of the model is then to predict these masked words. In NSP, the model learns about the relationship between two sentences. As input, the model receives two sentences A and B. The goal of the model is to decide whether sentence B follows A, where this is in 50% of the cases true and in 50% B is a random sentence from the Corpus.

BERT has been used extensively for various NLP tasks in economics and finance, including sentiment analysis (see, for example, Araci (2019), Sousa et al. (2019)).[7] For our sentiment analysis, we use the pre-trained multilingual base model (Devlin et al. 2018b) for the French language and the BERT model provided by Deepset (2019) for the German language.

To fine-tune the model, we create a random sample of 1,000 articles for each language. In these articles, we focus on the paragraphs that write about inflation. We then self-classify these articles into two categories, positive and negative. An article is classified as positive (negative) if inflation is assessed to be positive (negative). For example, in February 2008, a newspaper article of "Le Matin" translates to *"[...] The economy does not need it. Inflationary pressures have just returned to a level not seen for more than a decade. [...] "*. In this article, inflation is negatively assessed. In contrast, the following article of the "NZZ" in March 2002 that translates to *"[...] The Swiss National Bank (SNB) considers the current interest rate level [...] is appropriate for a sustainable and inflation-free economic development. [...] An increase would be inappropriate in view of the favourable inflation outlook [...]"*. Here, the level of inflation is positively connoted.

Our training data set consists of 85% of the articles. Validating the predictions on our test data set, we achieve an accuracy of 72% and 68% to predict the sentiment for the French and German language, respectively. Due to the novelty of this inflation sentiment measure, the accuracy can be compared most closely with the financial sentiment prediction of Araci (2019). In their paper, Araci (2019) achieved an accuracy of 86%. However, the sentiment prediction of Araci (2019) is based on single sentences and the model was pre-trained on financial vocabulary. In contrast, due to the different languages considered, we use two models that were trained on non-specialized text corpora and use entire paragraphs to predict the sentiment of inflation.

Using the fine-tuned model, we predict the sentiment of the same articles considered for the quantitative inflation news measure. Then, we average the prediction of negative and positive sentiment for a given month. We standardize the time series by subtracting the

[7]Other popular approaches, such as sentiment analysis via dictionary method would require comparable dictionaries for the two languages that classify sentiment similarly. The most common dictionary from Loughran and McDonald (2011) has only been translated to German (see Bannier, Pauls, and Walter (2019)), but not to French. Moreover, these dictionaries usually capture the general sentiment, non-specific to inflation.

mean over the entire sample period and dividing by its standard deviation.

2.5 Descriptive Results

In Figure 3, we plot the qualitative inflation news measure for the newspapers written in German and French, respectively as a four-month moving average (left-hand-scale) together with the actual inflation rate (right-hand-scale). The correlation between the qualitative news measure and the actual inflation rate is not consistently positive or negative.

For example, during the financial crisis, the sentiment for both newspapers written in German and French decreased, while this decrease is more marked for German-written newspapers. At the same time, the inflation rate increased. Similarly, after 2021, the recent spike in inflation correlates negatively with the sentiment measures from German and French-written newspapers. The correlation is -0.54 for the German and -0.37 for the French-written newspapers.

In contrast, there are periods of positive correlation between sentiment and the inflation rate. At the beginning of the sample from 1998 to 2001, the correlations are 0.37 and 0.46 for the German and French-written newspapers, respectively. Another example is the period from 2010 to 2012 where rising inflation rates are associated with a more positive sentiment for both newspapers.

Inflation is not always assessed similarly across newspapers written in German and French. For example, during a 12-month period after January 2012, French-written newspapers assessed the current level of inflation to be positive, while the newspapers written in German assess it to be more negative. However, there are also periods where both newspapers written in German or French assess the level of inflation in a similar fashion. For example, both sentiment measures are in the negative territory during the Covid 19 crisis.

Our qualitative news measure indicates that a rise (fall) in the quantitative news measure does not always correspond to negative (positive) news for households, which challenges the assessment by Soroka (2006).[8]

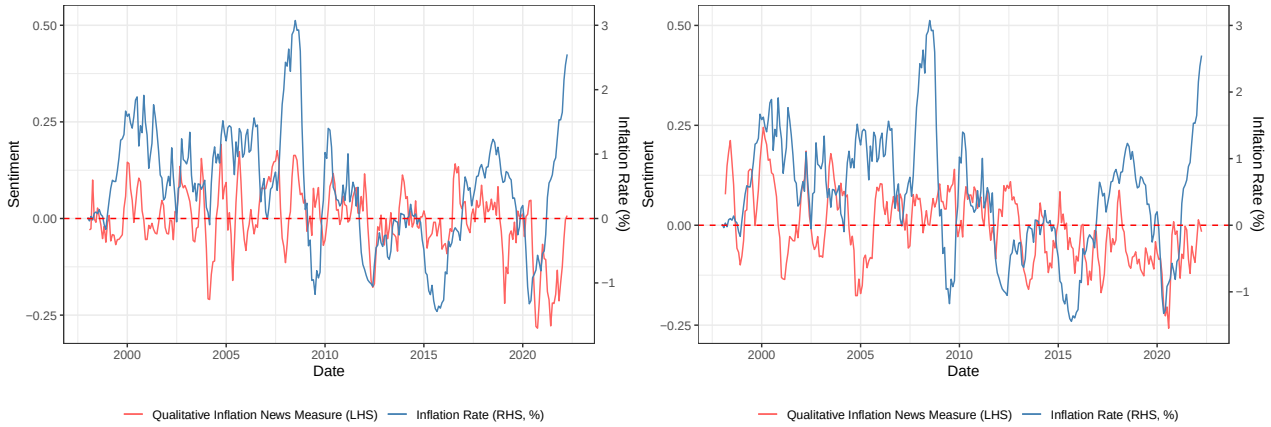
For example, from 2015 to 2016, the level of inflation decreased strongly in Switzerland. The qualitative sentiment measure decreases and falls into negative territory during this time. Accordingly, newspapers assess the level of inflation negatively. This is reflected in the text of the newsarticles. For example, the "Tribune de Genève" wrote in August 2018: "[...] *Our central bank had the opportunity to continue to print money, especially since the risk of*

[8]Note that GMZ follow a similar line of argument to study good and bad news reporting and the households' reaction to these news in the case of unemployment. Arguably, the relation of bad and good news with the actual unemployment rate is less ambiguous compared to inflation. For example, Doepke and Schneider (2006) show that elderly rich households are most affected by inflation where younger, middle-class households with mortgage debt might benefit from it.

inflation is zero and we suffer rather from an even more insidious evil, deflation.[...]".

In the line of argument of Soroka (2006), this period of an inflation decrease should correspond to good news from the perspective of households. As the number of articles writing about an increase of inflation is lower than the number of articles writing about a decrease in inflation, the quantitative inflation news measure decreases during this time. During such periods, our qualitative news measure can provide a more nuanced picture of the actual sentiment of inflation in newspapers.

We stress that our qualitative inflation sentiment measure is not tracking a general economic sentiment. This could be a valid concern if the paragraphs writing about inflation also feature prominent information about GDP and unemployment. However, in that case, we would expect a strong positive correlation of the sentiment with GDP (Shapiro, Sudhof, and Wilson (2022); Starr (2012)). The Figure A.2 in the appendix plots the qualitative inflation news measure together with the real GDP growth rate of Switzerland. For both newspapers written in German and in French, the correlation is low at -0.18 and 0.08, respectively.



(a) Newspapers written in German

(b) Newspapers written in French

Figure 3: Qualitative Inflation News Measure

Notes: In the left panel, the figure plots the qualitative inflation news measure for newspapers written in German (left-hand scale) together with the observed inflation rate (right-hand scale). The qualitative news measure is the average sentiment resulting from the prediction of the BERT model. In the right panel, we plot the qualitative news measure for newspapers written in French (left-hand scale) together with the actual inflation rate (right-hand scale). The qualitative inflation news measure is standardized and displayed here with a four-month moving average. Values above (below) the horizontal zero line indicate periods of a predominantly positive (negative) sentiment with respect to inflation.

3 Inflation Reporting of Newspapers

3.1 Model

In this section, we describe the framework from GMZ to analyse how the quantitative and qualitative inflation news measures in newspapers react to changes in inflation rate using a TSVAR model.

We use the novel empirical approach from GMZ for two main reasons. First, it allows to check for a negativity bias in news reporting. Such a negativity bias has been reported in the literature for both unemployment and inflation in US newspapers, where news coverage is relatively higher during periods where inflation and unemployment increases compared to times when inflation and unemployment decreases. News about inflation and unemployment increase are generally referred to as bad news for households (see, for example, Soroka 2006).

A negativity bias could shape people's exceptions as well as perceptions and lead them to have overly pessimistic news during times when unemployment or inflation increases. Ultimately, this may affect how households respond to these economic conditions (GMZ). Therefore, this analysis will be helpful later on when we interpret the effects of news on inflation expectations and perceptions.

Second, with their approach, we can exploit the frequency of our news measures and inflation rates to identify (non-structural) media shocks. In contrast to our survey data about inflation expectations and perceptions, news data and inflation rates are available at monthly frequency. We then aggregate these shocks to match the quarterly frequency of the survey data, to study the effects of news on expectations and perceptions.

y_t is a $m \times 1$ time series vector with m endogenous variables of interest and $\tilde{y}_{t-1}$ being a $m \times (mp + 1)$ matrix, where p is the lag-order such that $\tilde{y}_{t-1} = (1, y_{t-1}, \ldots, y_{t-p})$. Then, a threshold VAR can be written as

$$y_t = (1 - \Gamma(z_t))[\tilde{y}_{t-1}\beta_1] + \Gamma(z_t)[\tilde{y}_{t-1}\beta_2] + \varepsilon_t \tag{1}$$

where ε_t is a $m \times 1$ disturbance term with $\varepsilon_t \sim WN(0, \Sigma)$. z_t is a scalar and $\Gamma(\cdot)$ a function taking the value 0 or 1. Similar to GMZ, we set $z_t = \Delta\pi_{t-1}$, the lagged change in the inflation rate. The lag ensures unconfoundedness with the disturbance term ε_t. As we are interested in potential differences in media reporting in cases of an inflation decrease or increase, we set $\Gamma(z_t) = 0$ if $\Delta\pi_{t-1} \leq 0$ and $\Gamma(z_t) = 1$ if $\Delta\pi_{t-1} > 0$. The model can then be estimated as an OLS on two distinct samples, with β_1 being the coefficients that describe the dynamics in case of an inflation decrease, and β_2 the coefficients for the dynamics in case of an inflation increase.

To investigate whether the inflation news measures derived from the newspaper articles react differently during times of an inflation increase or decrease, we analyse the dynamic

response of the quantitative and qualitative news measure to an innovation in the inflation rate that is not related to the other shocks in the system. To identify the shock, we follow GMZ by using a Cholesky decomposition. We define C to be the Cholesky factor of Σ. C is a lower triangular matrix such that $\Sigma = CC'$. Therefore, the identified shocks can be calculated by $v_t = C^{-1}\varepsilon_t$. Our first endogenous variable in the system is the change in the inflation rate and the second variable is the inflation news measure. Consequently, the first identified shock v_{1t} is orthogonal to v_{2t}. In that case, v_{1t} represents unexpected changes in the inflation rate, unrelated to past changes in the inflation rate or the inflation news measure.

It's important to note that this shock is a combination of different structural shocks. These shocks drive the forecast error in the inflation rate change for the upcoming month. The impulse response to this shock shows how the variables evolve when the inflation rate unexpectedly changes, meaning when they are higher or lower than expected. The identified shock, though not structural, helps analyze how the inflation news measure reacts to positive or negative changes in the inflation rate, regardless of the underlying shock's nature.

As the observed inflation rate is the same for the French-speaking and German-speaking region, the regime indicator z_t as well as the impact effects in both regimes ($\Gamma(z_t) = 0, \Gamma(z_t) = 1$) are the same. This makes it easier to compare the dynamics in the systems across the regimes, but also across regions. As in GMZ, we condition on the sign of the shock to retrieve the regime-specific impulse response functions. For confidence intervals, we use bias-corrected bootstrap confidence bands as proposed by Kilian (1998).

3.2 Results

In the baseline specification, we set $y_t = [\Delta\pi_t, \text{News Measure}_{t,r}]$, where News Measure is the quantitative or qualitative inflation news measure. $r \in$ [DE,FR] stands for the region and refers to whether the news measure is derived from the German-written media ("DE") or the French-written media ("FR"), respectively. Using the Schwarz Information Criterion (SIC) for lag selection, we obtain a value of $p = 2$ for the models with the quantitative and qualitative inflation news measure for both newspapers written in German and French.

In a first step, we focus on the results of the quantitative news measure and compare the results across the newspapers written in German versus French. In a second step, we repeat the analysis for the qualitative news measure.

Figure 4 summarizes the results for the quantitative inflation news measure. We discuss the panels from left to right.

Panel 4a and 4c plot the change in the inflation rate to a positive (red) and negative (blue) shock for the models estimated with the German and French-written newspaper measures,

respectively. The impulse response functions to a positive or negative change in inflation are very similar in terms of size and persistence. This is in contrast to what GMZ find for unemployment where positive shocks to unemployment (that is, an increase in unemployment) are significantly more persistent than negative shocks. Naturally, the impulse response functions of inflation for the model estimated on German-written newspapers and those with French-written newspapers are similar as we use the same national inflation rate in the model.

Panel 4b and 4d show the impulse response functions of the quantitative news measure to a positive and negative one standard deviation inflation innovation (0.28 percentage points). We discuss two main observations.

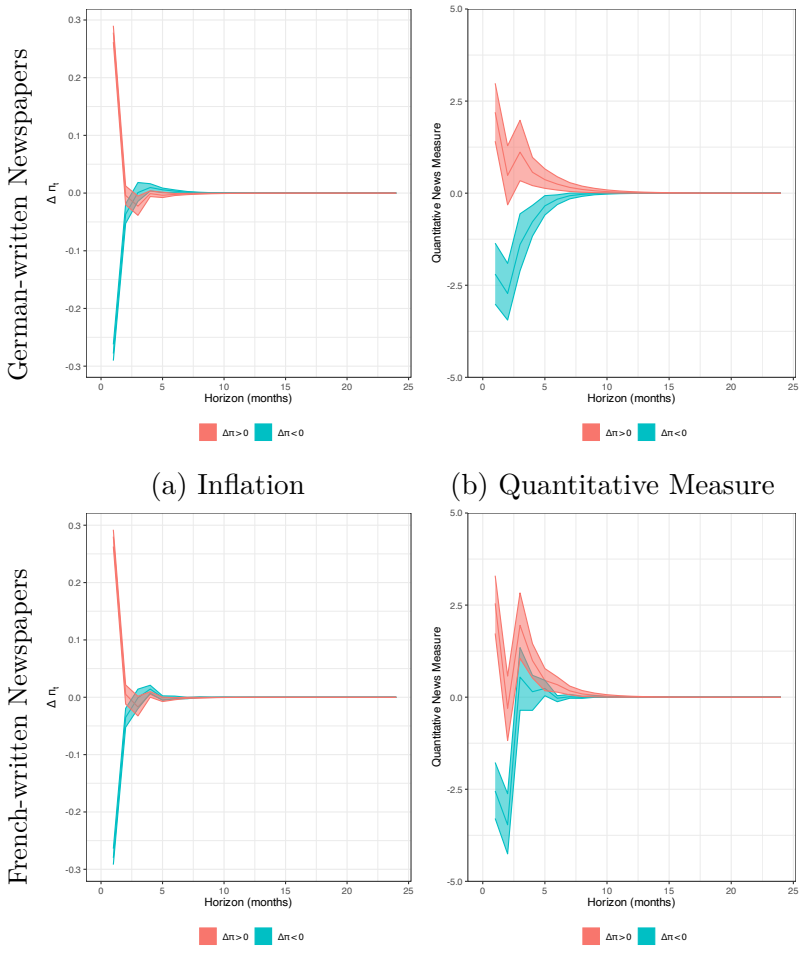
First, following a positive shock in the inflation rate, the quantitative inflation news measure increases significantly. Similarly, following an unexpected decrease in the inflation rate, the quantitative news measure decreases significantly. This means that after an unexpected positive (negative) increase in the inflation rate, relatively more news about an inflation increase (decrease) are published.

