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

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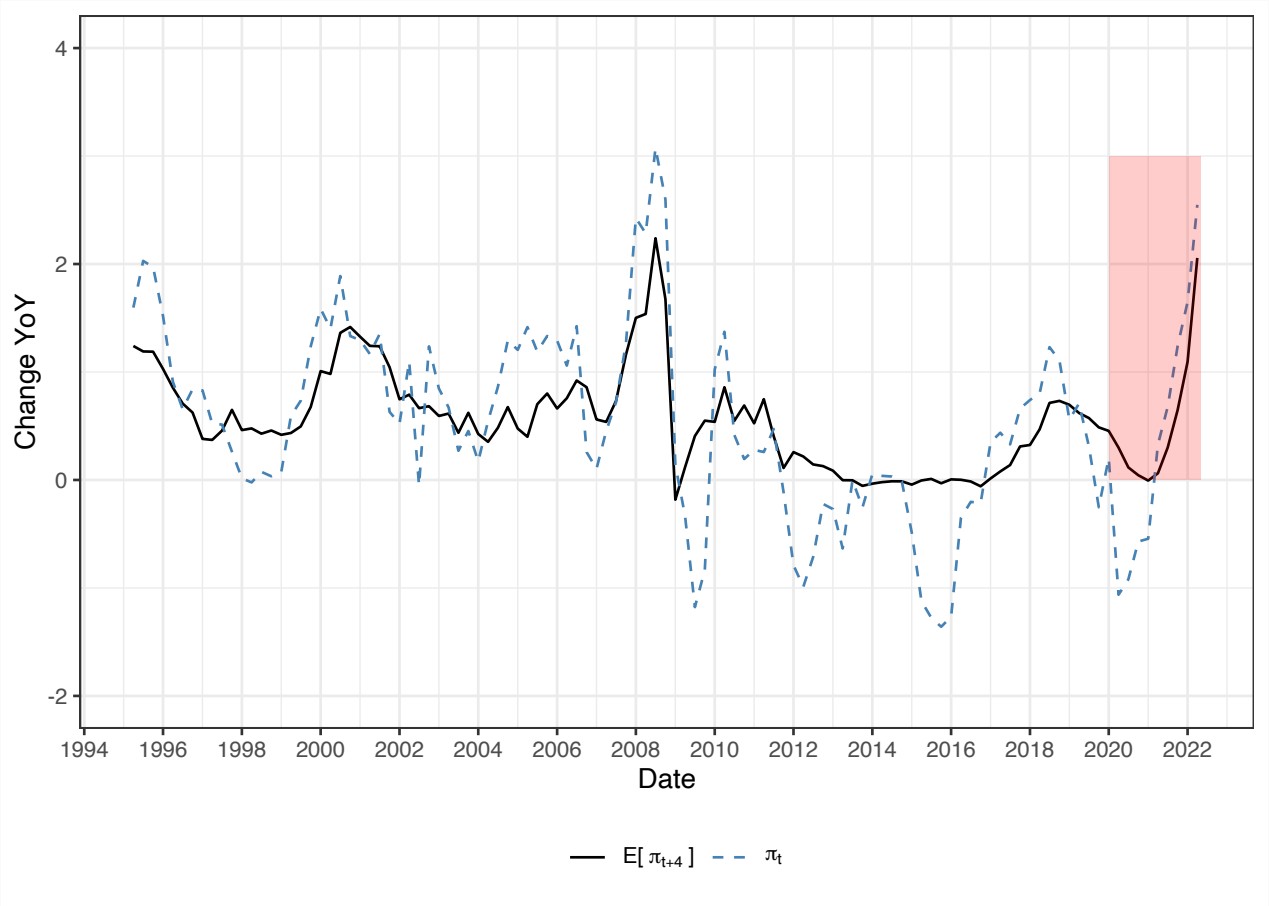
Introduction

Inflation and Expectations from Households in Switzerland



Motivation

- Globally, countries face **historically high inflation** rates
  - Prevailing challenge for both **policy makers** as well as **households**
- Theoretically and empirically, **inflation expectations** are center stage as **main drivers of inflation**
  - Expectations are shaped by **information**
  - For **households**, **newspapers** are an important source of such information

News Articles about Inflation

Donnerstag, 11. November 2021 17

Wirtschaft

Vorsicht Geldentwertung! Die Inflation steigt immer schneller

In den USA hat die Teuerungsrate im Oktober den höchsten Stand seit 30 Jahren erreicht. Ist das ein Grund zur Sorge?

Daniel Zulauf

In den USA hat die Jahresteuerung im Oktober 6,2 Prozent erreicht. Im September lag sie noch bei 5,4 Prozent. Sie steigt somit weit schneller, als dies die amerikanische Notenbank erwartet hatte. Die Inflation galoppiert aber nicht nur in den USA. Die Preise legen weltweit stark zu, auch in Schwellenländern wie Brasilien, wo die Teuerung bereits im zweistelligen Prozentbereich angekommen ist. Im Euroraum erreichte die Inflationsrate im Oktober ebenfalls einen historischen Höchstwert von 4,1 Prozent. Das sind die Antworten auf die derzeit drängendsten Fragen zum Thema:

1 Welche Probleme ergeben sich aus der Inflation?

Ein anderes Wort für Inflation ist Geldentwertung. Diese trifft Menschen aus tieferen Einkommensklassen typischerweise

Die Preise für Occasionsautos sind in den USA stark gestiegen. Bild: Jim Watson/AFP (Annapolis, 27. Mai 2021)

Schweiz schneller steigen als im Euroraum, werden sie sich mit Franken eindecken und zu einer weiteren Höherbewertung unserer Währung gegenüber dem Euro beitragen. Die Nationalbank kann und darf den Wechselkurs nicht aus den Augen lassen, denn eine zu rasche und heftige Aufwertung des Frankens kann in der exportorientierten Schweizer Wirtschaft grossen Schaden anrichten.

6 Weshalb beträgt die Inflation in der Schweiz aktuell nur 1,2 Prozent?

Wir starten von einem viel tieferen Niveau aus als die meisten anderen Länder. Auch das hat viel mit dem Franken zu tun. Dieser hat sich im Coronajahr 2020 gegenüber dem Dollar um mehr als acht Prozent aufgewertet. So hat die Schweiz die für den jüngsten Preisschub mitverantwortlichen Energieträger wie Erdöl, Kohle oder Gas im inter-

Erste Skiregion setzt auf 2G

Samnaun GR Wer nicht geimpft oder genesen ist, darf in der Silvretta Arena Samnaun/Ischgl nicht mehr auf die Piste. Grund ist die österreichische 2G-Regel, welche negativ getesteten Personen den Zutritt verweigert. Die Betreiber des grenzüberschreitenden Skigebiets Samnaun/Ischgl hatten sich schon vor der Verschärfung der Zertifikatspflicht in Österreich darauf geeinigt, dass im gesamten Skigebiet die jeweils strengere Zertifikatsregel gelten soll.

Gleichzeitig lanciert Samnaun aber auch eine eigene Tageskarte für negativ Getestete. Diese können sich dann aber mit dieser nur auf der Schweizer Seite des Skigebiets bewegen. Die Schweizer 3G-Zertifikate werden dann an den Drehkreuzen der Lifte der Bergbahnen Samnaun kontrolliert. Um aber sicherzustellen, dass die negativ getesteten Personen nicht aufs österreichische 2G-Territorium vorrücken, dürfen sie drei Lifte nicht benutzen, die zur Landesgrenze führen. *(wap)*

So viele

Source: Swissdox (2022)

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Vorsicht Geldent
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Inflation en Suisse

Mai marque un record pour l'inflation: +2,9%

Les prix à la consommation en Suisse ont poursuivi leur progression en mai, toujours portés par l'envolée des tarifs pour les hydrocarbures mais aussi de certains produits alimentaires. Cette accélération du coût de la vie est inédite depuis près de 14 ans. Certains économistes voient l'inflation allègrement franchir la barre des 3%.

Publié: 02.06.2022, 15h25

17

So viele

Source: Swissdox (2022)

Research Question

How does News affect Inflation Expectations and Perceptions?

We proceed in **two steps**:

1. We analyze inflation news reporting in French and German articles
2. We study how news reporting affects inflation expectations and perceptions.

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Motivation

If News Coverage affects Inflation Expectations, real effects can be the consequence:

- Inflation Expectations can be self-fulfilling (Leduc et al., 2007)
- News as a source to (de-)anchor inflation expectations
  - Well-anchored inflation expectations improve the effectiveness of monetary policy (Lamla & Lein, 2014; Nautz & Strohsal, 2015)

Main Results

Media Reporting and Inflation

- No evidence for negativity bias
- No systematically different news reporting across regions

Effects of News on Inflation Expectations and Perception

- Small but significant effects on both expectations and perceptions
- News has stronger effects across older households and households in the German speaking part

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Data

Newspaper Articles - Data

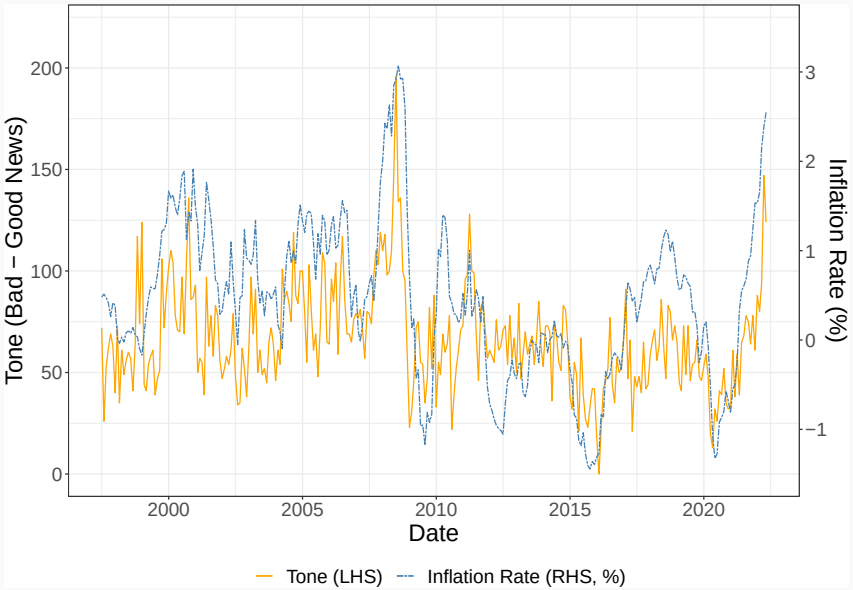
- Swissdox newspaper database
- Selection of the biggest (in terms of readership) newspapers in Switzerland and region
- Focus on printed articles that contain the word inflation (or prices)
- **10,520** newspaper articles in German, **13,407** in French

