

Müller, Henrik; Hornig, Nico

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"I heard the News today, oh Boy": An updated Version of our Uncertainty Perception Indicator (UPI) – and some general thoughts on news-based economic indicators

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**DORTMUND CENTER  
FOR DATA-BASED  
MEDIA ANALYSIS**

DoCMA Working Paper #2-2020

## **“I heard the News today, oh Boy”**

An updated Version of our Uncertainty Perception Indicator (UPI) – and some general thoughts on news-based economic indicators

Henrik Müller and Nico Hornig\*

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\*Prof. Dr. Henrik Müller is a professor for economic policy journalism at TU Dortmund University and Dortmund Center for data-based Media Analysis (DoCMA). Nico Hornig is a research assistant at TU Dortmund University and DoCMA. The authors wish to thank colleagues at DoCMA for helpful comments.<sup>1</sup>

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**Abstract:**

News-based indicators are in vogue in economics. But they tend to be applied with little consideration for the properties of news itself. In this paper, we try to shed light on the nature of this type of data.

Drawing from established findings in communication science and journalism studies we argue that news-based indicators should be taken with a pinch of salt, since news is a somewhat biased representation of political and social reality. Contrary to economics and other social sciences, journalism tends to be driven by outliers, the outrageous, and the outraged. This structural dissonance between journalism and other disciplines needs to be born in mind when dealing with news content as data, and it is of particular concern in the context of economic developments. While economics and statistics are inherently backward looking, trying to make sense of the (immediate) past using models and probability distributions derived from bygone observations, journalism is about the present, and sometimes about the future. What's going on right now? And where does it lead us? Seeking answers to these questions makes news a valuable data input, as a measure of what drives society at a given point in time.

We show how taking the properties of news into consideration influences the entire process of large-scale news analysis. As an example, we update our Uncertainty Perception Indicator (Müller and Hornig 2020), setting it on a firmer footing by enlarging the newspaper corpus considerably. The new version of the UPI for Germany yields some remarkable results. At the trough of the Covid-19-induced economic crisis in Q2 of 2020, the overall indicator already decreased considerably, although it stayed at elevated levels. Deconstructing the UPI by applying the topic modelling approach Latent Dirichlet Allocation (LDA), shows that the coverage of the pandemic has merged with the issue of climate change and its mitigation. In the past decade or so incalculable politics was the main driver of economic uncertainty perception. Now truly exogenous developments, neither elicited by the economy nor by politics, come to the fore, adding to the sense of an inherently unstable world.

Key words: uncertainty, economic policy, business cycles, Covid-19, Latent Dirichlet Allocation

## 1. Introduction: Media is a product, not the truth

John Lennon's opening line of the Beatles song "A Day in the Life" contains several characteristics of news: it's timely (*today*), fast, often negative, sometimes sensational (*oh boy*), and perceived by users each of whom hosts an individual set of subjective biases (*I heard...*). Why, then, are economists increasingly keen on using media content for their analyses?

One possible answer to this question is: because they can. Computational methods in communication science, in combination with rapid increases in computing capacity, have enabled scientists to analyze vast amounts of media content, an exercise that was virtually impossible to perform a decade or so ago.

A second answer would be: because economists expect to discover information that may become relevant to market developments but is not showing up in statistics or survey data yet. Media content is thought to reveal what's going on in the realms of politics and society that is bound to impact the economy in the future.

Both are reasonable objectives. However, some caveats are warranted. Media content used in a naïve, empiristic way runs the risk of producing meaningless, even misleading results. At worst, time-series derived from quantitative content analysis may look like objective data, similar to the numbers drawn from national accounts, but actually measure next to nothing. Media content is not about hard facts (e.g. tons of produce, turnover in Euros) but about rather fuzzy concepts like public attention, framing, tone, narrative, or sentiment and should be treated as such. Therefore, it makes little sense to mechanically apply statistical methods without keeping humans in the loop to check the actual meaning of findings at various stages of the process.

Then there is the very nature of news itself. Economists tend to treat news as an exogenously provided source of data, often presupposing that there are certain real-world events and developments that the media report in a timely, correct and unbiased fashion. This is a heroic assumption that, taken for granted, can prompt economists to pose rather far-fetched questions. For instance, Bloom (2014) muses about the absence of the fall of the Berlin wall or the advent of the internet in his news-based measure of economic uncertainty: "Why does good news so rarely cause an uncertainty shock?" (Bloom 2014, p. 162). But the missing peaks of positive news shocks are all but astonishing. Two very basic media mechanisms apparently haven't occurred to the author: that media outlets focus on problems and conflicts rather than entertain the audience with positive stories (the latter being the unique job of public relations); and that the semantics of the very word "uncertainty", which is part of the Economic Policy Uncertainty Index' query (Baker et al. 2016), has in itself a negative slant. That's why journalists, when writing about positive developments, tend to choose words other than "uncertain" and its derivatives. After all, the EPU's search-term filters for articles with a negative slant: what shows up in the indicator is predominantly negative, and deliberately so. Bloom gets what he's been looking for.