Second, the quantitative inflation news measure reacts very similar to an increase or decrease in the inflation rate. If inflation media reporting were to be biased, that is, over-reporting of articles writing about an inflation increase versus decrease, the reaction of the quantitative inflation news measure would be asymmetrical. We get a similar picture if we focus on the cumulative response functions and calculate the differences in the respective cumulative impulse resopnse functions. The results are plotted in Figure C.10 in the appendix for German-written newspapers and in Figure C.11 for French-written newspapers.

However, as brought forward by GMZ, to correctly analyse whether media reporting is indeed (un-)biased, we need to look at the normalized impulse response functions and their differences. In more detail, reporting in newspapers may differ just because the shocks have different persistences. For the United States, GMZ show that after taking into account the potential non-linearity of the response of unemployment to an unemployment shock, the preliminary media bias of unemployment news reporting disappears. We calculate these multipliers and their difference as a robustness check and report them in the appendix in Figure C.12. Overall, the dynamic multipliers confirm our previous results that we find no evidence of under- or over-reporting following an unexpected increase or decrease in the inflation rate for both newspapers written in German and French.

Besides checking for a negativtiy bias "within" German and French-written newspapers, we can also investigate whether we find diferences in news reporting across German and French newspapers. This allows us to analyse whether newspapers written in German or French report systematically different following an inflation shock. To do this, we take the normalized cumulative impulse response functions of the quantitative news measure

of German-written articles that follows a positive unexpected shock in the inflation rate and calculate the difference to the same impulse response function of the quantitative news measure of French-written articles. Then, we do the same for a negative unexpected shock in the inflation rate. The results are displayed in Figure C.14 in the appendix. We find no significant difference, neither for the positive nor the negative inflation shock.



(a) Inflation (b) Quantitative Measure

(c) Inflation (d) Quantitative Measure

Figure 4: Results TSVAR for Quantitative News Measure

Notes: The Figure shows the impulse response functions of the inflation rate and the quantitative news measure to a one standard deviation innovation in the inflation rate for both the German and French-written newspapers. Red coloured impulse response functions correspond to the response to a positive innovation in the inflation rate, and blue ones to a negative innovation in the inflation rate. The quantitative news measure is the difference of articles writing about an inflation increase minus the number of articles writing about an inflation decrease. The shadowed areas correspond to 68% confidence bands.

These results are important. For both the quantitative news measure derived from German-written newspapers and from French-written newspapers, we find no evidence that they i) systematically over- or under-report after an unexpected change in the inflation

rate (i.e., no evidence for a negativity bias of inflation) and ii), we find no evidence for systematically different news-reporting across newspapers written in French and German. Next, we repeat this analysis for the qualitative news measure.

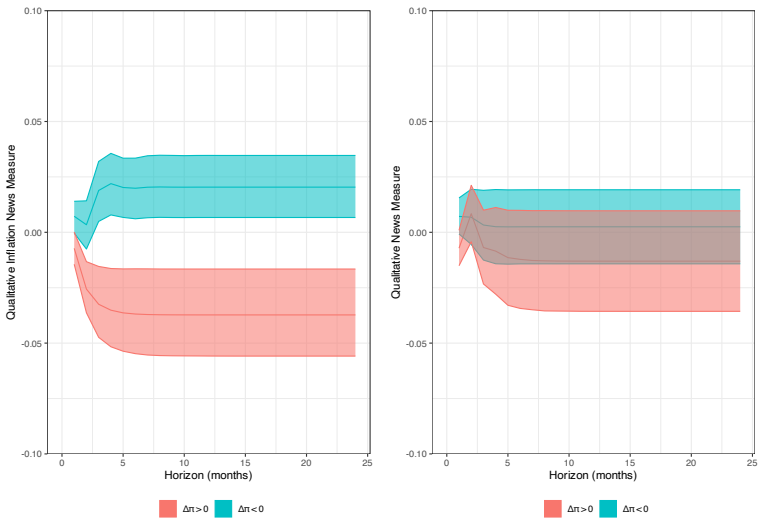
We are interested in analysing how newspapers' sentiment about inflation reacts to an unexpected change in inflation. Furthermore, we investigate whether newspapers written in German report differently about these changes compared to the French-written newspapers. For brevity, we only report the results of cumulative impulse response functions for both newspapers written in German and French in the main text and let the reader refer to the Figure C.13. in the appendix C for the normalised impulse response functions.

The results are displayed in Figure 5. For German-written newspapers, Panel 5a shows that the qualitative inflation news measure is more positive in case of a unexpected decrease in the inflation rate. For an unexpected increase in the inflation rate, the sentiment is more negative.

Panel 5b shows similar results for French-written newspapers. An unexpected increase (decrease) in inflation leads to more negative (positive) reports, even though the effect is not significant and less pronounced than for the German-written newspapers.

Finally, we test for differences in sentiment newspaper reporting across regions. In more detail, we analyse whether German-written newspapers report significantly more negative (positive) about an unexpected increase (decrease) in inflation. The results are displayed in the appendix Figure C.15. In general, we find no strong differences in the reaction of inflation sentiment to an unexpected inflation shock across region. However, for an increase in inflation, sentiment tends to be slightly more negative for German-written newspapers than French-written newspapers for months 2 to 4, but remains insignificantly ever after.

In summary, the results in this section provide several insights. First, we find no evidence for a negativity bias in newspapers written in German and French in applying the novel approach of GMZ for inflation news reporting. Moreover, we find no significant difference in the news reporting across regional newspapers. Second, for the qualitative sentiment measure, we find that newspapers tend to report rather negatively about an inflation increase compared to a decrease, where this pattern is more pronounced for German-written newspapers. Broadly speaking, there are no strong differences in inflation sentiment reporting across regional newspapers. These results will be useful to help us interpreting the effects of news on inflation expectations and perceptions in the next section.



(a) German-written Newspapers (b) French-written Newspapers

Figure 5: Cumulative Impulse Response Functions

Notes: The Figure shows the cumulative impulse response functions of the TSVAR model described in section 3.1 from the qualitative sentiment news measure. Panel (a) shows the results for the qualitative sentiment measure derived from the German-written newspapers. Panel (b) shows the results for the French-written newspapers. The shadowed areas correspond to 68% confidence bands.

4 Inflation Expectations Data

In the next step, we analyse how news affects inflation expectations and perceptions. For this, we use data from the national Swiss Consumer survey (State Secretariat for Economic Affairs (SECO) 2022) conducted by the State Secretariat for Economic Affairs (SECO). This quarterly survey provides information of a repeated cross-section of representative households about their perceptions and expectations with respect to the economy, inflation, but also job security. The survey started with a sample size of approximately 500 households. Between the first quarter 1981 up until 2012 in the second quarter, the sample size increased to around 1100 households. From the third quarter 2012 up until now, the sample size encompasses roughly 1200 households.

In the survey, the households provide qualitative answers to the following questions about inflation perception and expectations:

- *Question:* How, in your view, have prices changed over the last 12 months? Have they:

- *Answers:* risen sharply; risen slightly; remained virtually unchanged; fallen slightly; fallen sharply; Don't know; No answer given.
- *Question:* How, in your view, will prices change over the next 12 months? Will they:
- *Answers:* rise sharply; rise slightly; remain virtually unchanged; fall slightly; fall sharply; Don't know; No answer given.

Importantly for us, the survey also includes socio-demographic information. The survey reports so-called WEMF regions. WEMF regions group communities into self-contained economic areas. This allows us to separately analyse the replies of households in the French-speaking part of Switzerland and the German-speaking part. However, in between 2012 and 2013 no information about the location is recorded. For this reason, we will discard this period from our sample.

While our main empirical analysis about the effects of news on expectations and perceptions focuses on individual household level data from the qualitative responses of the survey, we also quantify inflation expectations. The quantification of inflation expectations allows for a more direct interpretation of the size of the effect of news on expectations and serves as a robustness check.

To quantify inflation expectations from qualitative survey data, we follow Rosenblatt-Wisch and Scheufele (2015) who use a modified, more robust version of the widely used probability approach of Carlson and Parkin (1975). Rosenblatt-Wisch and Scheufele (2015) use the same survey data for Switzerland. All details about the approach are described in the appendix B.

Figures B.4 and B.5 in the appendix plot the shares of the replies to the question about inflation expectations and perceptions for households living in the German and French-speaking regions, respectively. Overall, the share of households with both high inflation expectations and perceptions is bigger for households in the French-speaking part than the German-speaking part.

Table 1 summarizes the mean shares of the qualitative survey replies for each of the two language regions. On average, 8.43% of the households expected prices to strongly increase compared to 5.32% of the households in the German-speaking part. Also for a small expected increase of prices, the share is higher for households in the French-speaking part with 50.47% compared to 45.60% in the German-speaking part. Inversely, more households in the German-speaking part expect prices to decrease (10.12%) compared to the French-speaking households (5.95%).

We find the same pattern for inflation perceptions. A higher share of French-speaking households perceive prices to have strongly increased (12.99%) or slightly increased (45.87%) in comparison with households in the German-speaking part (7.45% and 41.47%, respectively).

Again, more households located in the German-speaking part perceived prices to have decreased (11.43%) compared to households in the French-speaking part (6.10%).

Table 1: Summary Table for Regional Inflation Expectations and Perceived Inflation

Variable	Reply	French Region	German Region
Inflation Expectations	Strong Increase	8.43	5.32
	Slight Increase	50.47	45.60
	Constant	35.15	38.96
	Decrease	5.95	10.12
Inflation Perceptions	Strong Increase	12.99	7.45
	Slight Increase	45.87	41.47
	Constant	35.04	39.64
	Decrease	6.10	11.43

Notes: The table shows the shares of replies for each category with respect to expected inflation and perceived inflation from the qualitative survey data for German and French-speaking households. The shares are in percentages and calculated over the entire sample period.

For brevity, the results for the quantified average inflation expectations are discussed and summarized in the appendix B.3.

5 News Media and Inflation Expectations and Perceptions

5.1 Model

In this section, we discuss the approach to derive the quantitative and qualitative inflation media shocks, following GMZ, and how we use them to investigate the effects on inflation expectations and perceptions. To analyse the effect of news on expectations and perceptions, we need changes in the news measures that are unrelated to the dynamics of the inflation rate. Otherwise, variations of expectations and perceptions due to the media shocks could simply reflect a stronger increase or decrease in the inflation rate.

For this reason, we make use of the series of shocks from our model in section 3.1. In more detail, the shocks v_{2t} represent variations in the news measure that are unrelated to the (current and past) inflation rate.

Arguably, households in the French-speaking part of Switzerland consume more news written in French whereas households in the German-speaking part consume more news in

German. We exploit this language barrier in our empirical set-up. In more detail, it allows us to control for time-fixed effects that capture confounds that affect the media shock as well as the perceptions and expectations at the same time.[9] For example, we control for a national shock that increases news coverage but also expectations and perceptions at the same time. The main linear probability model used can be written as follows.

$$\text{reply}_{i,r,t,q} = \alpha + \sum_{j=1}^{2} \beta_j \text{QMS}_{r,t+1-j} + \sum_{j=1}^{2} \tilde{\beta}_j \text{SMS}_{r,t+1-j} + \phi \text{HH}_{i,r,t} + \mu \text{Region}_r + \gamma_t + \varepsilon_{i,r,t} \quad (2)$$

The subscript i refers to household-level observations, subscript r refers to the region (German versus French-speaking region). We analyse quantitative media shocks (QMS) and qualitative sentiment media shocks (SMS) at time t and their lag $t-1$. QMS and SMS correspond to the series of shocks v_{2t} identified from the model estimated in section 3.1 using the quantitative and qualitative media news measures in the specification of y_t, respectively. $\text{HH}_{i,r,t}$ are household level controls that include gender and age, Region_r is an indicator whether the households is located in the French or German-speaking part of Switzerland, and γ_t are time fixed-effects.[10] $\text{reply}_{i,r,t,q}$ is a dummy equal to 0 if the household expects or perceives prices to decrease or have decreased, respectively, and 100 if the household expects or perceives prices to increase or have increased, with subscript q indicating whether the answer refers to the question about expectations (e) or perceptions (p). All media shocks are scaled by their respective standard deviation, such that a one unit increase corresponds to a one standard-deviation increase. For all regressions, we cluster the errors at the date×region level.

5.2 Results

In Table 2 we show the effects of a quantitative and qualitative media shock on the share of households expecting or perceiving an increase in prices versus a decrease in prices. In Columns (1) to (4), we estimate the regression from equation 2 with quantitative and qualitative media shocks separately, where in columns (5) and (6), all media shocks and their lags are included. Note that an increase in the quantitative shock corresponds to relatively more news articles writing about an inflation increase compared to decrease. An increase in the qualitative media shock corresponds to a more positive inflation sentiment.

[9] In effect, we exploit the regional variation in the shock series v_{2t}. These series of shocks are plotted in Figure C.16 in the appendix.

[10] Note that we also conduct robustness checks where we include additional controls such as the job and education level. However, these types of information are less populated which results in a significant lower number of total observations. As the results remain similar after controlling for these additional variables, we prefer to stick with a higher number of observations to retain a representative sample of households.

Table 2: Effect of Quantitative and Qualitative Media Shocks on Inflation Expectations and Perceptions

	(1) reply$_e$	(2) reply$_p$	(3) reply$_e$	(4) reply$_p$	(5) reply$_e$	(6) reply$_p$
Quantitative Media Shock$_t$	1.33**	0.79			1.34**	0.85
	(0.64)	(0.96)			(0.62)	(0.95)
Quantitative Media Shock$_{t-1}$	0.23	0.43			0.24	0.47
	(0.68)	(0.92)			(0.68)	(0.90)
Qualitative Media Shock$_t$			0.22	1.09**	0.19	1.08**
			(0.49)	(0.50)	(0.48)	(0.48)
Qualitative Media Shock$_{t-1}$			-0.07	0.29	0.08	0.36
			(0.50)	(0.46)	(0.49)	(0.49)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Region$_r$	Yes	Yes	Yes	Yes	Yes	Yes
HH$_{i,r,t}$	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32,447	34,747	32,447	34,747	32,447	34,747
$\bar{y}$	85	86	85	86	85	86

Note: The table shows the effects of quantitative and qualitative media shocks derived in section 3.1 on the share of households expectations (reply$_e$) and perceptions (reply$_p$) that indicate an increase versus a decrease. Household controls HH$_{i,r,t}$ include gender and age fixed effects. The media shocks are standardized such that a one unit increase corresponds to a one standard-deviation increase in the media shock. $\bar{y}$ corresponds to the mean of the dependant variable. * p<0.10, ** p<0.05, *** p<0.010. Standard Errors are clustered at the date × region level.