Newspaper Articles - Quantitative News Measure

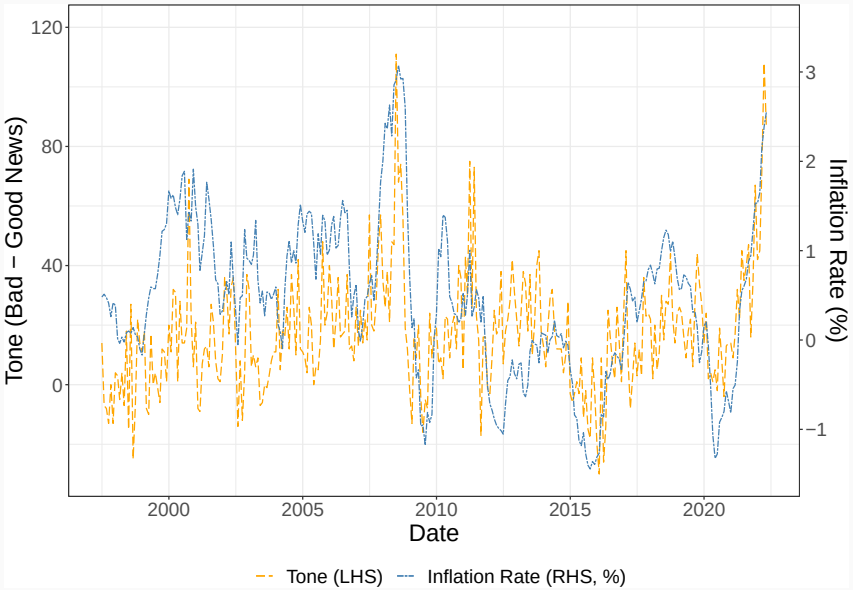
Classification of Articles

- Common cleaning steps for text (stopwords, punctuation, numbers)
- Sentence-by-sentence analysis of words in the vicinity of inflation
  - count if, within a 5 word distance, a word indicates an increase or decrease
- **Constructing a quantitative News Measure: #Increase news - #Decrease News**
- Standard measure in the literature
- Prevailing tone of inflation in news

Descriptive Results: Quantitative News Measure



(a) German written Newspapers



(b) French written Newspapers

Figure 1: Quantitative News Measure (Increase - Decrease)

CondInd

Newspaper Articles - Qualitative News Measure I

BERT Sentiment Classification

- BERT: **B**idirectional **E**ncoder **R**epresentation from **T**ransformers
- Natural Language Processing (NLP) model by Google AI

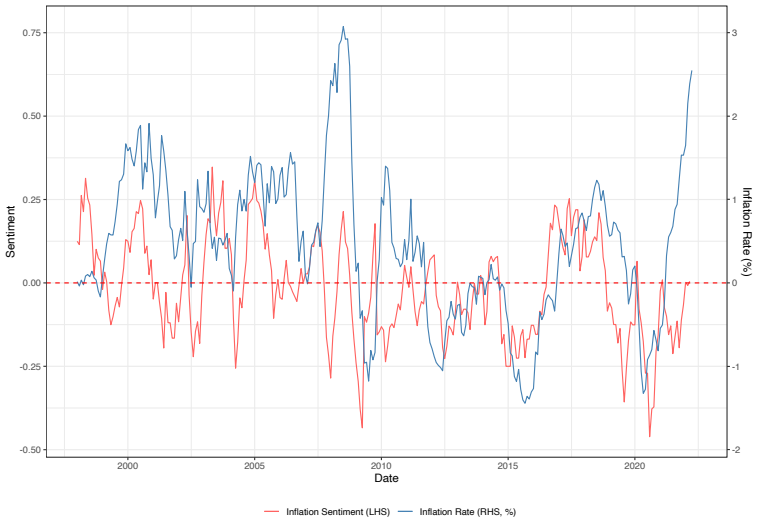
Aim: Predict Sentiment of Inflation

- **Finetune** the language model on this specific task
- **2000** self-annotated articles (positive/negative)
  - **Negative**: Le matin, 2008-02-2012: [...] *The economy does not need it.* ***Inflationary pressures*** *have just returned to a* ***level not seen for more than a decade****. [...]*
  - **Positive**: NZZ, 2002-03-22: [...] *"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*** *[...].*

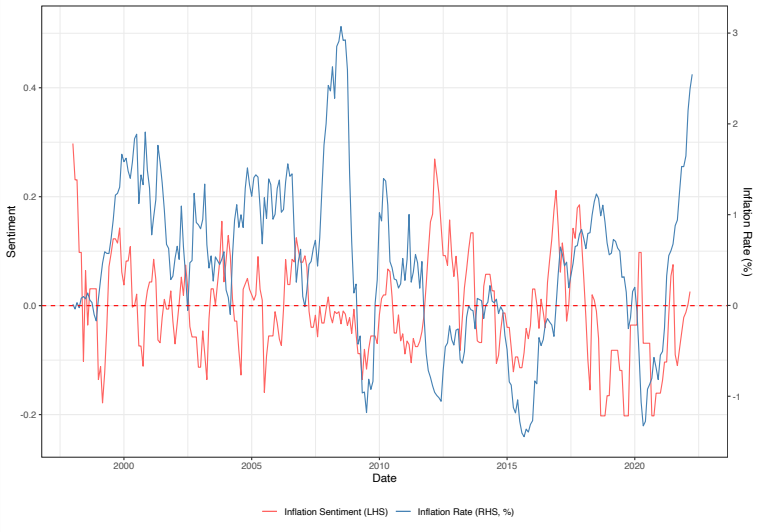
Newspaper Articles - Qualitative News Measure II

- **Machine learning task** to identify **sentiment** of article
- Accuracy: $\sim$ 75% for both language models
- Human agreement rate for similar classification task around 75 - 85% (Shalunts et al., 2016)

Newspaper Articles - Qualitative News Measure: Results



(a) Sentiment: German



(b) Sentiment: French

QvsS

Media Reporting

Inflation Reporting in Newspapers - Model

To analyse newspaper reporting of the quantitative and qualitative measure, we use a **threshold SVAR**

- We follow Gambetti et al. (2021) to study newspaper reporting when inflation is increasing versus decreasing
- $y_t = [\Delta\pi_t, \text{news}_{t,r}]'$ with $r \in (DE, FR)$
- Goal: Study the reaction of the news measure in newspapers to an increase or decrease in inflation
- Analyse impulse response functions to an innovation in the inflation rate change which is orthogonal to the remaining shocks in the system

Details Graph CIF

Results

Results

Quantitative Measure

- No negativity bias
- No systematic differences across newspapers

Qualitative Measure

- No difference for French written newspapers QDE
- No difference for German written newspapers QFR
- No significant differences across newspapers ALR

→ No systematic bias in newspaper reporting within and across regions

Effect of media shocks and Inflation Expectations and Perceptions

Inflation Expectations and Perceptions

- **Quarterly national survey** that covers questions about inflation expectations and perceptions, including data about the **region**
  - How, in your view, have (will) prices changed (change) over the last (next) 12 months? Have (will) they: risen (rise) sharply; risen (rise) slightly; remained (remain) virtually unchanged; fallen (fall) slightly, fallen (fall) strongly

Media shock and Inflation Expectations - Model

- We use the **orthogonalized media-shocks** from the first TSVAR model, aggregated on quarterly frequency
- This shock is **unrelated** to changes in the current and past inflation rate, but **triggers** a change in the news measure
- **Dependant variable:** binary indicator, decrease (=0) versus increase (=1) in inflation expectations and perceptions
- QMS: Quantitative Media Shock, SMS: Sentiment Media Shock
- Linear probability model
- **Controls**: age, male/female, **time fixed-effects**, region

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

Results

Results - Baseline

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

	(1) reply_e	(2) reply_p
Quantitative Media Shock$_t$	1.34**	0.85
	(0.62)	(0.95)
Quantitative Media Shock$_{t-1}$	0.24	0.47
	(0.68)	(0.90)
Qualitative Media Shock$_t$	0.19	1.08**
	(0.48)	(0.48)
Qualitative Media Shock$_{t-1}$	0.08	0.36
	(0.49)	(0.49)
Date FE	Yes	Yes
Region$_{i,t}$	Yes	Yes
HH$_{i,t}$	Yes	Yes
Observations	32,447	34,747
$\bar{y}$	85	86

Note: * p<0.10, ** p<0.05, *** p<0.010. Standard Errors are clustered at the date × region level.

Conditional on Inflation Environment

	$\Delta\pi > 0$		$\Delta\pi \leq 0$	
	(1)	(2)	(3)	(4)
	reply_e	reply_p	reply_e	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$_{i,t}$	Yes	Yes	Yes	Yes
HH$_{i,t}$	Yes	Yes	Yes	Yes
Observations	17,379	18,545	15,064	16,200
$\bar{y}$	89	89	81	83

Note: * p<0.10, ** p<0.05, *** p<0.010. Standard Errors are clustered at the date × region level.