Working with data derived from media content requires considering how this content actually came into being. News itself is a product that is manufactured under certain constraints. Therefore, what makes the news is not necessarily a matter of superior (objective) importance but rather the result of media organizations' economic incentives, professional standards, and

consumer (i.e. media user) behavior. News producers (aka journalists) face constraints and trade-offs, not just budgetary ones. The production of news is costly. Revenues need to be generated, whether from subscriptions or advertising or other sources. Reaching a paying (or marketable) audience of considerable size is a necessary condition for news' very existence. Product differentiation is well developed; different news outlets cater to different political and ideological tastes. Hence, journalistic publications at times pick different events and developments to report on, or identical ones they portray from different angles.

The *New York Times'* traditional claim "All the news that's fit to print" has been altered by media economist James T. Hamilton to "All the news that's fit to sell" (Hamilton 2004), implying that news, as a product, should not be confused with pure and comprehensive information. There may be some objective reality out there, but its representation in the media can only be partial and biased one way or another, precisely because news has to sell, because resources are scarce and users' attention is limited. That doesn't make news necessarily false or "fake", as fashionable insults have it. But it's undeniable that highly competitive media markets are prone to deteriorating quality; more attractive – i.e. sensational, attention-grabbing, easy-to-understand – stories and issues have the potential to crowd-out true, complicated, facts-laden ones. *Oh Boy!*

This working paper's aim is two-fold: it provides a cursory overview of basic mechanisms of news production from which it derives suggestions on how to take these mechanisms into account in the analysis of news (sections 2 and 3); second, we update our topic model-based Uncertainty Perception Indicator (section 4) using a broader corpus and compare the results with earlier exercises in the same vein (Müller et al. 2018, Müller 2020a, Müller and Hornig 2020). Section 5 draws some conclusions. A comprehensive annex provides detailed descriptions of all the topics considered.

## **2. What to expect from the analysis of news content**

Every day, editors make dozens of decisions concerning the issues to be covered. Which current events are worth to be reported? Which political battle is important enough, which positions or quotes are exciting enough to make the news? This process of prioritization implies that a lot of things that are happening at a given point in time are being ignored by the news media. Researchers working with media content, therefore, should not mistake the *coverage* of social reality with the real thing.<sup>2</sup> Yet, what's in the news informs societies who they are, what their most pressing problems are, and which ideas are being put forward to solve them. Thereby, media coverage influences the collective self-perception of society, and this in turn influences economic behavior by policy makers, firms and individuals (e.g. Lischka 2016, Carrol 2003, Doms and Morin 2004, Kholodilin et al. 2014, Kholodilin et al. 2015).

### *News Values*

The decision what to cover and what to ignore is informed by "news values". These criteria can be interpreted both as positive descriptions of what media are actually doing and as a normative set of rules that editors should follow. Communication scientists have come up with a multitude of lists (e.g. Maier et al. 2010, Schulz 1982, Staab 1990, Harcup and O'Neill 2017) containing factors that govern these choices. The essential news values can be summarized as

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<sup>2</sup> Communication science has been grappling with the relationship between reality and its representation in the news media for a long time (e.g. Adoni and Mane 1984, Luhmann 1995, Lau 2012, Couldry and Hepp 2017), albeit inconclusively.

follows: *timeliness, negativity, conflict, proximity, prominence, and consonance*. What's happening today is more important than what happened yesterday. It helps if a problem is addressed, even better, if it results in a clash between persons, groups, or other entities. The closer to home all this takes place, or the more it effects the readers personally, the better. The involvement of well-known figures enhances a story's news value. If it resonates with established frames or narratives, or if other media are intensely reporting on it, an issue's priority tends to increase. We would also like to add a seventh news value: *accessibility* – issues that are easy to grasp enjoy a communicative advantage.

Conversely certain issues rarely make the news: slowly evolving problems that cannot be pinned to a certain event; positive developments, and abstract ones happening in far-away places; new trends, or new interpretations of established ones; ordinary citizens living ordinary lives; complex issues (unless some populist short-cut logic is applied).

### *Blind Spots*

Statistics may be governed by averages and medians. Economics is preoccupied with equilibrium, efficiency, and growth. Journalism is driven by outliers, the outrageous, and the outraged. While the first two disciplines are backward looking, trying to make sense of the (immediate) past using models and probability distributions derived from bygone observations, journalism is about the present, and sometimes about the future. What's going on right now? And where does it lead us?