For the quantitative media shock, in column (1), a one standard deviation increase in the quantitative media shock leads to a 1.33 percentage point increase in the share of households indicating an increase in price expectations. Relative to the mean share, this corresponds to an increase of 1.6 percent. This effect is small but significant at the 5% level. We find no significant effect of the lag of the quantitative media shock. Column (2) shows the effect of the quantitative media shock on inflation perceptions. The coefficients have positive signs but are insignificant.

For the qualitative media shock at time t and $t-1$, in column (3), we find no significant effect on the share of households indicating an increase in price expectations versus those that indicate a decrease. However, in column (4) we find a significant effect on price perceptions. A one standard deviation increase in the qualitative media shock increases price perceptions by 1.09 percentage points. Again, this effect is small but similar in magnitude to the effects of a quantitative shock on expectations.

In Columns (5) and (6), we introduce both media shocks and their lags in the regression, as the quantitative and qualitative media shocks might be correlated. However, the results are largely unchanged and remain similar in their magnitude as well as their significance.

Next, we investigate whether expectations and perceptions react differently conditional

on whether the change in inflation is positive or negative. This analysis is motivated by the findings in section 3. In periods of a positive (negative) change in inflation, the quantitative news measure tends to increase (decrease), which corresponds to relatively more (less) news about an inflation increase compared to news about a decrease. Furthermore, the sentiment reported during a period of inflation increase is rather negative compared to a positive sentiment for an inflation decrease. For this, we estimate the model conditional on times when inflation increases $\Delta\pi_t > 0$ and times when inflation decreases $\Delta\pi_t \leq 0$ (or stays constant).

The results are displayed in table 3. We first focus on the results in columns (1) and (2) where the model is estimated conditional on times where $\Delta\pi_t > 0$. With respect to expectations, column (1) shows that relatively more news about an inflation increase than decrease have a positive effect on inflation expectations. In contrast, a more positive sentiment with respect to inflation during this period has a decreasing effect on inflation expectations. For perceptions, we find that the lag of the quantitative media shock can have a significant positive effect on perceptions but find no effect of the qualitative news sentiment.

Columns (3) and (4) focus on periods where $\Delta\pi_t \leq 0$. While the quantitative media shock has no significant effect during these periods, the qualitative sentiment shock has a positive effect on both expectations and perceptions. A one standard deviation increase in the qualitative media shock at time t increases expectations and perceptions by 1.7 and 3.3 percentage points, respectively.

Table 3 underlines two observations. First, the quantitative news measure has the highest effects when the change in inflation is positive. As seen in section 3, this effect is not driven by systematically different news reporting during these periods. We find that the qualitative sentiment measure of inflation has a significant effect during all periods. Moreover, the alternating sign of the effect of sentiment point towards a potential counter-cyclical effect of sentiment on expectations and perceptions.

The quantitatively rather small effects of news on expectations and perceptions are in line with the findings of Dräger (2015) about news reporting and their effect on expectations and perceptions in Sweden. Also, sticky expectations of households could be another explanation for the rather small effects of news. As pointed out by Rosenblatt-Wisch and Scheufele (2015) who use the same survey data for Switzerland, households only update their expectations once a year.

Finally, we investigate whether the effects of news on expectations and perceptions vary conditional on socio-demographic characteristics.

In Figure 6, we plot the interaction effects of the media shocks with different age categories. We split the sample into households aged between 15 and 40 (age category 1), 40 to 60 (age

Table 3: Effect of Quantitative and Qualitative Media Shocks conditional on Change in Inflation

	$\Delta\pi > 0$		$\Delta\pi \leq 0$	
	(1) reply$_e$	(2) reply$_p$	(3) reply$_e$	(4) reply$_p$
Quantitative Media Shock$_t$	1.41**	1.64	1.17	0.38
	(0.69)	(1.41)	(1.05)	(1.10)
Quantitative Media Shock$_{t-1}$	1.36*	2.36**	-2.11	-0.41
	(0.70)	(1.01)	(1.40)	(0.58)
Qualitative Media Shock$_t$	-0.87**	-0.14	1.71	3.30***
	(0.36)	(0.44)	(1.10)	(0.77)
Qualitative Media Shock$_{t-1}$	0.10	0.42	-0.79	0.03
	(0.50)	(0.60)	(1.33)	(1.01)
Date FE	Yes	Yes	Yes	Yes
Region$_r$	Yes	Yes	Yes	Yes
HH$_{i,r,t}$	Yes	Yes	Yes	Yes
Observations	17,379	18,545	15,064	16,200
$\bar{y}$	89	89	81	83

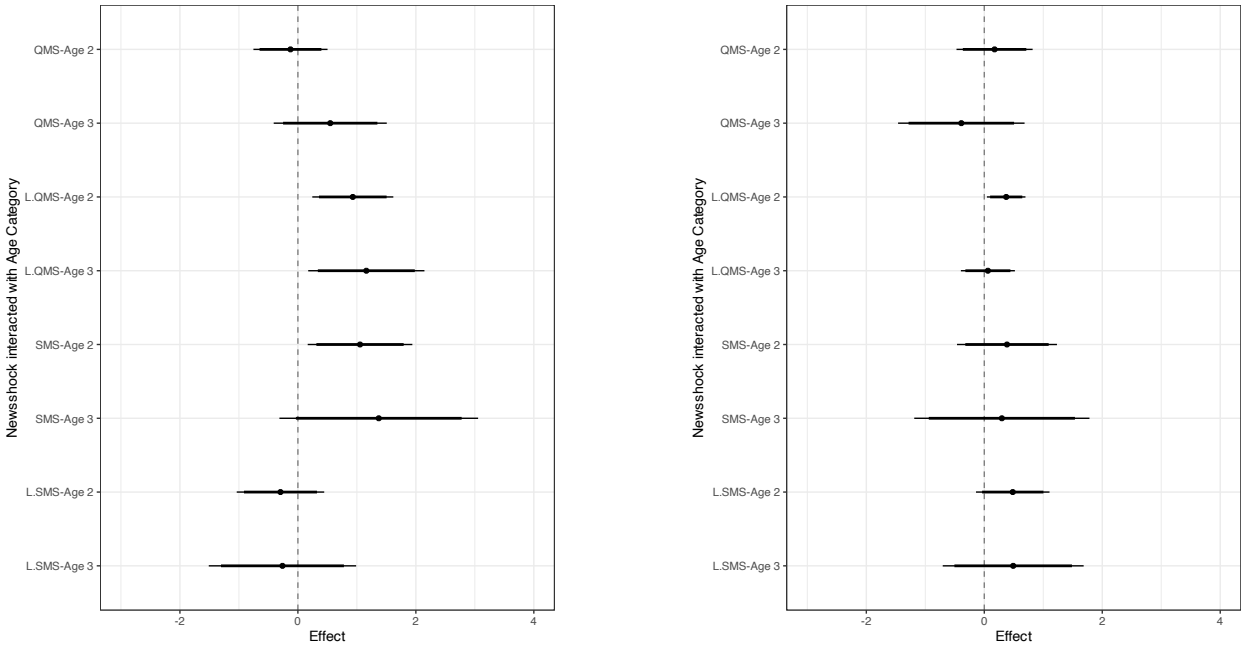
Note: The table shows the effects of quantitative and qualitative media shocks derived in section 3.1 on the share of households expectations (reply$_e$) and perceptions (reply$_p$) that indicate an increase versus a decrease. The models are estimated conditional on a positive or negative change in inflation. Household controls HH$_{i,r,t}$ include gender and age fixed effects. The media shocks are standardized such that a one unit increase corresponds to a one standard-deviation increase in the media shock. $\bar{y}$ corresponds to the mean of the dependant variable. * p<0.10, ** p<0.05, *** p<0.010. Standard Errors are clustered at the date × region level.

category 2), and households aged 60 and older (age category 3). We then interact the age category dummy with the contemporaneous and lagged media shocks. The reference group in the regressions are the youngest households aged between 15 and 40. The results are displayed in Figure 6.

For expectations, we find some evidence that the interaction effect of news on the share of households indicating an inflation increase versus decrease is generally more positive for households in older age categories compared to the households in the youngest age category. For the quantitative media shock, it is especially the lagged media shock that shows a higher effect for older age categories. For sentiment media shocks, we find that it is more positive for the contemporaneous media shock compared to the lagged shock.

For perceptions, however, we find only weak evidence of a higher effect of media shocks across age groups. The effect is only significantly positive for the lagged quantitative media shock. However, most coefficients tend to be slightly positive.

Such higher effects of news on expectations and perceptions with increasing age may be related to differences in news consumption among younger and elderly respondents. In various studies, age has been found to be an important driver of newspaper consumption (see,



(a) Expectations (b) Perceptions

Figure 6: Media shocks interacted with Age Categories

Notes: The Figure shows the marginal effects of the media shock interacted with the Age Categories. The marginal effects are effects relative to the reference group, which are households aged between 15 and 40. The second age category are households aged between 40 and 60. The third age category are households aged 60 and above. Panel (a) shows the results for the interactions of the quantitative media shock (QMS), its lag (L.QMS) and the qualitative sentiment shock (SMS) and its lag (L.SMS) on the share of households expecting an inflation increase versus decrease. Panel (b) the same interaction effects but for inflation perceptions. The Figure shows 5% and 10% confidence intervals.

for example, Lauf (2001), Elvestad and Blekesaune (2008)), even after taking into account online articles of newspapers (Thurman and Fletcher 2019).

An alternative explanation for the higher effect of elderly households is that they might pay more attention to inflation news as they have a higher exposure through their savings (Doepke and Schneider 2006) or due to differences in their relative shares of food and housing on the consumption basked (Basso, Dimakou, and Pidkuyko 2023).

In Table 4, we analyse whether the effects of news differ across the language border. More precisely, we interact the media shocks with the Region_r variable. For households living in the German-speaking region, most of the coefficients for the both the quantitative and qualitative media shocks are positive and significant. In contrast to that, we find that for households in the French-speaking region, news tends to have a lower effect on expectations and perceptions. Note that the higher effect of news on expectations and perceptions for households in the German-speaking part remains robust when estimating the models conditional on periods when inflation increases or decreases.

A potential explanation for a higher effect of inflation media shocks on households in the German-speaking part might be that those households are more receptive to inflation news than households in the French-speaking part. From the results in section B.3, we can rule out that the effect of news is purely driven by systematically different news reporting. Moreover, Jost (2018) has documented that households in the German-speaking part show a significantly higher inflation aversion than the households in the French-speaking part. This, in turn, could mean that households in the German-speaking part are more receptive to inflation news, prompting a stronger reaction.

Alternatively, it is possible that the differences observed across the language border might be driven by different shopping experiences both across Swiss regions but also across the border, or that households draw information on different inflation rates across region from official government statistics. However, recent evidence from Kluser (2023) shows no support for regional price discrimination of one of the largest Swiss retailers. In addition, Figure B.7 shows that inflation rates in Germany are very similar to those in France.[11] Figure B.6 shows a similar pattern for regional inflation rates of the three biggest cities in Switzerland, Zürich, Geneva and Basel. It is therefore unlikely that these explanations are the main drivers of the different effect we observe across the language border.

In summary, exploiting regional variation in inflation news reporting, we find that both the quantitative media shocks and qualitative sentiment shocks have a significant effect on inflation expectations and perceptions. While relatively more news about an inflation increase compared to news about an inflation decrease has the strongest positive effect during periods of positive inflation, sentiment has a countercyclical effect on expectations and perceptions during times when inflation is positive or negative. Furthermore, we find some evidence that the effect of news is stronger for elderly households. Finally, we document differences in the reaction to news across the language border, where we find households located in the German-speaking part to be more reactive to news compared to households in the French-speaking part.

[11] Exceptions are the period in between 2003 to 2004 and after 2021. However, note that our sample excludes observations in between 2003 and 2004 due to a reporting issue of the Swissdox database during the period.

Table 4: Effect of Quantitative and Qualitative Media Shocks conditional on Region

	(1) reply_e	(2) reply_p
German speaking Region		
Quantitative Media Shock_t	1.35*	1.06
	(0.69)	(1.04)
Quantitative Media Shock_{t-1}	0.69	1.36
	(0.65)	(0.82)
Qualitative Media Shock_t	1.25*	1.14**
	(0.74)	(0.53)
Qualitative Media Shock_{t-1}	-0.41	-0.56
	(0.71)	(0.67)
French speaking Region		
French speaking Region=1 × Quantitative Media Shock_t	-0.30	-1.20**
	(0.51)	(0.47)
French speaking Region=1 × Quantitative Media Shock_{t-1}	-1.50***	-1.86***
	(0.55)	(0.58)
French speaking Region=1 × Qualitative Media Shock_t	-2.40**	-0.52
	(1.10)	(0.90)
French speaking Region=1 × Qualitative Media Shock_{t-1}	0.55	-0.90
	(1.17)	(0.83)
Date FE	Yes	Yes
Region_r	Yes	Yes
$\text{HH}_{i,r,t}$	Yes	Yes
Observations	32,447	34,747
$\bar{y}$	85	86

Note: The table shows the effects of quantitative and qualitative media shocks derived in section 3.1 interacted with a region dummy on the share of households expectations (reply_e) and perceptions (reply_p) that indicate an increase versus a decrease. The reference group are households located in the German-speaking part. Household controls $\text{HH}_{i,r,t}$ include gender and age fixed effects. The media shocks are standardized such that a one unit increase corresponds to a one standard-deviation increase in the media shock. $\bar{y}$ corresponds to the mean of the dependant variable. * p<0.10, ** p<0.05, *** p<0.010. Standard Errors are clustered at the date × region level.

6 Robustness Checks

In this section, we provide several robustness checks. First, we estimate the main results including a business cycle indicator, ordered after the inflation rate but before the quantitative or qualitative news measure. Arguably, inflation is a lagged variable that follows business cycle activity. For this reason, our shock identified in section 5.1 might be confounded by other shocks, following from the current economic conditions.[12] The results are displayed in appendix D.1. Overall, our results remain unchanged with respect to both newspaper reporting as well as for the effects of media shocks on inflation expectations and perceptions.

Second, we add the stock prices growth rate from the Swiss Market Index to the baseline model specification in section 5.1. We order this variable at the last position, such that

[12]GMZ conduct a similar robustness check where they use industrial production. However, due to data limitations, we use a business cycle indicator as an alternative to industrial production.

our shock series takes into account this forward-looking variable. We report the results in appendix D.1. In general, our results remain robust this alternative specification.

Third, we use the quantitative inflation expectations derived from the qualitative survey replies to study the effects of news on expectations. The results indicate that the qualitative survey responses about inflation expectations are similar to the findings obtained from quantitative analysis, although the latter are less significant due to the limited number of observations. In general, it appears that a positive quantitative media shock can have a positive effect on expectations, and the effects of qualitative media shocks are consistent with those discussed in section 5.2. One notable exception is that we did not observe a similar negative effect of expectations from sentiment shocks during periods of positive inflation growth. However, it is worth noting that all media shocks had a relatively smaller impact on households in the French-speaking region. A detailed breakdown of these results is available in Table D.3 in the appendix.

7 Conclusion

In this paper, we use a novel data set of newspaper articles in Switzerland to shed light on the links between regional news reporting and households' inflation expectations and perceptions. We create a standard quantitative inflation news measure that reports the differences in the number of articles published about an inflation increase and those that report an inflation decrease. Then, we develop a novel qualitative inflation news measure. Using a state-of-the-art NLP model, we conduct a sentiment analysis on the news articles to predict whether inflation is positively or negatively assessed.