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Socio-demographic Variables: Age and Region

Age Groups:

- Expectations:
  - Higher Effect among elderly households Age
- Perceptions:
  - Positive, but not significant effect among elderly househlds

Region:

- Significantly **lower** effect for households in the **French** speaking region Region

Conclusion

Policy implications

- Effects of news: identification via language border
  - **Small but significant effects** on expectations and perceptions
- **Real effects can be the consequence**
  - Inflation expectations can be **self-fulfilling**
- As **communication of central banks** is picked-up by news media (20% of articles), their message is **transmitted to households**
  - **anchoring inflation expectations through inflation sentiment**
  - well-anchored inflation expectations improve the **effectiveness of monetary policy**
- **Qualitative inflation sentiment** can be used as a timely **policy indicator** how newspapers assess inflation

Thank you for your attention

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Appendix

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- Economic outcomes: unemployment (Gambetti et al, 2021; Soroka, 2006) , inflation (Soroka, 2006)
  - Inflation increase (decrease) regarded as bad (good) news

→ We investigate inflation news reporting using a TSVAR

The role of information for expectations and perceptions

- Mankiw et al. (2003), Coibon & Gorodnichenko (2015), Bordalo et al. (2020), Cavallo et al. (2017)

→ We exploit the language barrier in Switzerland to study the effects of news on expectations and perceptions

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→ Different effect of news across language border

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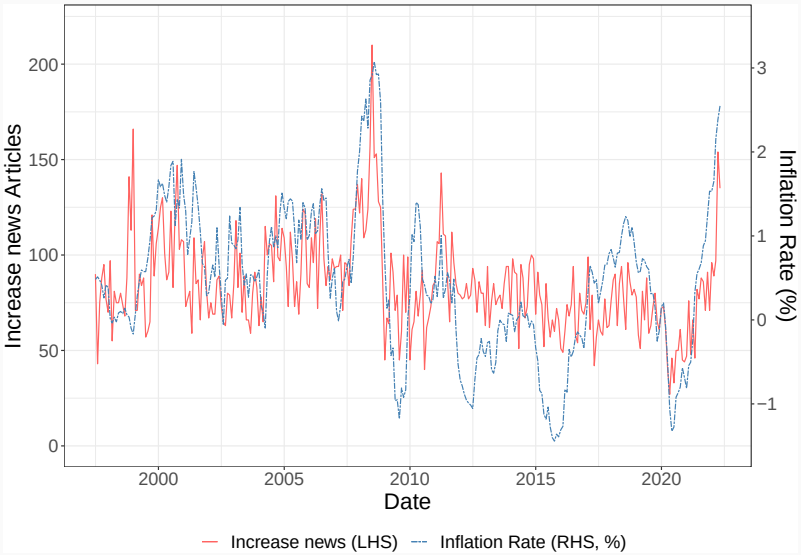
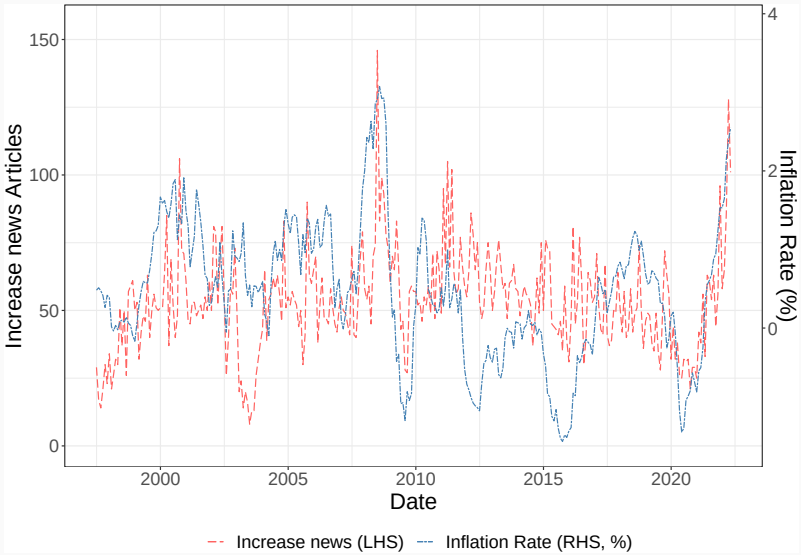
Robustness Checks

- Inclusion of Business Cycle Indicator
- Inclusion of Growth Rate of Stock Prices
- Quantification of Inflation Expectations QEX
- Cantonal Inflation Rates CIF
- Index conditional on newspaper INP-DE INP-FR

Descriptive Results - I: Inflation Increase News



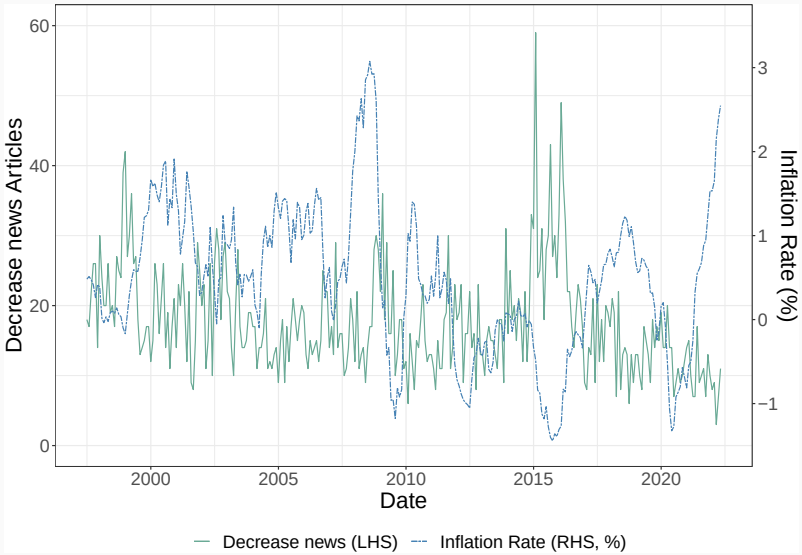
(a) German - Increase News



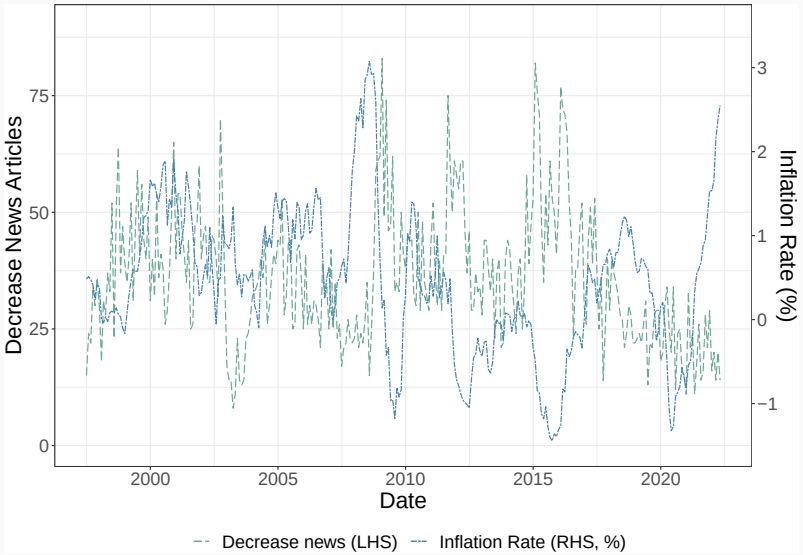
(b) French - Increase News

Figure 3: Increase News

Descriptive Results - II: Inflation Decrease News



(a) German - Inflation Decrease News



(b) French - Inflation Decrease News

Figure 4: Decrease News

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Newspaper Articles - Qualitative vs. Quantitative Measure

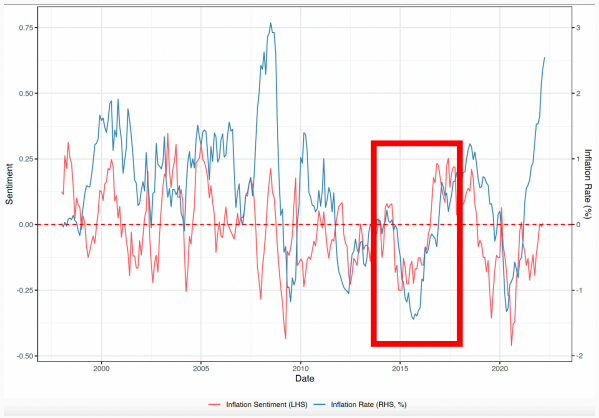

Figure 5: Sentiment: German

- TA, 2015-04-30: [...] The US FED and Swiss National Bank have quintupled their balance sheets since the crisis, the ECB has doubled and central bankers **are not afraid of inflation but of deflation**. [...]

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- Le Temps, 2015-08-22: [...] Switzerland confronted with **high risk of deflation** [...]