We proceed by investigating how newspapers in Switzerland report about inflation using a threshold SVAR. For the quantitative news measure, we check for the existence of a negativity bias, i.e. newspapers over-reporting during times when inflation increases versus times when inflation decreases. We find no evidence for a negativity bias in newspapers written in French nor in German. Moreover, we find no across-regional differences in quantitative news reporting. For the qualitative news sentiment measure, we find that newspapers assess inflation in general positively during times of negative inflation and assess it rather negative during times of positive inflation. Again, we find that these differences do not differ significantly across newspapers written in French and German.

Deriving media shock for both the quantitative and qualitative news measure, we exploit a quasi-experimental setting in Switzerland to study the effects of news on expectations and perceptions. In this set-up, we find that both the quantitative media shocks and qualitative sentiment shocks have a significant effect on inflation expectations and perceptions.

While relatively more news about an inflation increase compared to news about an inflation decrease has the strongest positive effect during periods of positive inflation, sentiment has a countercyclical effect on expectations and perceptions during times when inflation is positive or negative. Furthermore, we find some evidence that the effect of news is stronger for elderly households. Finally, we document differences in the reaction to news across the language border, where we find households located in the German-speaking part to be more reactive to news compared to households in the French-speaking part. While these observed differences across the language border cannot be explained by systematic differences in news reporting across the regions, a potential explanation is that households in the German-speaking part are more receptive to news as they have been found to be more inflation averse.

Overall, our findings are policy relevant for several reasons. As news coverage affects inflation expectations, real effects can be the consequence. Well-anchored inflation expectations improve the effectiveness of monetary policy. In our sample, 21% of the articles in the German-written newspapers and 15% of those in French-written newspapers write about the Swiss National Bank. This leaves a potential role for central bank communication which has been shown to be picked up by news media and affecting households' inflation expectations (Hirsch, Feld, and Köhler 2023). If central bank communication can affect the sentiment, i.e. how newspapers assess inflation, it may be used as a channel to affect expectations and perceptions in line with the price stability target. In addition, our results suggest that central banks should exploit various communication channels to reach households of all age categories (and regions). Finally, our novel measure of inflation sentiment may be used as a policy indicator that summarizes how newspapers assess inflation.

We think that several directions of further research seem to be worth following. First of all, in this paper, we focused on printed newspaper articles. An in-depth analysis of online articles (and social platforms), changing media consumption habits and its effects on households' expectations and perceptions would contribute to our understanding of news coverage and its effects on households. Another question that we have left aside in this paper is whether different narratives might lead to asymmetric effects in households' expectations. Promising methods in topic modelling, as in Müller et al. (2022), provide a fruitful starting point for this question. Finally, analysing the linkages of media reporting to other expectations and different agents in the economy is a valuable topic for future research.

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Appendix

A Inflation News Indices

A.1 Description

To construct indices about inflation news, we focus on printed articles that write about the Swiss economy. For newspapers written in German, we select the *Tages Anzeiger, Berner Zeitung, Blick* and *20 Minuten*. For French-written newspapers, we select *Le Temps, 24 heures, Tribune de Genève, 20 minutes* and *Le Matin*. These newspapers are among the largest in terms of readership (Federal Statistical Office 2022b). Note that we do not consider the *Neue Zürcher Zeitung* (NZZ). Swissdox classifies the NZZ as a national newspaper. As the goal of this paper is to analys regional newspaper reporting of inflation, we dismiss articles from the NZZ.

We analyse articles from January 1998 to April 2022. For all articles, we look for the words inflation, a synonym of inflation and price ("Inflation", "Teuerung" and "Preis" in German, "inflation", "renchérissement" and "prix" in French). Similar to GMZ, we search for words indicating an increase or decrease in the vicinity of inflation. The words that identify an increase or decrease are translated and described in table A.1. We use similar words for both languages.

Table A.1: Words indicating decrease or increase in Inflation

Indicator	Words
Increase	Increase∗, pop+upward, spike, augment∗, markup, boom∗, boost, growth, grow∗, increment∗, drive∗, high∗, soar∗, more expensive, accelerate∗
Decrease	Decrease∗, decline∗, drop∗, dampen∗, reduce∗, reduction, fall∗, dip∗, downward∗ , low∗, abate∗, shrink∗, go + down, plunge∗, attenuate∗

We count newsarticles that report an increase in inflation if inflation or its synonym appears within a five-word distance of an indicator for increase, and without an indicator of a decrease in a two word distance. Symetrically, we count newsarticles that report a decrease in inflation when inflation or its synonym appears within a five-word distance of an indicator for decrease and no indicator of an increase within a two word distance. In contrast to GMZ, we use a two word instead of a one-word distance. Especially in German, an increase (decrease)

is often indicated with the combination of two words, i.e. "nehmen" + "zu" ("nehmen" + "ab").

With these articles at hand, we construct a "quantitative inflation news" measure. This measure is defined as the difference between the number of articles writing about an increase in inflation minus the number of articles that writing about a decrease in inflation. We then aggregate these measures on a monthly frequency.

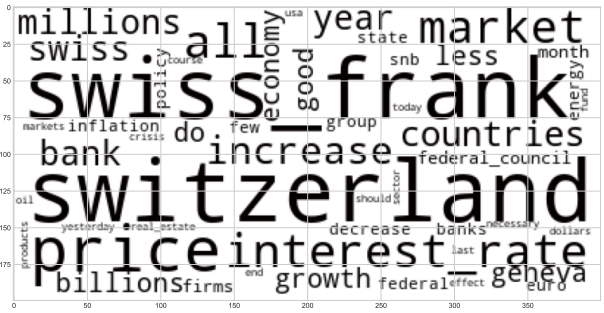
To get an overview of the articles considered, Figure A.1 shows a wordcloud for German and French-written articles. These wordclouds represent the keywords found in the newspaper articles weighted by the term frequency-inverse document frequency (tf-idf) score. The tf-idf score is based on how often a term appears in an article (term frequency) and how rare it is in the entire corpus (inverse document frequency).

The tf-idf score is defined as the product of the term-frequency and the inverse-document frequency. The term frequency is defined as $tf(w,a) = \frac{N_{w,a}}{\sum_{w' \in a, N w', a}}$, where $N_{w,a}$ stands for the absolute frequency of word w in article a. $\sum_{w' \in a, N w', a}$ is the total number of words in article a. The inverse document frequency is defined as $idf(w,a) = \log \frac{N}{|\{a \in A : w \in a\}|}$, where N is the total number of articles in the corpus and $|\{a \in A : w \in a\}|$ indicates the number of articles where the word w appears.

In Panel A.1a, we plot the 50 words with the highest tf-idf score for newspapers written in German. The larger a word is plotted, the higher its tf-idf score. Reassuringly, all words displayed are economic-related terms. Furthermore, terms describing the Swiss National Bank (national bank, or SNB), related to the interest rate and the exchange rate are among the words with the highest tf-idf score.

In Panel A.1b, we plot the wordcloud of French-written articles. Again, the Swiss National Bank (short SNB) and words related to the interest rate and national currency are important keywords. Overall, the wordcloud for French-written articles feature similar words. However, the weights attached to these words vary conditional on the newspapers. For example, the word "swiss_frank" has a lower score in the German-written newspapers compared to the French-written newspapers. Therefore, "swiss_frank" is less relevant in terms of the tf-idf score in the German-written newspapers compared to the French-written newspapers.

(a) Wordcloud German-written Articles

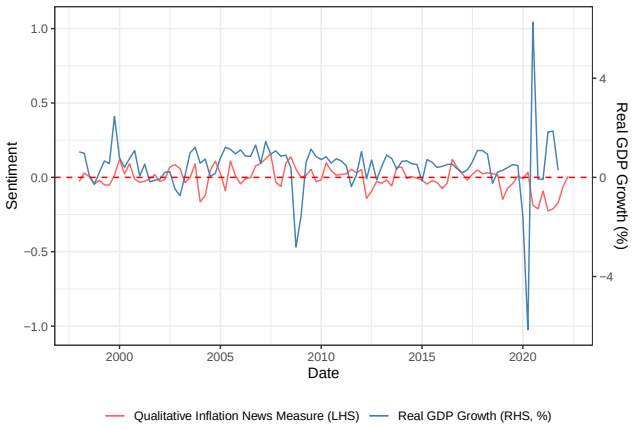


(b) Wordcloud French-written Articles

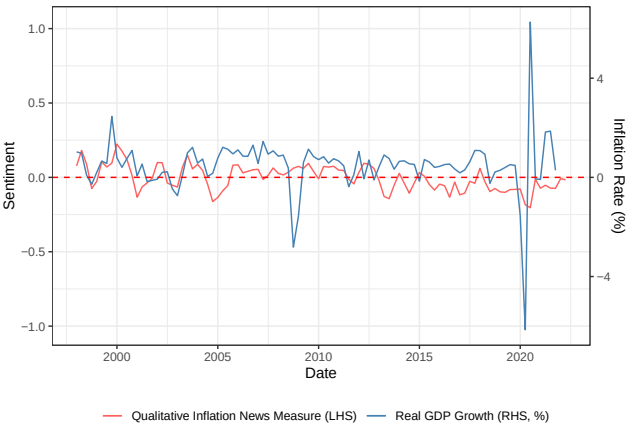
Figure A.1: Wordclouds

Notes: The Figure shows wordclouds built with all the articles considered in the main analysis for both newspapers written in German and newspapers written in French. The words are weighted by the term frequency-inverse document frequency (tf-idf). The tf-idf takes into account not only the frequency of each word, but also its relative importance in the context of the entire corpus. In both figures, words with higher tf-idf score are displayed with a larger font size.

A.2 Qualitative News Measure and GDP Growth



(a) Newspapers written in German



(b) Newspapers written in French

Figure A.2: Qualitative Inflation News Measure and Real GDP Growth

Notes: In the left panel, the figure plots the qualitative inflation news measure for newspapers written in German (left-hand scale) together with the real GDP growth rate (right-hand scale). The qualitative news measure is the average sentiment resulting from the prediction of the BERT model. In the right panel, we plot the qualitative news measure for newspapers written in French (left-hand scale) together with the real GDP growth rate (right-hand scale). The qualitative inflation news measure is standardized. Values above (below) the horizontal zero line indicate periods of a predominantly positive (negative) sentiment with respect to inflation. All data is averaged to quarterly frequency.

B Inflation Expectations

In this section, we will discuss the probability approach of Carlson and Parkin (1975) in more detail. Originally, this approach, often called the Carlson-Parkin method (CP method henceforth), was developed for only three categorical answers with respect to price developments but can easily be extended to more categories. The method is widely used (see Nardo 2003 for a review), but has been criticized in its original form recently Lolić and Sorić (2018). Especially the strong assumption of unbiased inflation expectations has been questioned. For this reason, we will use the modified approach from Rosenblatt-Wisch and Scheufele (2015) which circumvents the assumption of unbiased inflation expectations.

To start with, the probability approach assumes that individuals form their inflation expectations from a subjective probability distribution $f_i(\pi_{i,t+4})$, characterized by mean $\mathbb{E}_t[\pi_{i,t+4}]$ and standard deviation $\sigma_t(\pi_{i,t+4})$. This probability distribution function is the same across all agents. Further, the method assumes that the individuals reply to the question whether prices will *go down* if $\mathbb{E}_t[\pi_{i,t+4}] \leq -\delta_{it}^L$, *stay the same* if $-\delta_{it}^L < \mathbb{E}_t[\pi_{i,t+4}] \leq \delta_{it}^U$, *will rise moderately* if $\delta_{it}^U < \mathbb{E}_t[\pi_{i,t+4}] \leq \lambda_{it}$ and *will rise strongly* if $\mathbb{E}_t[\pi_{i,t+4}] > \lambda_{it}$. Therefore, in between the range of $-\delta_{it}^L$ to δ_{it}^U, the individual does not notice that prices either increase or decrease.

Given that all individuals share the same probability distribution function, we can describe the aggregate probability distribution using the shares of the survey replies for each category.

$$
\begin{aligned}
&P(\mathbb{E}_t[\pi_{i,t+4}] \geq -\delta_{it}^L) = A_t \\
&P(\mathbb{E}_t[\pi_{i,t+4}] \geq \delta_{it}^U) - P(\mathbb{E}_t[\pi_{i,t+4}] > -\delta_{it}^L) = B_t \\
&P(\mathbb{E}_t[\pi_{i,t+4}] \geq \lambda_{it}) - P(\mathbb{E}_t[\pi_{i,t+4}] > \delta_{it}^U) = C_t
\end{aligned}
$$

We define the abscissae a_t, b_t, c_t of the distribution function to correspond to the cumulative probabilities of $A_t, A_t + B_t, A_t + B_t + C_t$, respectively. Following Rosenblatt-Wisch and Scheufele (2015), we choose the normal distribution as the distribution function, as they find that alternatives have only minor effects on the results.

Finally, assuming that the interval in between individuals don't notice any differences in prices is symmetrical around 0, $-\delta_t^L = \delta_t^U$, we can define $\mathbb{E}_t[\pi_{i,t+4}]$ and $\sigma_t(\pi_{i,t+4})$ in terms of

the parameter λ_t and the quantiles of the distribution.

$$\mathbb{E}_t[\pi_{t+4}] = \frac{\lambda_t(a_t + b_t)}{(a_t + b_t - 2c_t)} \tag{3}$$

$$\sigma_t(\pi_{t+4}) = \frac{-2\lambda_t}{(a_t + b_t - 2c_t)} \tag{4}$$

$$\delta_t = \frac{\lambda_t(a_t - b_t)}{(a_t + b_t - 2c_t)} \tag{5}$$

Figure B.3 provides an illustration.

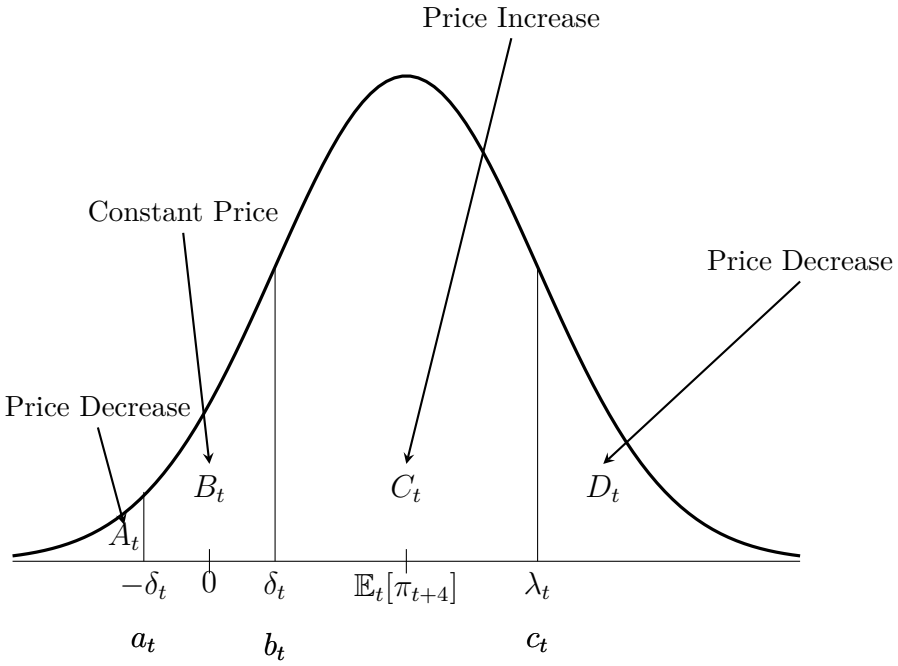


Figure B.3: Illustration CP method - Joint Probability Distribution

There exist different methods to estimate the parameter λ_t. The CP method assumes that the parameter is time-invariant and inflation expectations are unbiased, such that $\mathbb{E}_t[\pi_{i,t+4}] = \pi_{i,t+4}$ and the parameter can be easily estimated using the observed inflation rate. These rigorous assumptions can be relaxed in several ways. First, Rosenblatt-Wisch and Scheufele (2015) propose a time-variant scaling parameter and second, they circumvent the assumption of unbiased inflation expectations by using information about the perceived inflation rate.

Rosenblatt-Wisch and Scheufele (2015) assume that individuals have, on average, a correct perception of prices (compare also Berk 1999). This is arguably a less strong assumption than unbiased inflation expectations. Following the same logic as for inflation expectations

using the survey shares for inflation perceptions, $\hat{\pi}_t$, we can write

$$\hat{\pi}_t = \frac{\lambda_t(a'_t + b'_t)}{(a'_t + b'_t - 2c'_t)}$$

with a'_t, b'_t, c'_t being the abscissae of the distribution function of perceived inflation. Now, assuming that $\hat{\pi}_t = \pi_t$ on average, we can estimate the parameter λ_t.

In this paper, we focus on the estimation of λ_t using a state-space model and present robustness checks using rolling regressions as an alternative. In Rosenblatt-Wisch and Scheufele (2015), both methods have led to reasonable results. First, we describe the state-space model and its estimation. Second, we briefly summarize the rolling regression method.

B.1 State-Space Model

The State-Space Model was originally proposed by Seitz (1988). It consists of one measurement equation (6) and a transition equation (7).

$$\pi_t = \lambda_t \frac{(a'_t + b'_t)}{(a'_t + b'_t - 2c'_t)} + u_t \tag{6}$$

$$\lambda_t = \lambda_{t-1} + v_t \tag{7}$$

with $\mathbb{V}ar(u_t) = (1-\gamma)\sigma^2$ and $\mathbb{V}ar(v_t) = \gamma\sigma^2$. This is a simple Kalman Filter set-up. To proceed, however, we need initial estimates of the variance parameters σ^2 and γ. We follow the approach of Cooley and Prescott (1976) using a constrained maximum likelihood function.

B.2 Rolling Regressions

Another approach to estimate λ_t is using rolling regressions. For each window, we run the regression

$$\pi_t = \lambda \frac{(a'_t + b'_t)}{(a'_t + b'_t - 2c'_t)} + u_t$$

. Using a window of 30 quarters, λ_t is defined as

$$\lambda^r_t = \frac{\sum_{k=t-w+1}^{t}(a'_k + b'_k)/(a'_k + b'_k - 2c'_k)\pi_k}{\sum_{k=t-w+1}^{t}((a'_k + b'_k)/(a'_k + b'_k - 2c'_k))^2}$$

The choice of the window leads to similar results as in Rosenblatt-Wisch and Scheufele (2015).

To calculate a_t, b_t and c_t, we use the mean shares the survey replies for each category

with respect to price expectations and price perceptions. Figure B.4 plots the qualitative survey replies for inflation expectations over the relevant sample period from the second quarter of 1997 up until the second quarter 2022 conditional on the region. In general, the shares over time follow a similar evolution. However, the share of households that expect inflation to increase (strongly or moderate) is, on average, higher for the French region.

Figure B.5 plots the share for each category with respect to inflation perceptions. Similarly to inflation expectations, the share of households that perceive inflation to be high or moderate is higher compared to the German region.

There may be several reasons why we observe average differences in the shares of survey replies. First, it is possible that the different perceptions and expectations mirror different inflation rates in these regions. Second, it might be possible that expectations and perceptions might be influenced by shopping experience across the border. Third, the implicit rates for which households' perceive and expect inflation to belong to either category differ across regions.

For this reason, we plot in Figure B.6 cantonal inflation indices.[13]. In Switzerland, cantonal inflation indices are only available for three cantons, namely Basel, Zürich and Geneva. These cities are also the three biggest in terms of population. Except for the very beginning of the sample period around 1998, inflation rates across the cantons are very similar and follow closely the national Swiss inflation rate.

Figure B.7 plots the inflation rate for France and Germany. We show both the national inflation measures as well as the Eurostat's harmonized index of consumer prices (HICP). Again, the inflation rates are very similar across these two countries.

Therefore, the observed difference in the shares of perceived and expected inflation is most likely due to different thresholds in the rates at which households perceive (and expect) inflation to change.

B.3 Descriptive Results

Figure B.8 plots the resulting inflation expectations using both methods, the Kalman Filter and the Rolling Regression approach for each region, respectively. Overall, the inflation expectations are similar with some exceptions at the very beginning of the sample and shortly after 2015.

[13]Sources are linked in the references (Basel-Stadt 2022; République et Canton de Genève 2022; Stadt Zürich 2022).

Figure B.4: Qualitative Inflation Expectations

Notes: The Figure shows the share of replies for the survey question about inflation expectations over the next 12 months conditional on the region. Note that from 2012 to 2013, there is no information about the region of the households available.

Figure B.5: Qualitative Inflation Perception

Notes: The Figure shows the share of replies for the survey question about inflation perceptions from the past 12 months conditional on the region. Note that from 2012 to 2013, there is no information about the region of the households available.

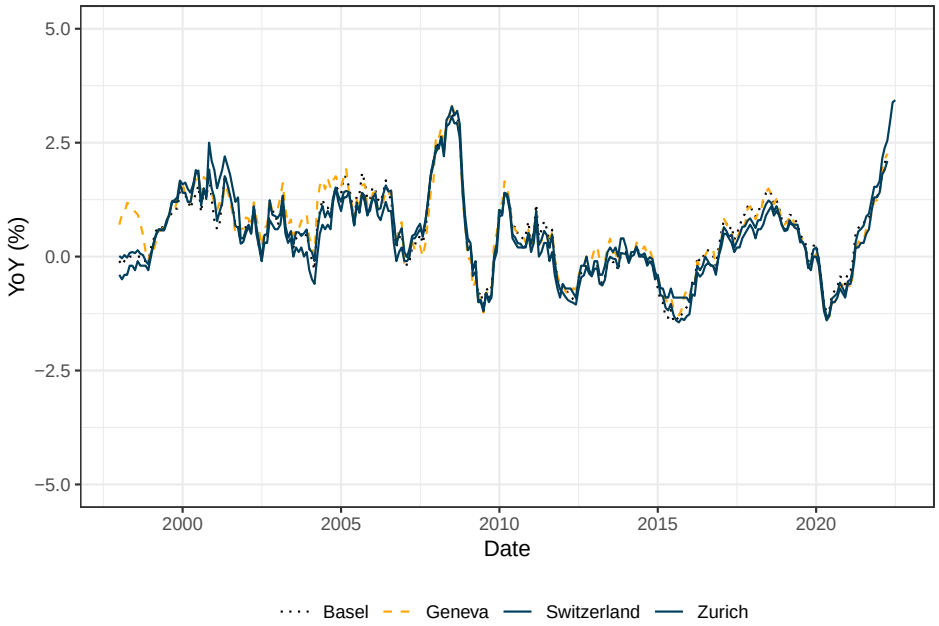


Figure B.6: Cantonal Inflation Rates

Notes: This Figure plots three different cantonal inflation indices, namely from Basel, Geneva and Zurich, together with the average inflation index of Switzerland.

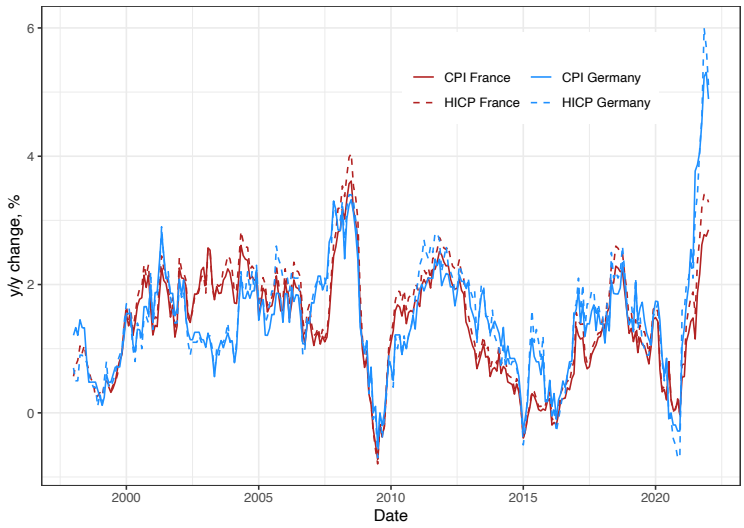


Figure B.7: Inflation Rates for Germany and France

Notes: The figure shows the consumer price indices and harmonized consumer price indices for Germany and France. Sources: Organization for Economic Co-operation and Development (2023a), Organization for Economic Co-operation and Development (2023b), Organization for Economic Co-operation and Development (2023c), Organization for Economic Co-operation and Development (2023d)

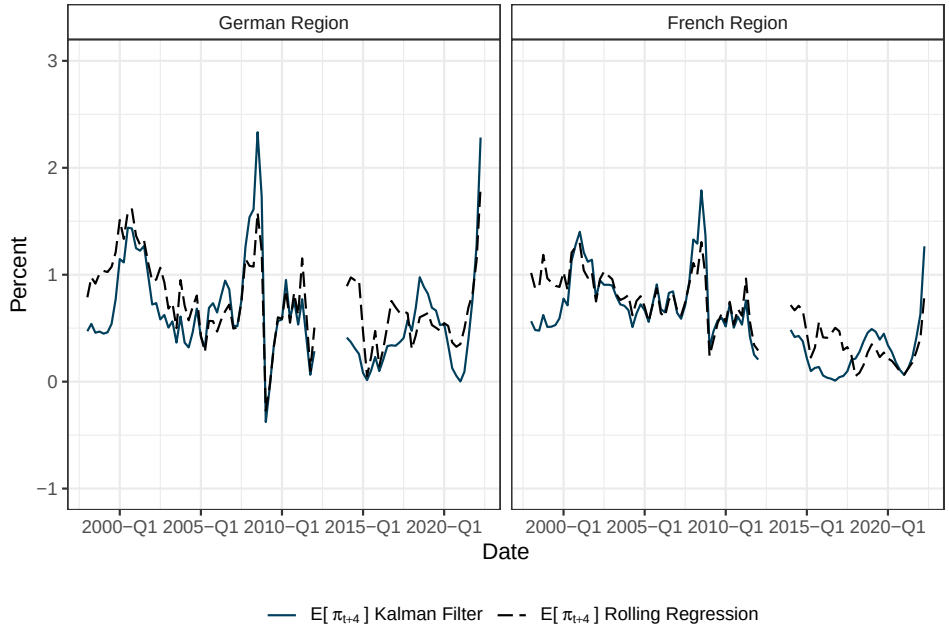


Figure B.8: Inflation Expectations with Kalman Filter and Rolling Regressions

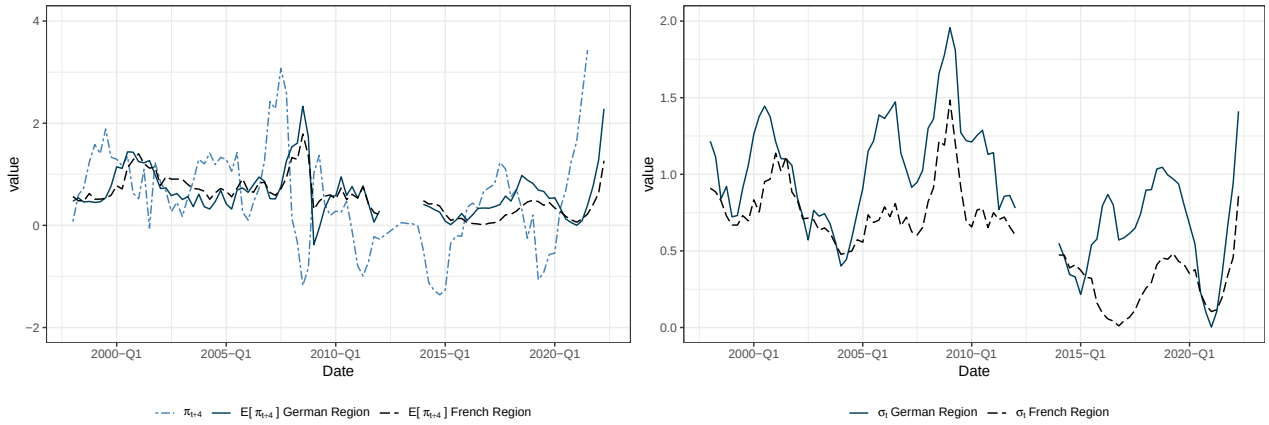
Notes: The Figure shows the mean inflation expectations for households using two different estimation techniques for the parameter λ_t. We compare the results from the Kalman Filter estimation process described in B.1 with the Rolling Regression approach described in B.2.

In Figure B.9 panel B.9a, we plot the average inflation expectations $\mathbb{E}[\pi_{t+4}]$ derived from the qualitative survey conditional on each region together with the actual observed inflation

rate π_{t+4}. Inflation expectations differ across regions but overall share a very similar trend in the French and German-speaking regions. Only after 2015, inflation expectations are higher for the German-speaking regions. Overall, inflation expectations seem well anchored, with exceptions during the financial crisis and most recently following the pandemic.

While households in the French-speaking part show higher shares of inflation perceptions and expectations in the categories of strong and slight increase, average inflation expectations are lower for households in the French-speaking part. This is due to the different thresholds at which these households perceive inflation to be decreasing, constant, slightly increasing or strongly increasing. As, by assumption, inflation perceptions are unbiased on average, this means that households in the French-speaking part perceive inflation to be slightly increasing or increasing at a lower rate than German households do. For this reason, adjusting inflation expectations for the scaling parameters results in lower inflation expectations for households in the French-speaking part.

In panel B.9b, we plot the standard deviation of the inflation expectations conditional on the regions. In general, the inflation expectations in the French region are less volatile than in the German region. Similar to the mean inflation expectations, the standard deviation is higher during the financial crisis and increasing since the pandemic.



(a) Mean (b) Standard Deviation

Figure B.9: Mean and Standard Deviation of $\mathbb{E}[\pi_{t+4}]$ conditional on the Region

Notes: The left panel shows the realized inflation rate (change comapred to the same month in the previous year) and the mean inflation expectations for changes in prices in the next 12 months for households in both regions, the German and French-speaking part (equation 3). The right panel shows the standard deviation of the inflation expectations calculated as in equation 4.

Table B.2 summarizes the main moments of the observed inflation rate and households' inflation expectations over the entire sample period. The average observed inflation of 0.54 is quite close to expectations of the German-speaking region with 0.63 and French-speaking region with 0.58. While observed inflation reaches a maximum at 1.79 in the third quarter

2021, inflation expectations for both regions reach a local maximum in the third quarter of 2008, with 2.33 for the German region and 3.43 for the French-speaking region.