Cantonal Inflation Rates

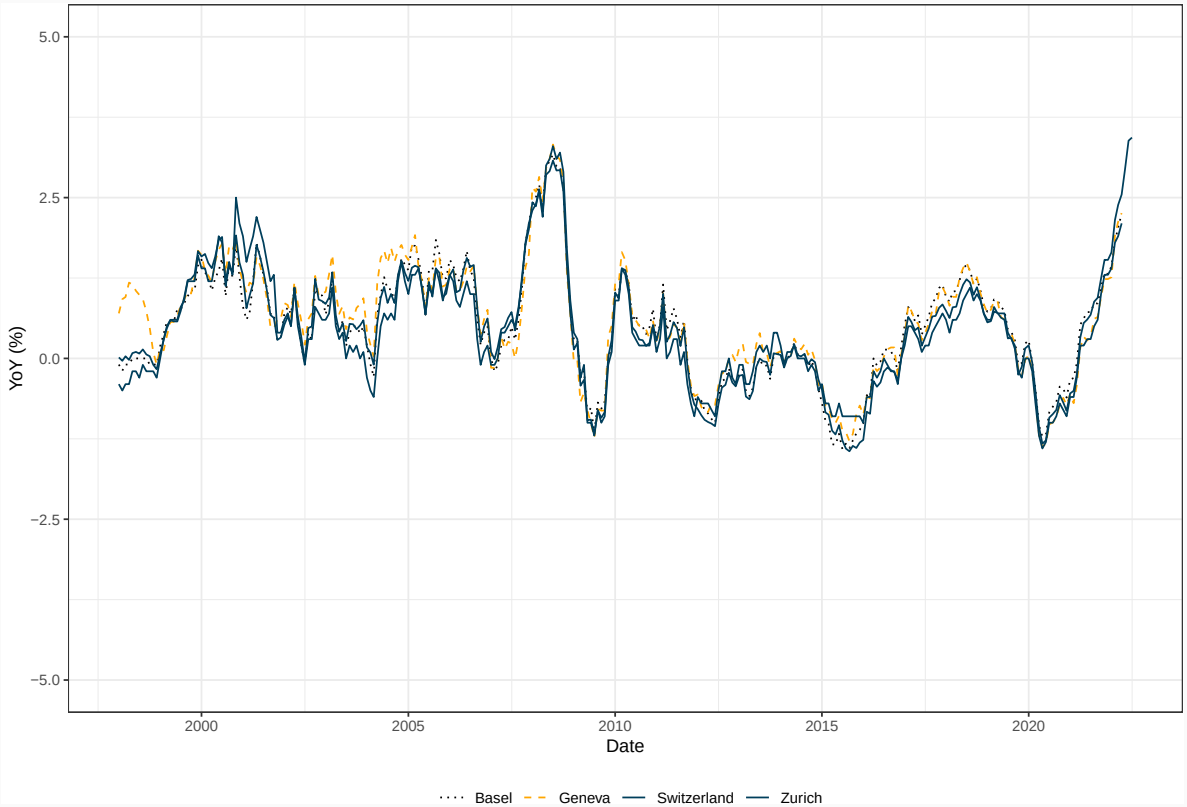

Figure 6: Cantonal Inflation Rates

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Inflation Rates FR versus DE

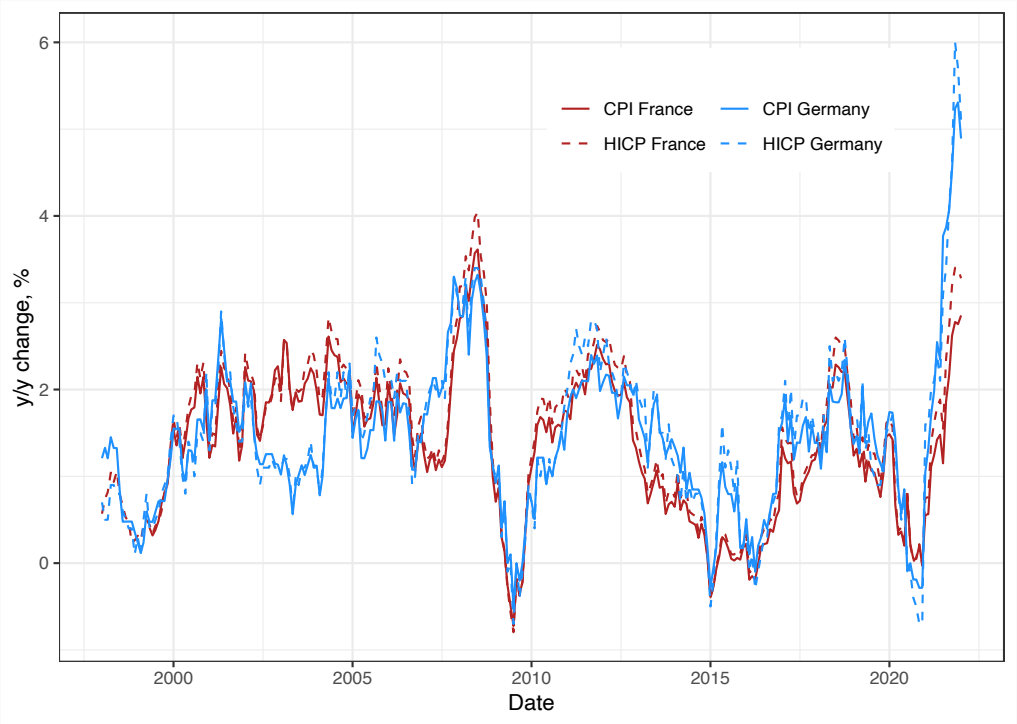

Figure 7: Inflation Rates for Germany and France

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TSVAR: German Newspapers and Sentiment

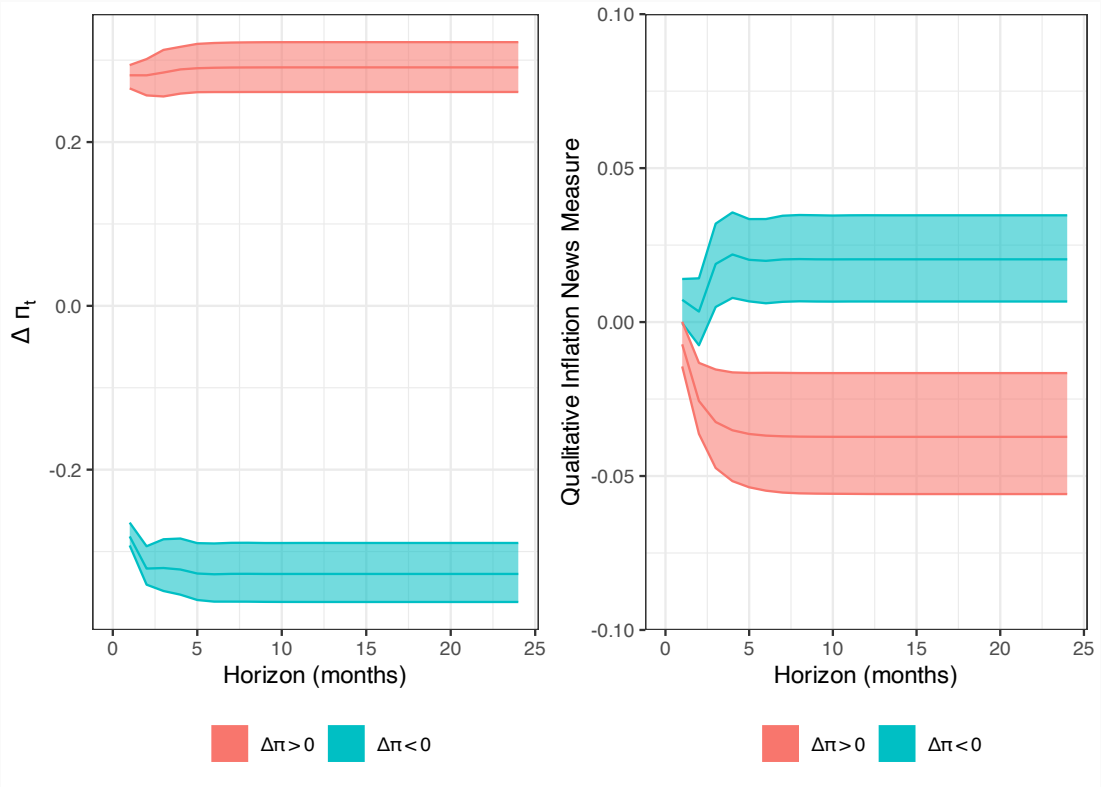

Figure 8: TSVAR: German

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TSVAR: French Newspapers and Sentiment

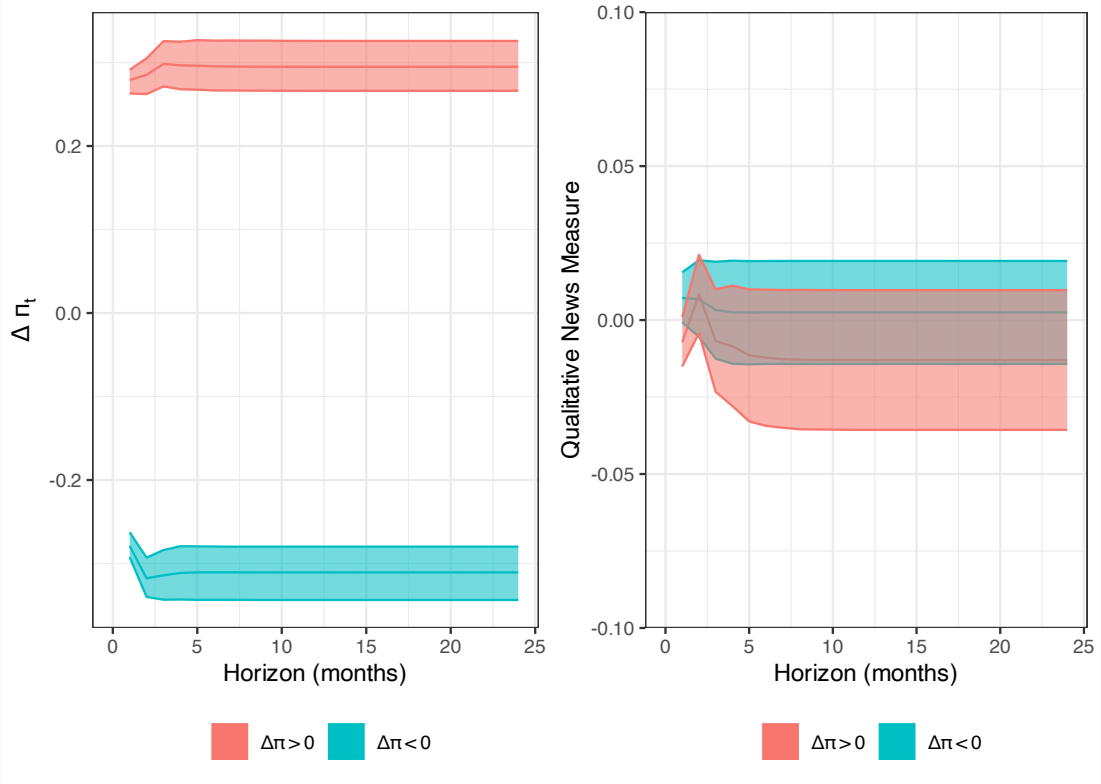

Figure 9: TSVAR: French

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Quantitative Measure by Newspaper - German Newspapers

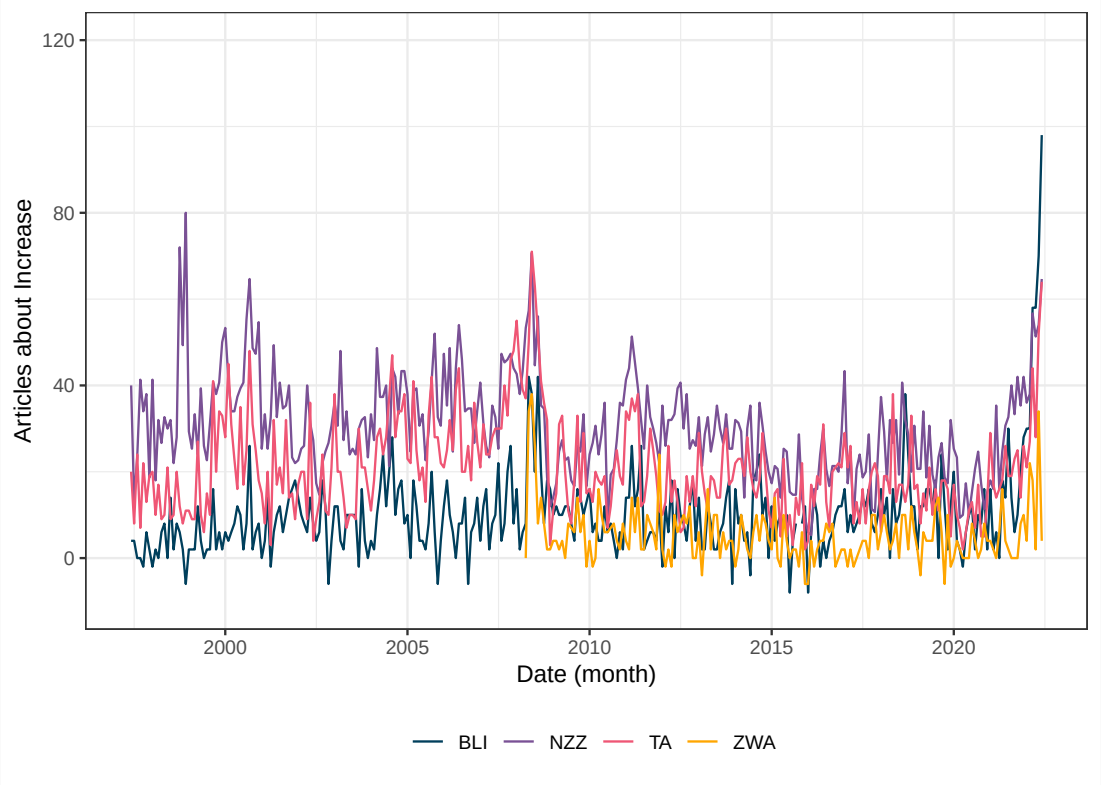

Figure 10: Index by Newspaper - German

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Differences Across Regions - I

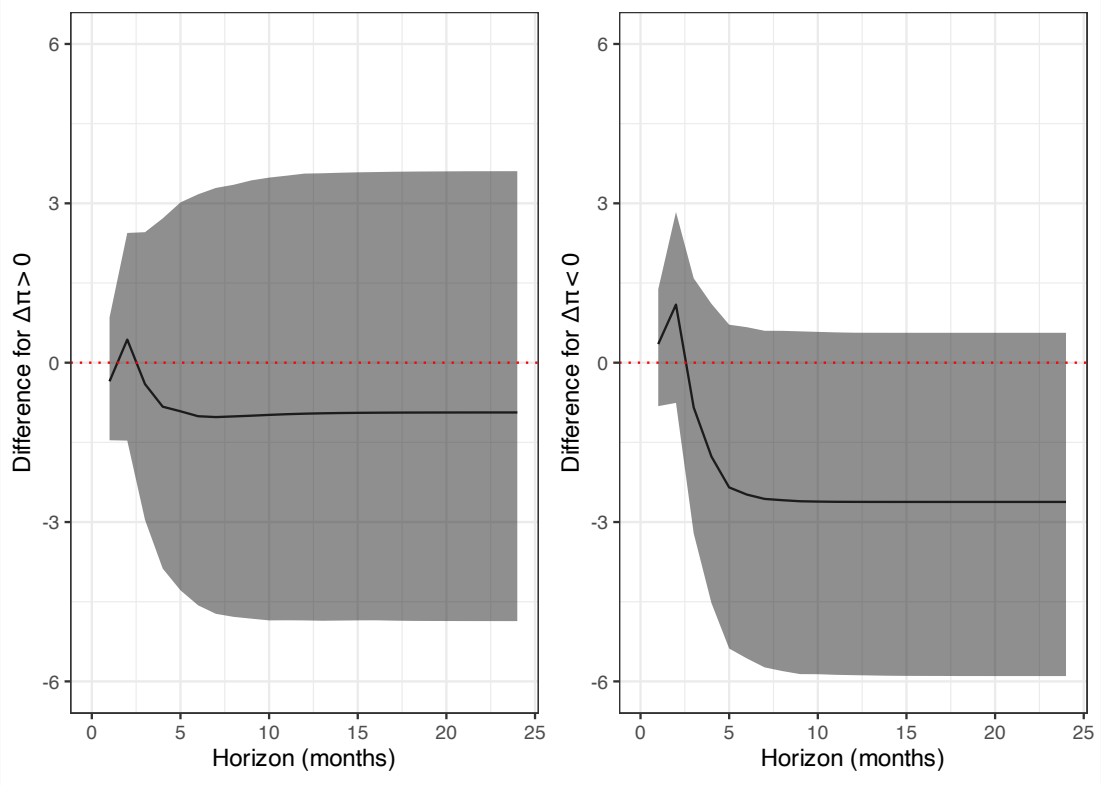

Figure 11: Differences in Quantitative News Measure Across Region

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Differences Across Regions - II

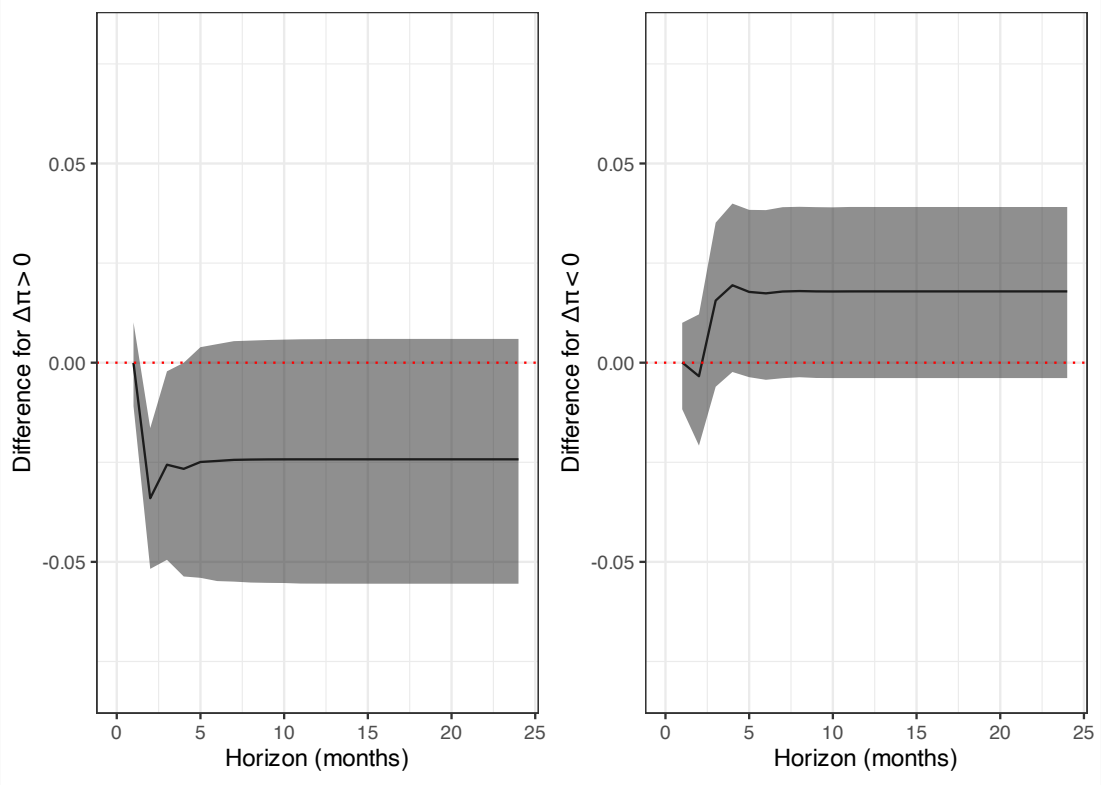

Figure 12: Differences in Qualitative News Measure Across Region

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Quantitative Measure by Newspaper - French Newspapers