Table B.2: Summary Table for Regional Inflation Expectations and Observed Inflation

Variable	Mean	Sd.	Min.	Max.
Observed Inflation	0.54	0.97	-1.36	3.43
Inflation Expectations German-speaking Region	0.63	0.47	-0.38	2.33
Inflation Expectations French-speaking Region	0.58	0.37	0.01	1.79

Notes: The table shows summary statistics of observed inflation and the quantified inflation expectations derived from qualitative survey data for German and French-speaking households.

C Additional Results Inflation Reporting of Newspapers

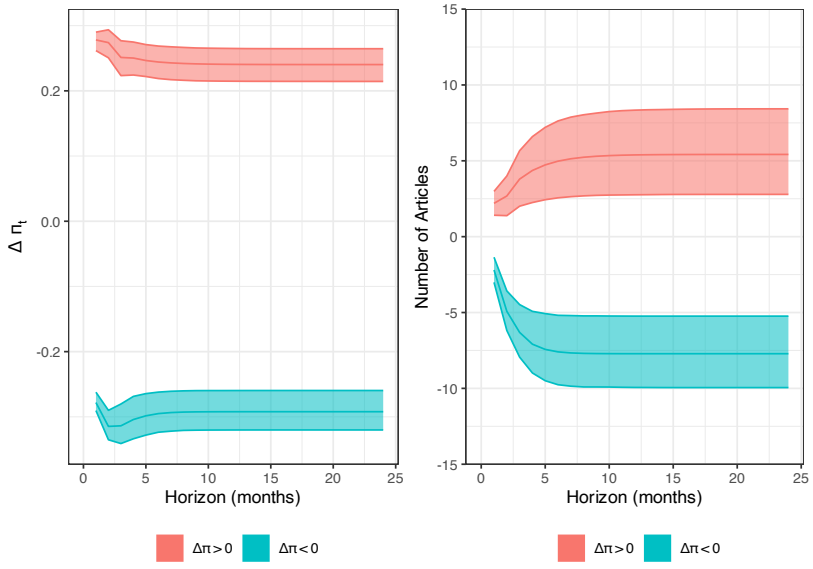


Figure C.10: Results TSVAR for Quantitative News Measure in German Newspapers

Notes: The Figure shows the cumulative impulse response functions of the TSVAR model described in section 3.1. The left-hand panel shows the cumulative sum of the responses of the change in the inflation rate to a positive (red) and negative (blue) inflation rate innovation, respectively. The right-hand side panel shows the cumulative sum of the responses of the quantitative inflation news measure (number of articles writing about an inflation increase minus number of articles writing about an inflation decrease) to the positive (inflation increases) and negative inflation rate innovation. The shadowed areas correspond to 68% confidence bands.

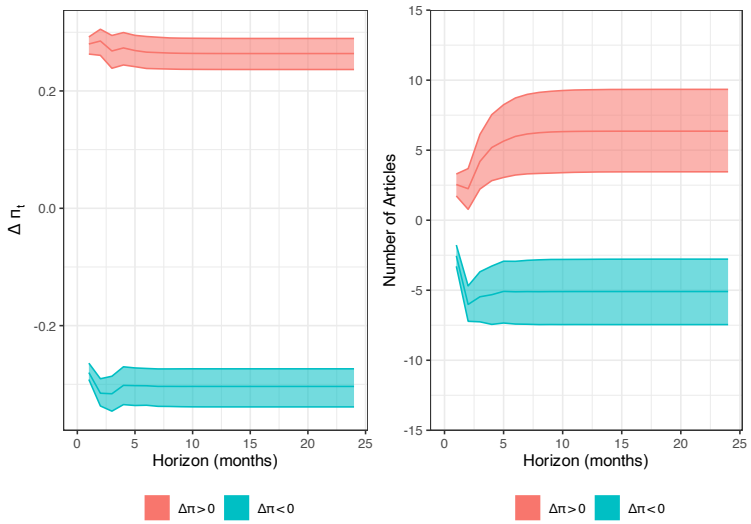
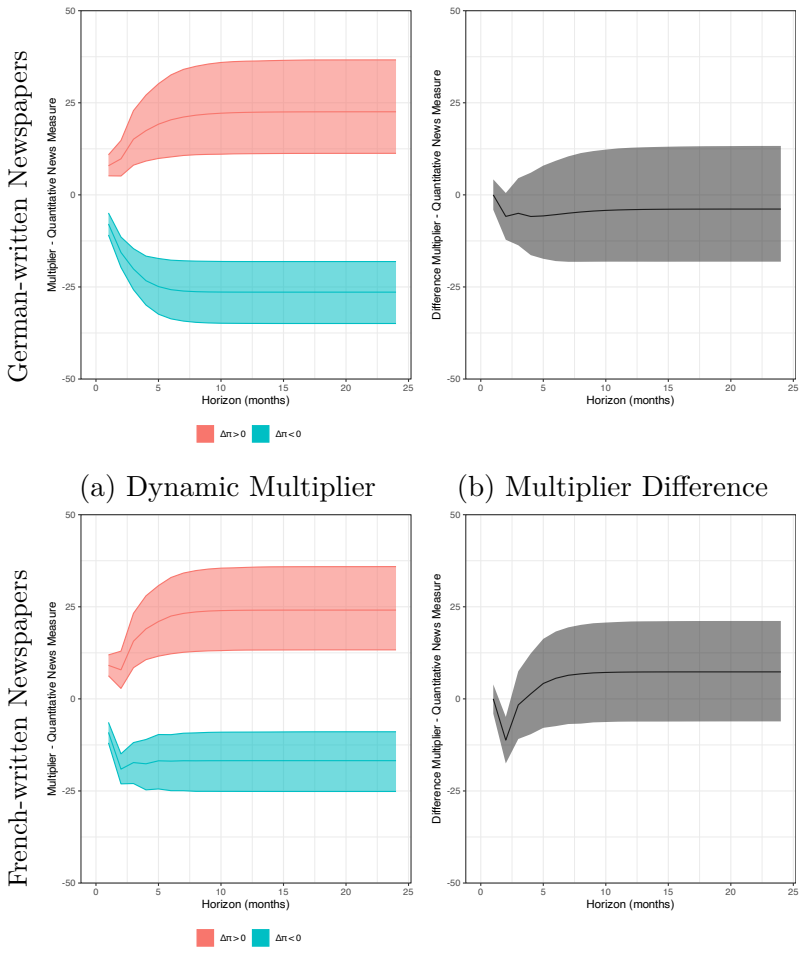


Figure C.11: Results TSVAR for Quantitative News Measure in French Newspapers

Notes: The Figure shows the cumulative impulse response functions of the TSVAR model described in section 3.1. The left-hand panel shows the cumulative sum of the responses of the change in the inflation rate to a positive (red) and negative (blue) inflation rate innovation, respectively. The right-hand side panel shows the cumulative sum of the responses of the quantitative inflation news measure (number of articles writing about an inflation increase minus number of articles writing about an inflation decrease) to the positive (inflation increases) and negative inflation rate innovation. The shadowed areas correspond to 68% confidence bands.

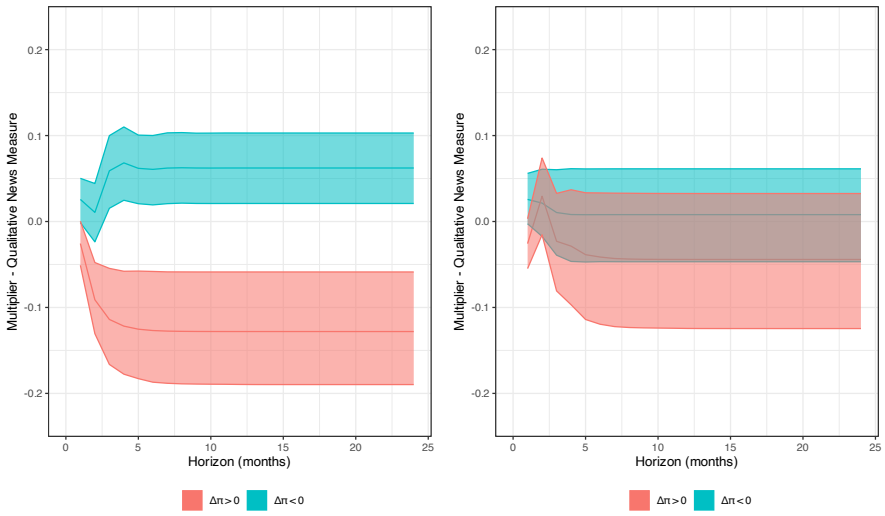


(a) Dynamic Multiplier (b) Multiplier Difference

(c) Dynamic Multiplier (d) Multiplier Difference

Figure C.12: Dynamic Multipliers for Quantitative News Measure

Notes: The Figure shows the dynamic multipliers of the TSVAR model described in section 3.1 for the qualitative news measure in Panel (a) and (c) and the multiplier difference in Panel (b) and (d). The dynamic media multiplier is a normalization of the impulse response function where, at every time t, the cumulative response of the qualitative news measure is normalized by the cumulative response of the inflation rate. The dynamic media multiplier can be interpreted as follows. At the end of the time horizon of our impulse response functions at 24 months, the dynamic media multiplier shows how many excess articles about an inflation increase compared to inflation decrease articles are generated by the news media in response to a 1 percentage point shock in inflation. The difference of the dynamic media multiplier in Panel (b) and (d) is calculated between states where changes in inflation are positive versus negative. A positive difference of the dynamic multiplier points towards a negativity bias, where newspapers would report more frequently about an inflation increase compared to a decrease. In Panels (a) and (b), the results for newspapers written in German is displayed, and in Panels (c) and (d) the results for the French-written newspapers. The shadowed areas correspond to 68% confidence bands.



(a) German-written Newspapers (b) French-written Newspapers

Figure C.13: Dynamic Multipliers for Qualtitative News Measure

Notes: The Figure shows the dynamic multipliers of the TSVAR model described in section 3.1 for the qualitative news measure. The dynamic media multiplier is a normalization of the impulse response function where, at every time t, the cumulative response of the qualitative news measure is normalized by the cumulative response of the inflation rate. Panel (a) shows the results for the qualitative news measure derived from the German-written newspapers. Panel (b) shows the results for the French-written newspapers. The shadowed areas correspond to 68% confidence bands.

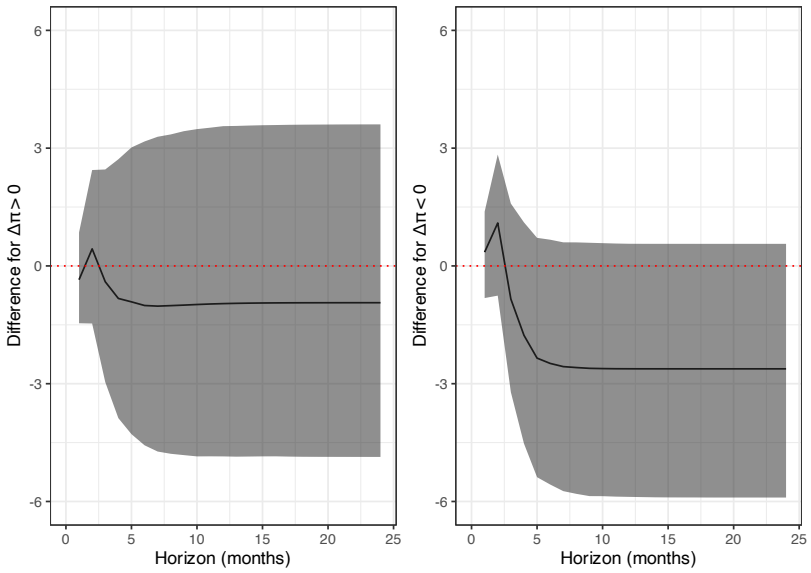


Figure C.14: Differences in Quantitative News Measure Across Region

Notes: On the left-hand side panel, the figure shows the difference in the quantitative news measure reaction to an unexpected inflation increase across region. Namely, we calculate the difference between the reaction of the quantitative news measure from the German newspaper and the French-written newspaper. On the right-hand side panel, the figure shows the difference in the quantitative news measure reaction to an unexpected inflation decrease across region. The shadowed areas correspond to 68% confidence bands.

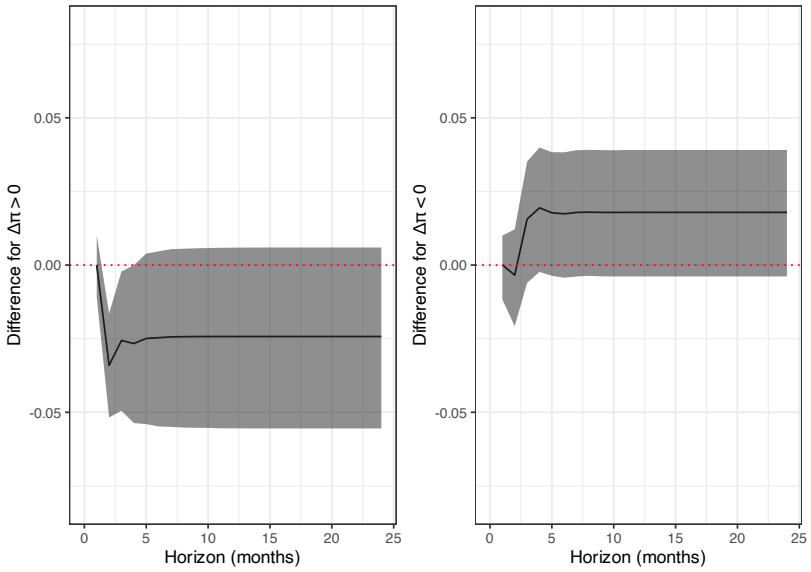
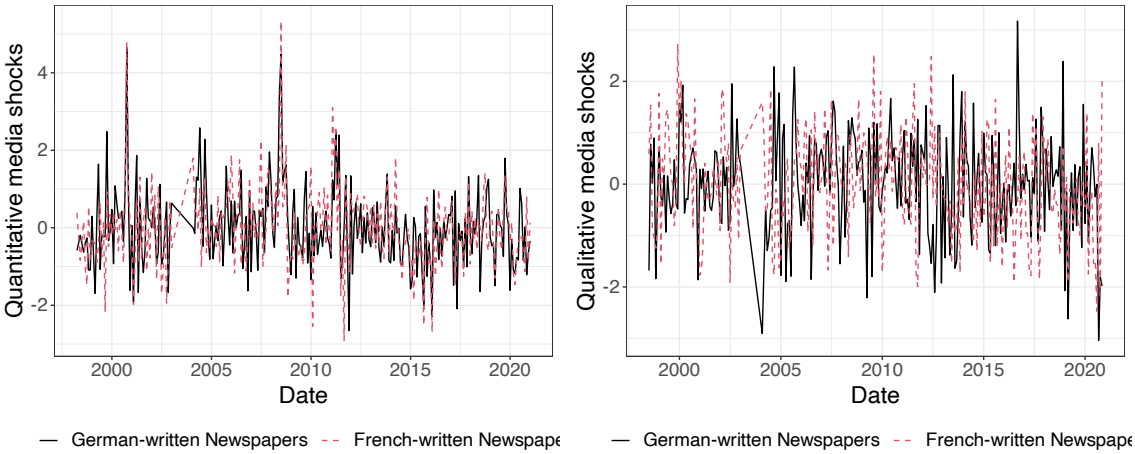


Figure C.15: Differences in Qualitative News Measure Across Region

Notes: On the left-hand side panel, the figure shows the difference in the qualitative sentiment measure reaction to an unexpected inflation increase across region. Namely, we calculate the difference between the reaction of the qualitative news measure from the German newspaper and the French-written newspaper. On the right-hand side panel, the figure shows the difference in the quantitative news measure reaction to an unexpected inflation decrease across region. The shadowed areas correspond to 68% confidence bands.