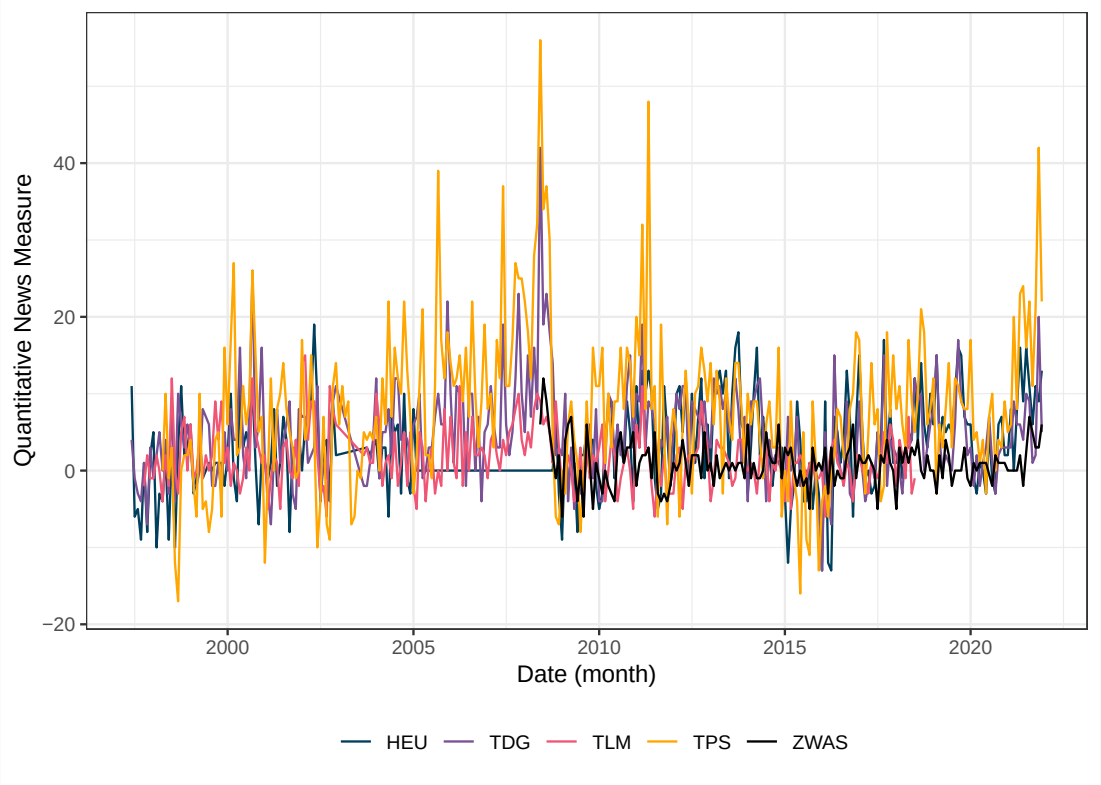

Figure 13: Index by Newspaper - French

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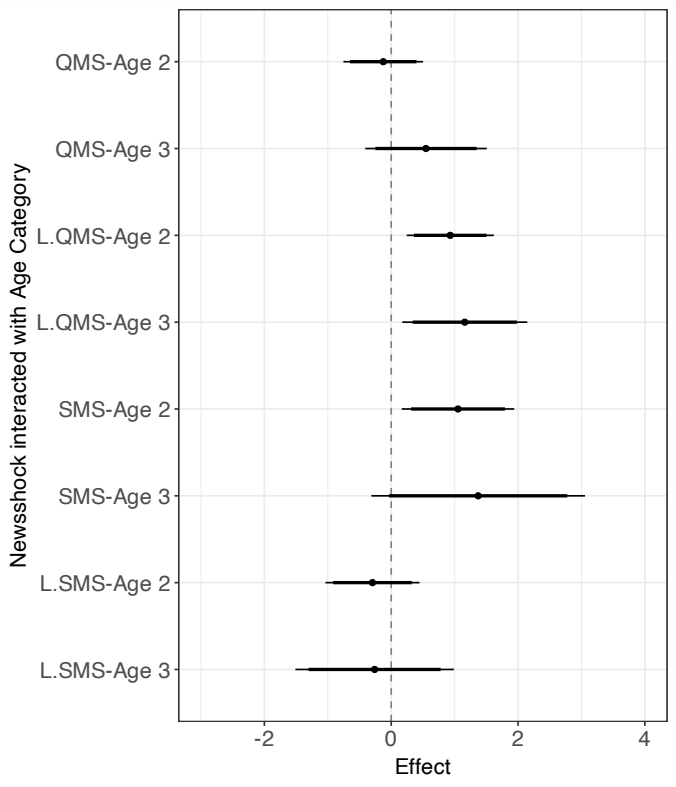
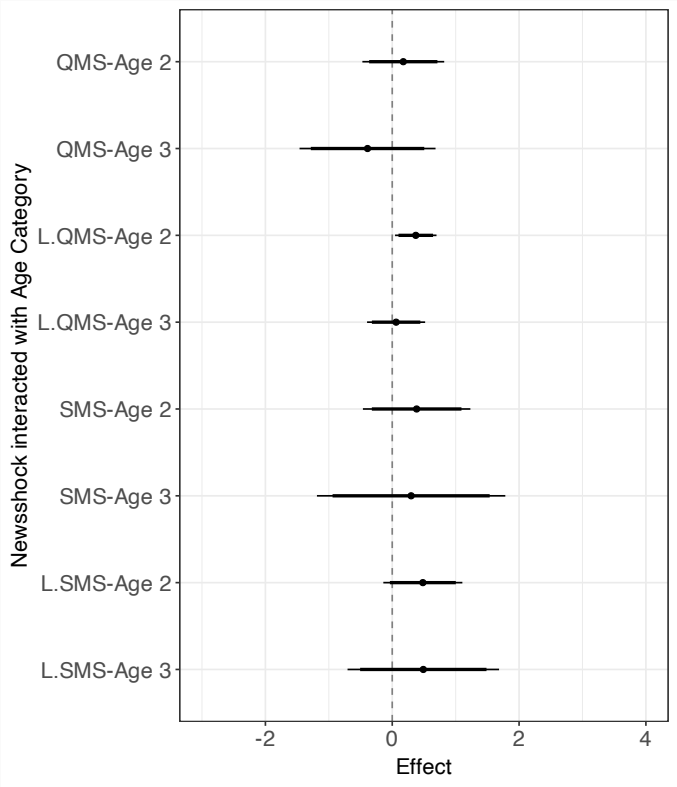
Different Effects Across Regions

	(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 $\times$ Quantitative Media Shock$_t$	-0.30	-1.20**
	(0.51)	(0.47)
French speaking Region=1 $\times$ Quantitative Media Shock$_{t-1}$	-1.50***	-1.86***
	(0.55)	(0.58)
French speaking Region=1 $\times$ Qualitative Media Shock$_t$	-2.40**	-0.52
	(1.10)	(0.90)
French speaking Region=1 $\times$ Qualitative Media Shock$_{t-1}$	0.55	-0.90
	(1.17)	(0.83)
Date FE	Yes	Yes
Region$_r$	Yes	Yes
Back	Yes	Yes
Observations	32,447	34,747
$\bar{y}$	85	86

Different Effects across Age



(a) Expectations



(b) Perceptions

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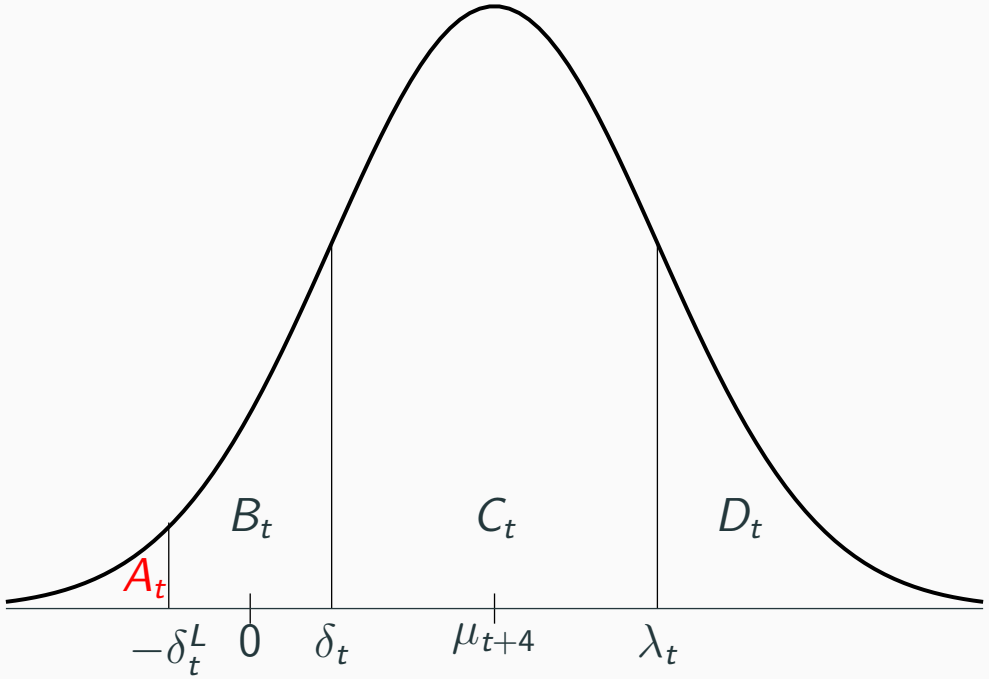
Inflation Expectations Quantification - Appendix I

Quick Summary

Assumptions

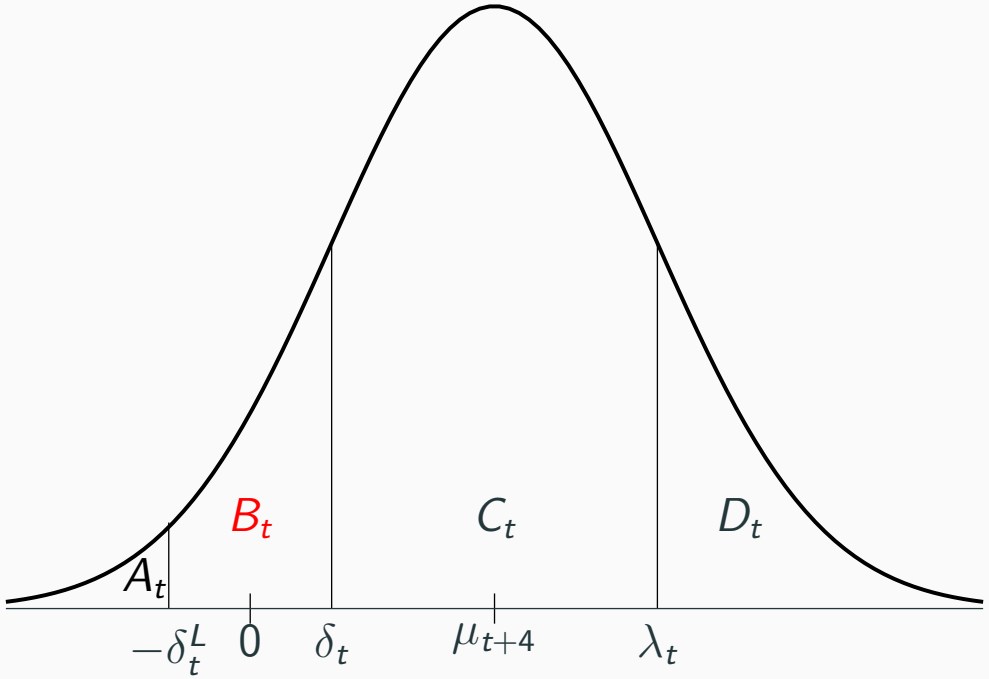
- Survey Particpants form their $\mathbb{E}$ based on subjective probability distribution (pd)
- The individual pd can be aggregated to a joint pd $f(x_{t+4|\Omega_t})$ with $\mathbb{E}[x_{t+4}|\Omega_t] = \mu_{t,t+4}$
- We assume a normal distribution function
- There exists an interval $-\delta_{it}^{L}, \delta_{it}^{U}$, in between households report "constant prices"
- There exists a threshold λ_t where households report "prices increase strongly"

Inflation Expectations - Appendix II



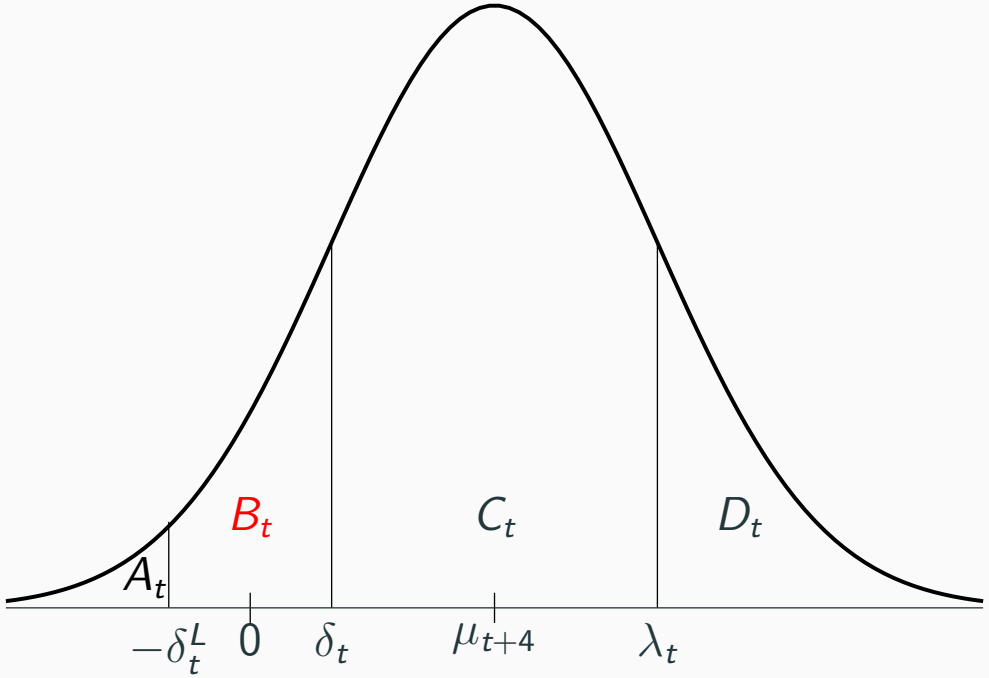
$$P(x_{t+4} \leq -\delta_t^L) = F(-\delta_t^L) = A_t$$

Inflation Expectations - Appendix II



$$P(\delta_t^L < x_{t+4} \leq \delta_t) = F(\delta_t) - F(-\delta_t^L) = B_t$$

Inflation Expectations - Appendix II



$$b_t = F^{-1}(A_t + B_t) = \frac{\delta_t - \mu_{t+4}}{\sigma_{t+4}}$$

Inflation Expectations - Appendix II

$$\mu_{t+4} = \frac{\lambda_t(a_t + b_t)}{(a_t + b_t - 2c_t)}$$
$$\sigma_{t+4} = \frac{-2\lambda_t}{(a_t + b_t - 2c_t)}$$
$$\delta_t = \frac{\lambda_t(a_t - b_t)}{(a_t + b_t - 2c_t)}$$

- 4 unknowns, 3 equations.
- Estimation of λ_t may follow different approaches (Rosenblatt-Wisch and Scheufele, 2015)
- We focus on a state-space model with time-varying parameters
- We provide robustness checks using rolling regressions

Inflation Expectations - Appendix III

To estimate λ_t, we use the information from the perceived inflation rate

Assumption

- On average, households perceive inflation to be equal to actual inflation $\hat{\pi}_t = \pi_t$
- Allows to estimate λ_t using a Kalman Filter set-up

Inflation Expectations - Appendix IV

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

where a'_t, b'_t and c'_t are the quantiles of the standard normal distribution calculated from the answers about **perceived inflation**

- On average, $\hat{\pi}_t = \pi_t$. Therefore, λ_t can be estimated as

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

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

with $\mathbb{V}ar(u_t) = (1-\gamma)\sigma^2$ and $\mathbb{V}ar(v_t) = \gamma\sigma^2$. For initial estimates of the variance parameters σ^2 and γ, we follow Cooley (1976) using a constrained maximum likelihood function.

Inflation Expectations - Appendix V

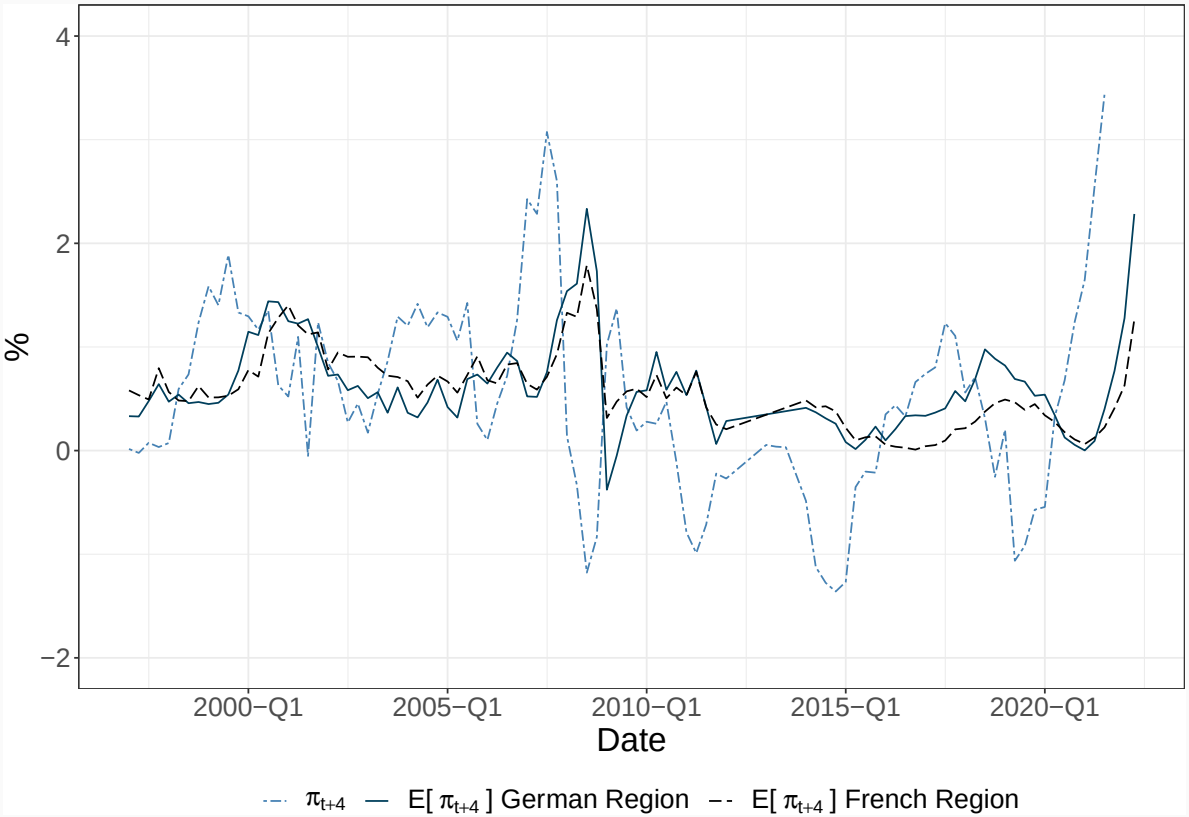


Figure 15: Expectations conditional on the Region

Effects 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 $\times$ Quantitative Media Shock$_t$				-0.04*
				(0.02)
French speaking Region=1 $\times$ Quantitative Media Shock$_{t-1}$				-0.04
				(0.03)
French speaking Region=1 $\times$ Qualitative Media Shock$_t$				-0.02
				(0.04)
French speaking Region=1 $\times$ 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

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Quantitative Measure: Differences for German newspapers II