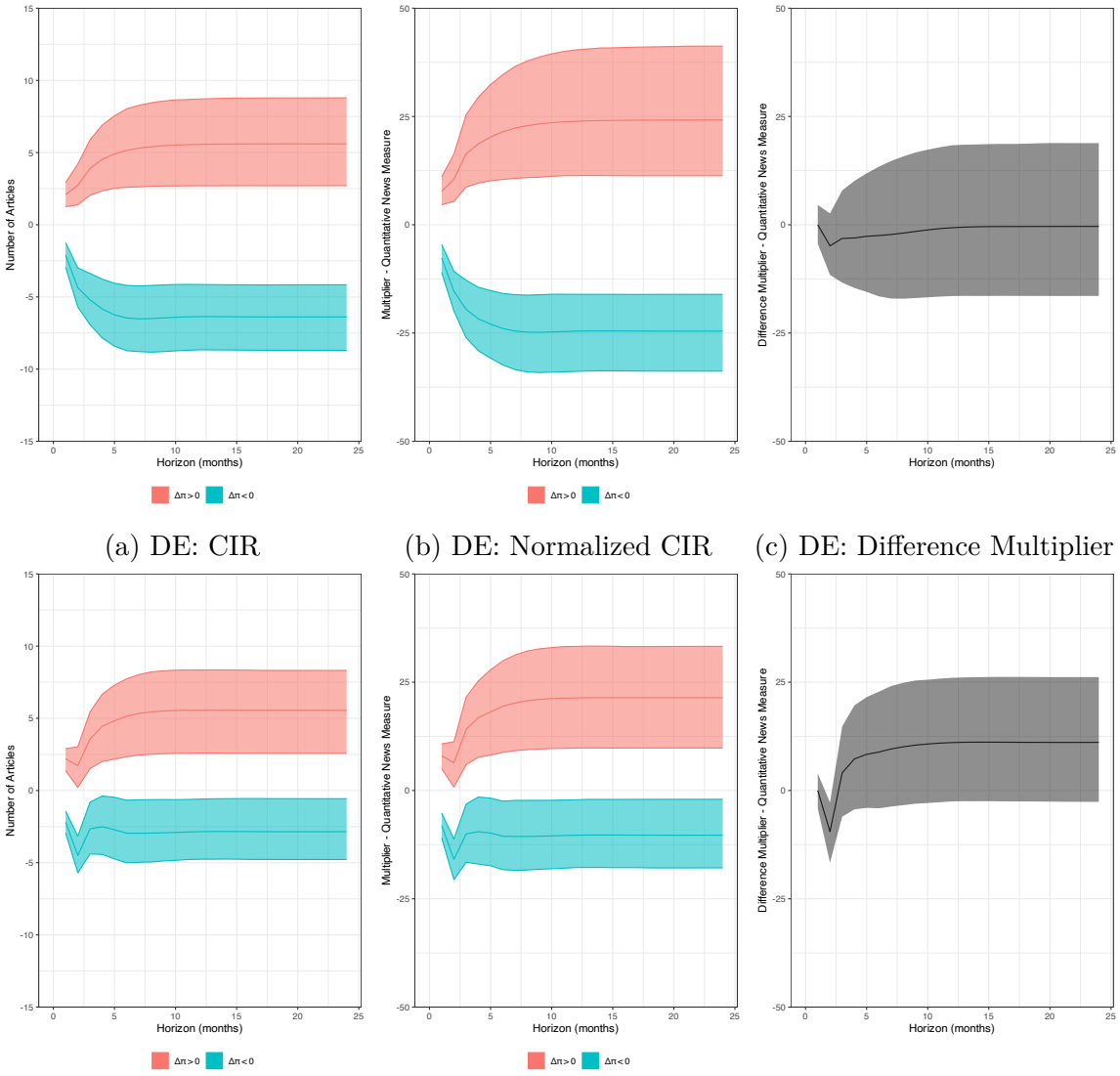
(a) Quantitative News Measure (b) Qualitative News Measure

Figure C.16: Media shocks

Notes: The Figure shows the media shocks described in section 3.1 for the quantitative and qualitative news measure, conditional on the region for each month. Note that the gap in between the period of January 2003 to December 2003 is due to a reporting issue in the Swissdox database.

D Robustness Checks

D.1 Inclusion Business Cycle Indicator

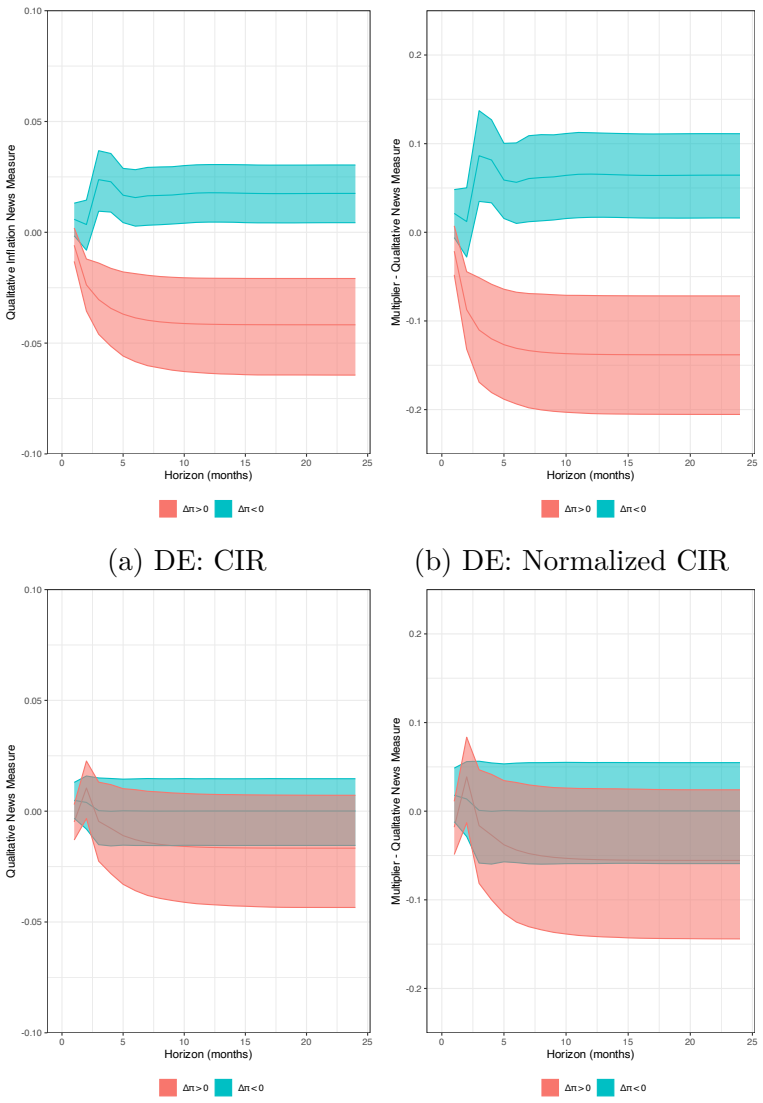


(a) DE: CIR (b) DE: Normalized CIR (c) DE: Difference Multiplier

(d) FR: CIR (e) FR: Normalized CIR (f) FR: Difference Multiplier

Figure D.17: Inclusion of Business Cycle Indicator - Quantitative News Measure

Notes: The Figure shows the cumulative, normalized cumulative impulse response functions, as well as the difference between the normalized cumulative impulse response (dynamic multiplier) functions of the TSVAR model described in section 3.1 including a business cycle indicator in between the inflation rate and the quantitative news measure. It shows the response of the quantitative news measure to a one standard deviation shock in the inflation rate. CIR stands for Cumulative Impulse Response. All panels with subtitle "DE" show the results for the German-written newspapers, and those with subtitle "FR" the results for the French-written newspapers. The shadowed areas correspond to 68% confidence bands.



(a) DE: CIR (b) DE: Normalized CIR

(c) FR: CIR (d) FR: Normalized CIR

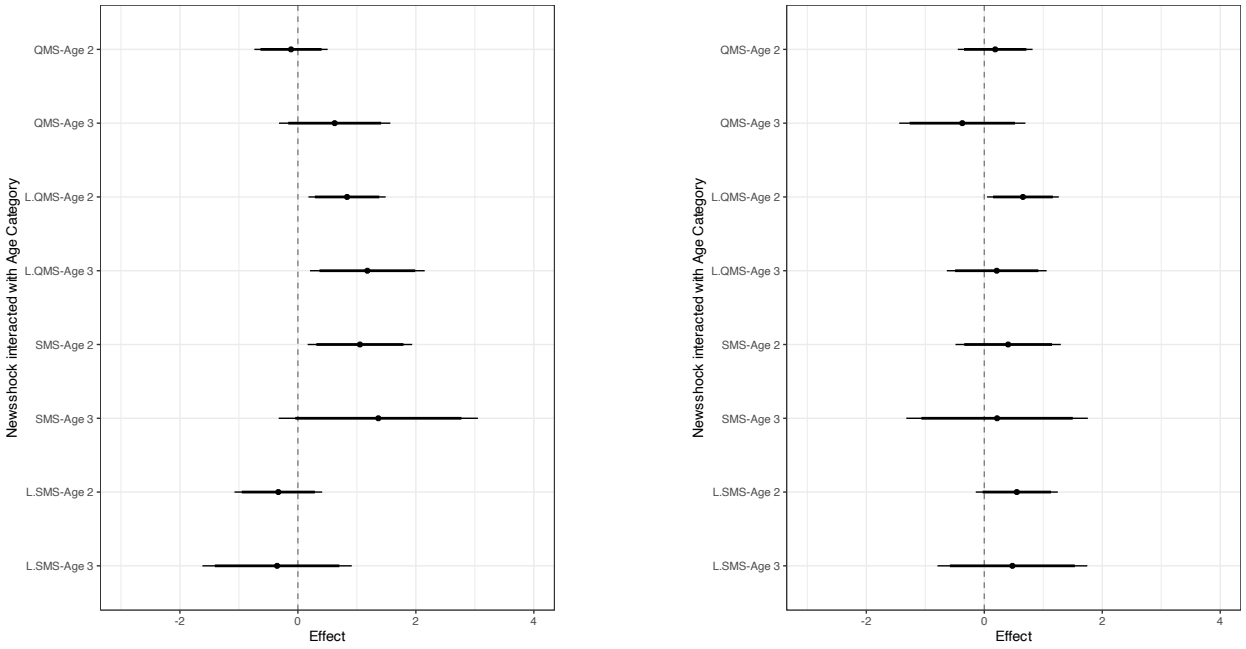
Figure D.18: Inclusion of Business Cycle Indicator - Qualitative News Measure

Notes: The Figure shows the cumulative and normalized cumulative impulse response functions of the TSVAR model described in section 3.1 including a business cycle indicator in between the inflation rate and the qualitative news measure. It shows the response of the qualitative news measure to a one standard deviation shock in the inflation rate. CIR stands for Cumulative Impulse Response. All panels with subtitle "DE" show the results for the German-written newspapers, and those with subtitle "FR" the results for the French-written newspapers. The shadowed areas correspond to 68% confidence bands.

Table D.3: Robustness Check: Estimation with Business Cycle Indicator

	Baseline		$\Delta\pi > 0$	$\Delta\pi \leq 0$	$\Delta\pi > 0$	$\Delta\pi \leq 0$	Region	
	(1) reply$_e$	(2) reply$_p$	(3) reply$_e$	(4) reply$_e$	(5) reply$_p$	(6) reply$_p$	(7) reply$_e$	(8) reply$_p$
Quantitative Media Shock$_t$	1.57**	1.08	1.30*	1.40	1.58	0.61	1.56**	2.49*
	(0.61)	(0.97)	(0.70)	(1.11)	(1.43)	(1.10)	(0.69)	(1.41)
Quantitative Media Shock$_{t-1}$	0.55	0.84	1.28*	-1.43	2.43**	-0.47	0.92	2.92***
	(0.66)	(0.86)	(0.69)	(1.44)	(0.99)	(1.06)	(0.66)	(0.77)
Qualitative Media Shock$_t$	0.19	1.09**	-0.86**	1.78	-0.12	3.28***	1.27*	0.64
	(0.47)	(0.47)	(0.37)	(1.13)	(0.46)	(0.78)	(0.73)	(0.47)
Qualitative Media Shock$_{t-1}$	0.09	0.37	0.08	-0.69	0.36	0.10	-0.33	0.44
	(0.48)	(0.49)	(0.50)	(1.36)	(0.59)	(1.03)	(0.69)	(0.68)
French speaking Region=1 × Quantitative Media Shock$_t$							-0.32	-1.38***
							(0.46)	(0.51)
French speaking Region=1 × Quantitative Media Shock$_{t-1}$							-1.37***	-1.01*
							(0.50)	(0.52)
French speaking Region=1 × Qualitative Media Shock$_t$							-2.38**	-1.99*
							(1.09)	(1.11)
French speaking Region=1 × Qualitative Media Shock$_{t-1}$							0.39	-1.22
							(1.13)	(0.91)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region$_r$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HH$_{i,r,t}$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32,447	34,747	17,379	15,064	18,545	16,200	32,447	18,545
$\bar{y}$	85	86	89	81	89	83	85	89

Note: The table shows the main results from the model presented in section 5.1, estimated with a business cycle indicator in between the inflation rate and the news measure. Columns (1) and (2) show the unconditional effects of the quantitative and qualitative media shocks. Column (3) to (6) estimate the effects conditional on a positive or negative change in inflation. Columns (7) and (8) add the interaction effect of the region with the media shocks. The media shocks are standardized such that a one unit increase corresponds to a one standard-deviation increase in the media shock. $\bar{y}$ corresponds to the mean of the dependant variable. * p<0.10, ** p<0.05, *** p<0.010. Standard Errors are clustered at the date × region level.