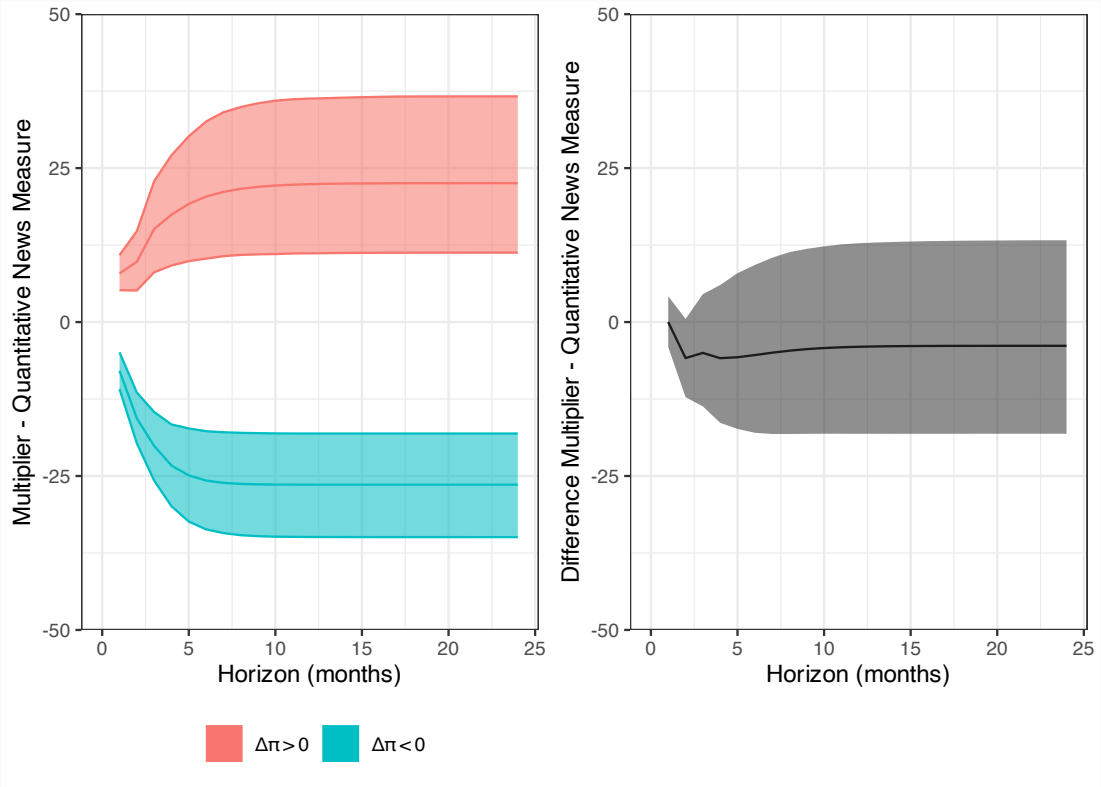

Figure 16: Results TSVAR for Quantitative Measure in German Newspapers

INP-DE INP-FR

Quantitative Measure: Differences for French newspapers

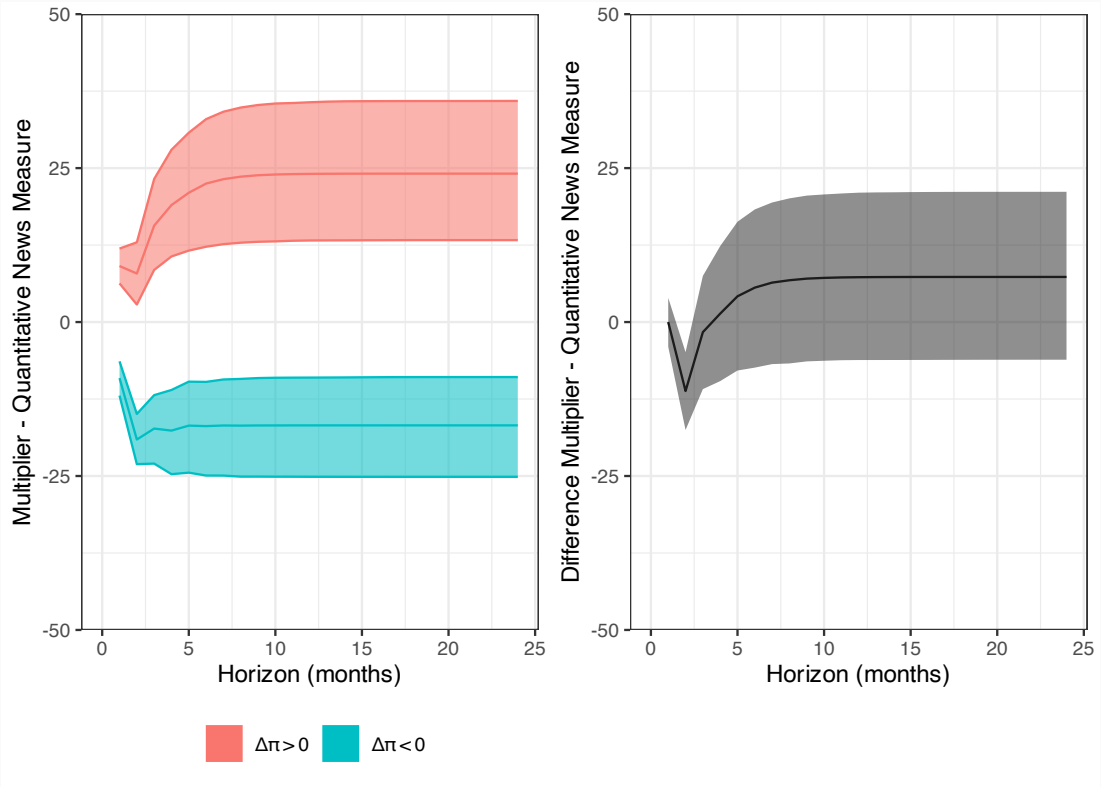

Figure 17: Results TSVAR for Quantitative Measure in French Newspapers

INP-DE INP-FR

Details TSVAR

- We follow Gambetti et al. (2021) to study newspaper reporting when inflation is increasing versus decreasing
  - Allows to control for the persistence of the shocks of inflation
- $y_t = [\Delta\pi_t, \text{news}_{t,r}]'$ with $r \in (DE, FR)$
- Aim: Analyse whether newspapers report differently in times when inflation is increasing or decreasing

$$y_t = (1 - \Gamma(z_t))[y_{t-1}\beta_1] + \Gamma(z_t)[y_{t-1}\beta_2] + \varepsilon_t \qquad (1)$$

- $\varepsilon_t \sim WN(0, \Sigma)$
- $\Gamma(z_t)$ is a function that takes the value 1 or 0, $z_t = \Delta\pi_{t-1}$
- $\Gamma(z_t) = 0$ if $\Delta\pi_{t-1} \leq 0$ and $\Gamma(z_t) = 1$ if $\Delta\pi_{t-1} > 0$
- Estimated by OLS on two subsamples for each region

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Inflation Reporting in Newspapers - Model

- We study the reaction of the news measure in newspapers to an increase or decrease in inflation
- We analyze impulse response functions to an innovation in the inflation rate change which is orthogonal to the remaining shocks in the system

$\rightarrow$ Colesky decomposition

- $SS' = \Sigma$, $v_t = S^{-1}\varepsilon_t$
- v_{1t} is the innovation in the inflation rate change which is orthogonal to v_{2t}
- It captures any factor that changes the inflation rate unexpectedly
- No Structural Shock

Quantitative Measure: Differences for German newspapers

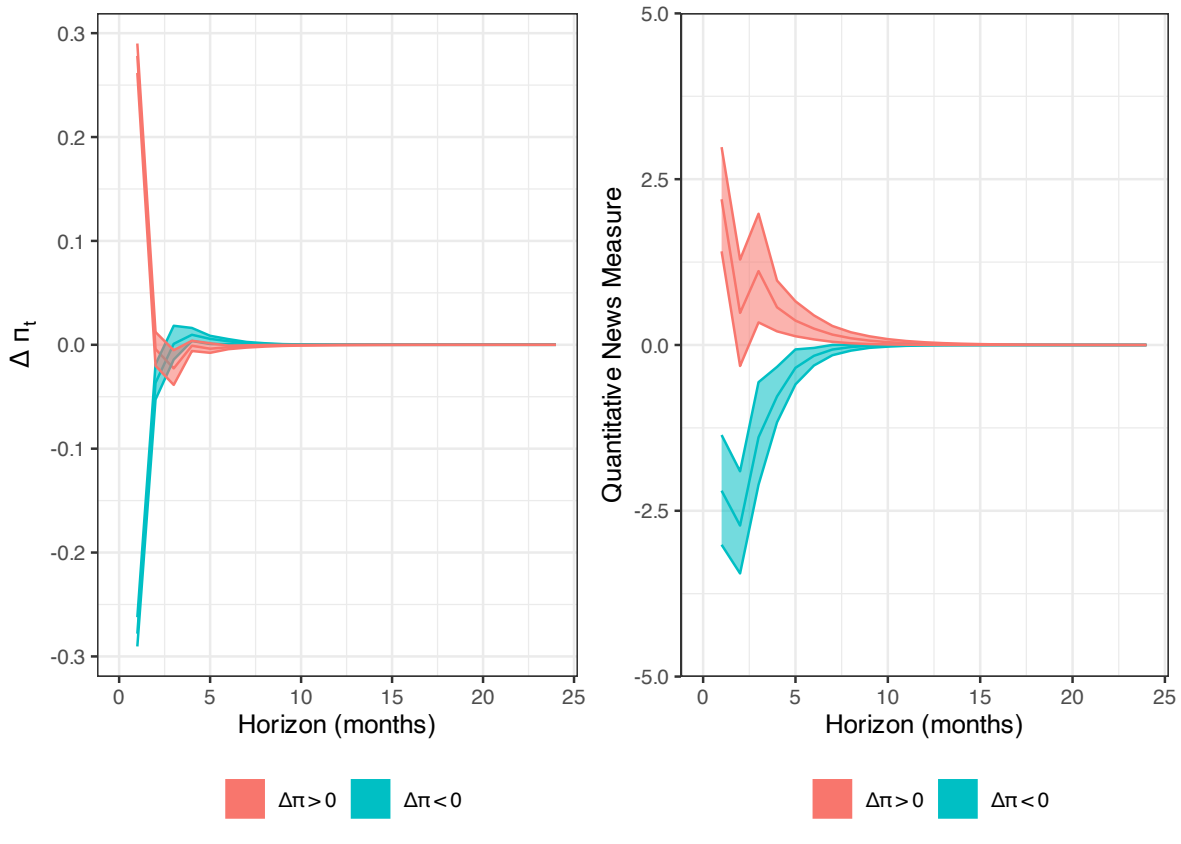

Figure 18: Results TSVAR for Quantitative Measure in German Newspapers

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