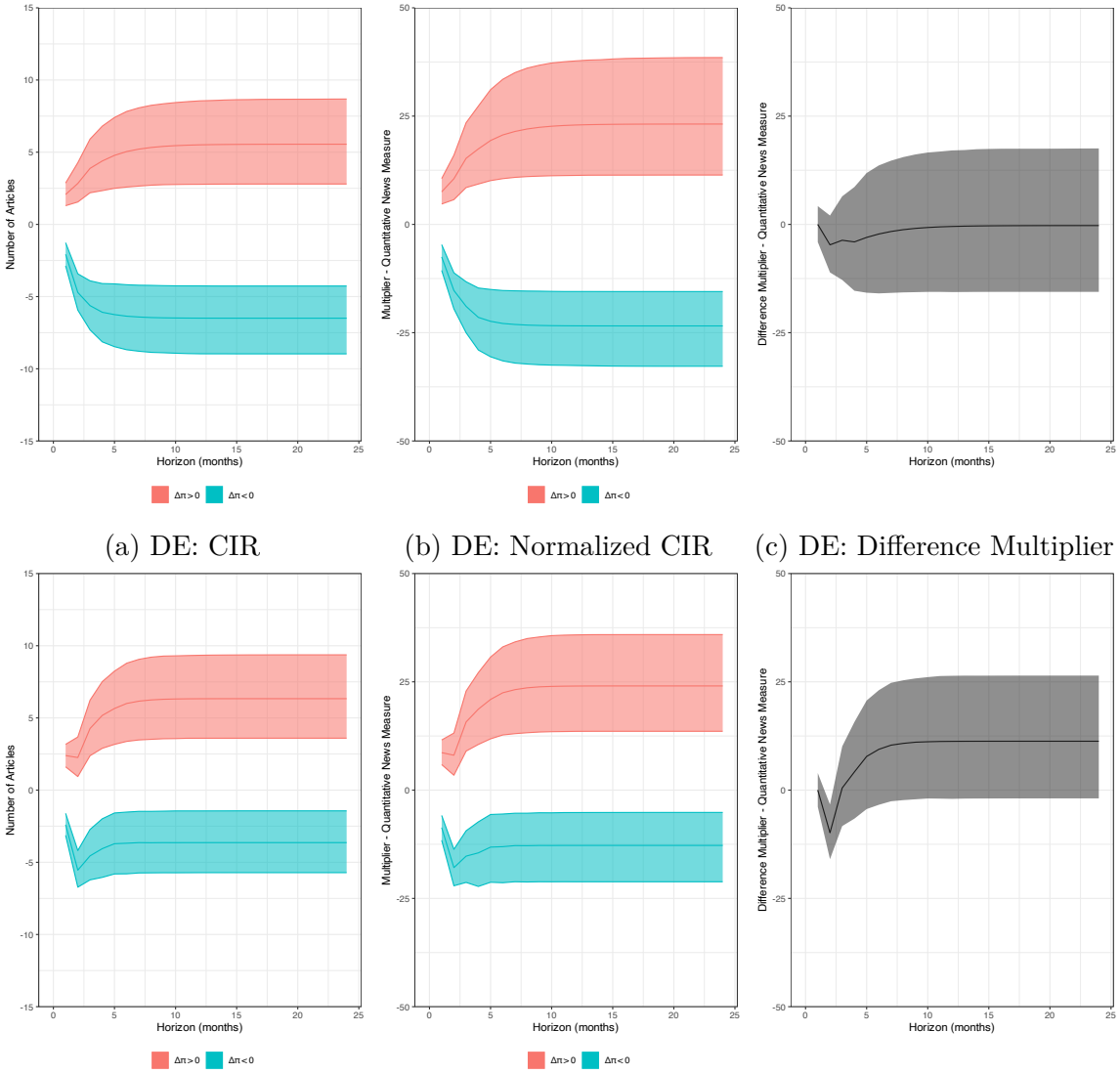


(a) Expectations (b) Perceptions

Figure D.19: Media shocks interacted with Age Categories

Notes: The Figure shows the marginal effects of the media shock interacted with the Age Categories. The marginal effects are effects relative to the reference group, which are households aged between 15 and 40. The second age category are households aged between 40 and 60. The third age category are households aged 60 and above. Panel (a) shows the results for the interactions of the quantitative media shock (QMS), its lag (L.QMS) and the qualitative sentiment shock (SMS) and its lag (L.SMS) on the share of households expecting an inflation increase versus decrease. Panel (b) the same interaction effects but for inflation perceptions. The Figure shows 5% and 10% confidence intervals. The media shocks correspond to the model with the specification adding a business cycle indicator in between the inflation rate and the news measure, as described in the robustness section 6.

D.2 Inclusion SMI

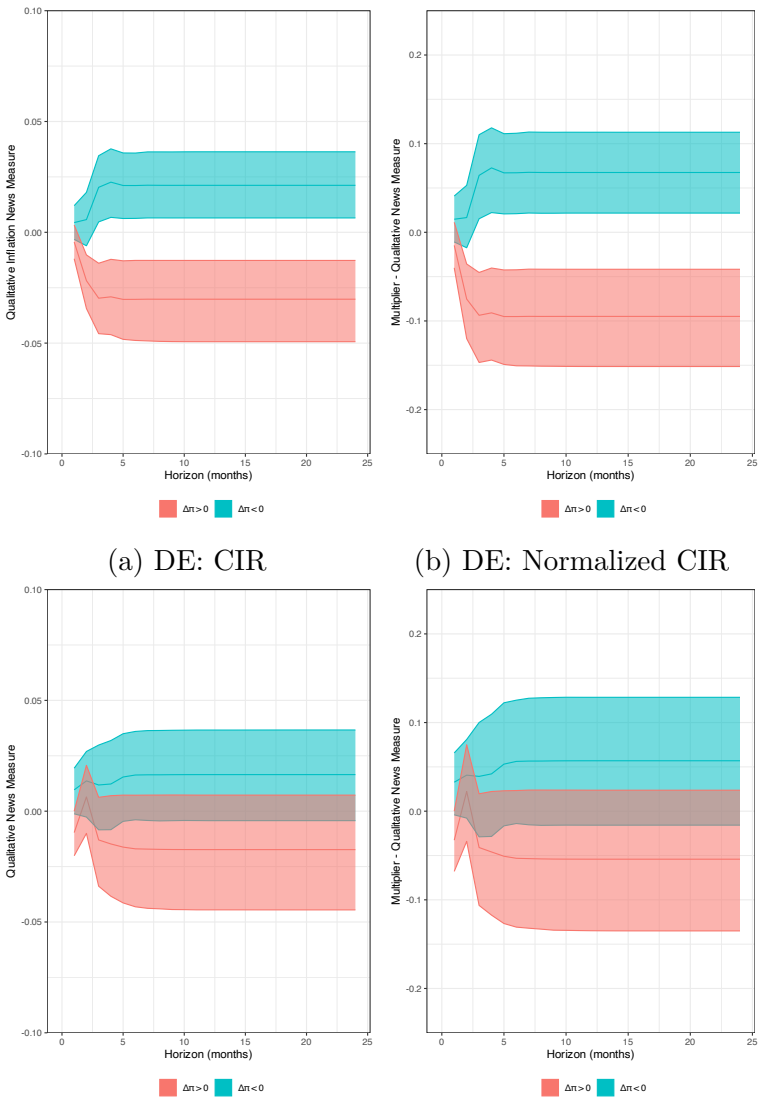


(a) DE: CIR (b) DE: Normalized CIR (c) DE: Difference Multiplier

(d) FR: CIR (e) FR: Normalized CIR (f) FR: Difference Multiplier

Figure D.20: Inclusion of Stock Prices Growth - Quantitative News Measure

Notes: The Figure shows the cumulative, normalized cumulative impulse response functions, as well as the difference between the normalized cumulative impulse response (dynamic multiplier) functions of the TSVAR model described in section 3.1 including the growth rate of stocks as measured by the Swiss Market Index ordered last. It shows the response of the quantitative news measure to a one standard deviation shock in the inflation rate. CIR stands for Cumulative Impulse Response. All panels with subtitle "DE" show the results for the German-written newspapers, and those with subtitle "FR" the results for the French-written newspapers. The shadowed areas correspond to 68% confidence bands.



(a) DE: CIR (b) DE: Normalized CIR

(c) FR: CIR (d) FR: Normalized CIR

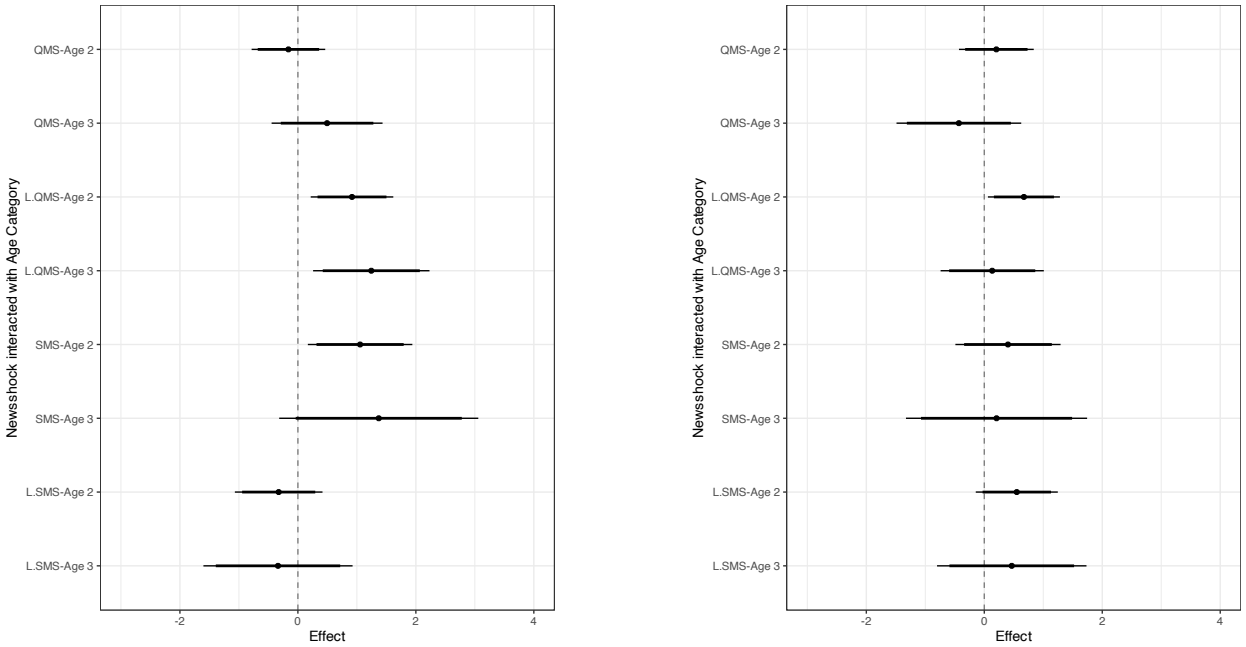
Figure D.21: Inclusion of Stock Prices Growth - Qualitative News Measure

Notes: The Figure shows the cumulative and the normalized cumulative impulse response functions of the TSVAR model described in section 3.1 including the growth rate of stocks as measured by the Swiss Market Index ordered last. It shows the response of the qualitative news measure to a one standard deviation shock in the inflation rate. CIR stands for Cumulative Impulse Response. All panels with subtitle "DE" show the results for the German-written newspapers, and those with subtitle "FR" the results for the French-written newspapers. The shadowed areas correspond to 68% confidence bands.

Table D.4: Robustness Check: Estimation with SMI

	Baseline		$\Delta\pi > 0$	$\Delta\pi \leq 0$	$\Delta\pi > 0$	$\Delta\pi \leq 0$	Region	
	(1) reply$_e$	(2) reply$_p$	(3) reply$_e$	(4) reply$_e$	(5) reply$_p$	(6) reply$_p$	(7) reply$_e$	(8) reply$_p$
Quantitative Media Shock$_t$	1.29**	0.80	1.29*	0.97	1.44	0.32	1.27*	2.14
	(0.63)	(0.98)	(0.69)	(1.14)	(1.41)	(1.13)	(0.70)	(1.34)
Quantitative Media Shock$_{t-1}$	0.27	0.50	1.28*	-1.98	2.28**	-0.78	0.75	2.76***
	(0.68)	(0.88)	(0.72)	(1.45)	(1.03)	(1.11)	(0.68)	(0.79)
Qualitative Media Shock$_t$	0.19	1.09**	-0.85**	1.71	-0.10	3.29***	1.22	0.66
	(0.48)	(0.47)	(0.37)	(1.11)	(0.46)	(0.78)	(0.74)	(0.47)
Qualitative Media Shock$_{t-1}$	0.08	0.36	0.11	-0.80	0.44	0.01	-0.43	0.44
	(0.49)	(0.50)	(0.50)	(1.35)	(0.61)	(1.02)	(0.70)	(0.67)
French speaking Region=1 × Quantitative Media Shock$_t$							-0.39	-1.34**
							(0.49)	(0.53)
French speaking Region=1 × Quantitative Media Shock$_{t-1}$							-1.62***	-1.19**
							(0.55)	(0.57)
French speaking Region=1 × Qualitative Media Shock$_t$							-2.37**	-2.02*
							(1.10)	(1.12)
French speaking Region=1 × Qualitative Media Shock$_{t-1}$							0.57	-1.06
							(1.16)	(0.87)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region$_r$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HH$_{i,r,t}$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	32,447	34,747	17,379	15,064	18,545	16,200	32,447	18,545
$\bar{y}$	85	86	89	81	89	83	85	89

Note: The table shows the main results from the model presented in section 5.1, estimated with the growth rate of stocks as measured by the Swiss Market Index ordered last in the specification. Columns (1) and (2) show the unconditional effects of the quantitative and qualitative media shocks. Column (3) to (6) estimate the effects conditional on a positive or negative change in inflation. Columns (7) and (8) add the interaction effect of the region with the media shocks. The media shocks are standardized such that a one unit increase corresponds to a one standard-deviation increase in the media shock. $\bar{y}$ corresponds to the mean of the dependant variable. * p<0.10, ** p<0.05, *** p<0.010. Standard Errors are clustered at the date × region level.



(a) Expectations (b) Perceptions

Figure D.22: Media shocks interacted with Age Categories

Notes: The Figure shows the marginal effects of the media shock interacted with the Age Categories. The marginal effects are effects relative to the reference group, which are households aged between 15 and 40. The second age category are households aged between 40 and 60. The third age category are households aged 60 and above. Panel (a) shows the results for the interactions of the quantitative media shock (QMS), its lag (L.QMS) and the qualitative sentiment shock (SMS) and its lag (L.SMS) on the share of households expecting an inflation increase versus decrease. Panel (b) the same interaction effects but for inflation perceptions. The Figure shows 5% and 10% confidence intervals. The media shocks correspond to the model with the specification adding the growth rate from the Swiss Market Index ordered last as described in the robustness section 6.

D.3 Quantified Inflation Expectations

Table D.5: Effect of Quantitative and Qualitative Media Shocks on Quantified Inflation Expectations

	Baseline	$\Delta\pi > 0$	$\Delta\pi \leq 0$	Region
	(1)	(2)	(3)	(4)
	$\mathbb{E}[\pi_{t+4}]$	$\mathbb{E}[\pi_{t+4}]$	$\mathbb{E}[\pi_{t+4}]$	$\mathbb{E}[\pi_{t+4}]$
Quantitative Media Shock$_t$	0.04	0.01	-0.00	0.02
	(0.25)	(0.03)	(0.04)	(0.03)
Quantitative Media Shock$_{t-1}$	-0.02	0.01	0.01	0.02
	(0.03)	(0.04)	(0.04)	(0.03)
Qualitative Media Shock$_t$	0.02	0.02	0.03	0.02
	(0.02)	(0.02)	(0.04)	(0.03)
Qualitative Media Shock$_{t-1}$	0.02	0.01	0.07*	0.03
	(0.02)	(0.02)	(0.04)	(0.03)
French speaking Region=1 × Quantitative Media Shock$_t$				-0.04*
				(0.02)
French speaking Region=1 × Quantitative Media Shock$_{t-1}$				-0.04
				(0.03)
French speaking Region=1 × Qualitative Media Shock$_t$				-0.02
				(0.04)
French speaking Region=1 × Qualitative Media Shock$_{t-1}$				0.01
				(0.05)
Date FE	Yes	Yes	Yes	Yes
Observations	154	80	74	154
$\bar{y}$	0.61	0.65	0.57	0.61

Note: The table shows the effects of quantitative and qualitative media shocks on the quantified inflation expectations. The quantification of qualitative survey data is described in detail in appendix B. * p<0.10, ** p<0.05, *** p<0.010. Standard Errors are clustered at the date × region level.