This structural dissonance between journalism and economics and econometrics needs to be born in mind when dealing with news content as data, and it is of particular concern in the context of economic developments. Over-leveraging and asset price bubbles rarely make the news – until things turn bad. What's happening at important international bodies, such as the WTO (Müller and Boczek 2020), has largely faded from public awareness. Complicated and abstract policy areas such as monetary or tax policy, when addressed in general media, tend to be reduced to the strong framing of certain leading figures. Distant but important countries, such as India or Brazil, are barely covered in European or North-American media. Even big business is a tough sell in general media these days, with the exception of a few superstar CEOs (think: Elon Musk).

Consonance has become more important, driven in part by publishing on the internet where editors are able to observe competitors' editorial choices in real-time. Issues that attract attention elsewhere can be easily adopted. Since speed is of the essence, replicating prevailing *frames*, i.e. the interpretation of a problem's causes and potential remedies (Entman 1993), is an instant way to inform new facts with established meaning. The results are episodes of herd behavior when virtually all the "mainstream" news media cover the same issue with a similar spin. *Issue attention cycles* (Downs 1972, Dayan and Katz 1992, Kepplinger 2001, Waldherr 2012) have become faster and stronger (Lorenz-Spreen et al. 2019).

While herd behavior is rational from the perspective of individual news media – maximizing user attention while a topic is "trending" at low cost – it is problematic in sum: the uniform focus on a sequence of emotionally charged issues is bound to produce blind spots. Important issues, overshadowed by the at-the-time dominant story, are unduly ignored; problems fade from public attention when users (and editors) get tired of them, even if they are all but resolved.

### *The Business of News*

The mechanisms of news are problematic. Still, they are firmly grounded in both professional practices and in patterns of media perception. After all, media need to attract an audience, and mass media cannot exist without a mass audience. Journalism needs to grab the users' attention and try to hold on to it as long as possible. News pages and programs are designed to induce curiosity, not necessarily to enlighten their audience. Stories are composed in ways that keep users reading, watching or clicking. Journalism is part of a vast attention industry, governed by "attention merchants" (Wu 2017), with newish intermediaries like Google and Facebook at its core. Individual news outlets compete with other journalistic media and with predominantly entertaining ones (movies, streaming, gaming...) for users' limited time-budgets. Competition is fierce, and it's getting ever more so.

However, journalism's particular incentives and instincts are tamed by the *experience good* (Nelson, 1970) properties of news products. Since individual users mostly cannot judge the quality of a story, they have to rely on the media to emphasize the most important issues and to report the most relevant facts correctly. Trust is being built over time by the frequent use of the same media brand and by observing which brands other people use and trust; that's why the established names of print and TV journalism are still major news sources on the internet (Nielsen 2016). To ensure recurring quality, professional standards and editorial procedures (such as pre-publication fact-checking) have been established. Journalism as a "knowledge profession" (Donsbach 2013) relies on specialization and educational programs designed to train journalists to be up to the task (e.g. Müller 2020c). Facticity, impartiality, multi-perspectivity, never relying on a single source alone – such characteristics of quality journalism strive to reconcile the public's desire for trustworthy information with journalism's own restrictions. Serious news media do not only compete for attention but also for the audience's trust.

### *Journalism and Social Media*

The quest for trust is even more important as the advent of social media has stripped journalism of its once-unique *gate keeping* role. In the old days, those who wanted to address the public could only do so through newspapers, TV or radio programs. Now all they need is a smartphone and a Twitter account. Everybody can take part in public discourse, where the news values of negativity, consonance, and conflict are even more prevalent than in traditional media. There are several channels through which social media content spills over to traditional media: journalists use social media, Twitter in particular, as a source of inspiration, information, argument, and quotes for their stories; social media and search engines have become important channels for the distribution of journalistic products that prompt editors to fabricate content tailored to algorithmic attention logic; political debates are increasingly pre-shaped on social media from where they spill over to traditional news outlets (von Nordheim et al. 2018, von Nordheim 2019).

Today, the interplay of social and traditional media sets a society's agenda: problems that need to be tackled urgently and issues that can wait; or, put differently, which issues citizens should know the key facts of and have an opinion about – and can thus discuss with their peers. Politicians react to headlines. Their priorities are largely driven by the media, which in turn are influenced by political elites, business lobbyists, activists, and scientists trying to convince the public of *what* to pay attention to (*Agenda Setting*, Lippman 1922, McCombs and

Shaw 1972), but also of *how* to think about it (*Second-Level Agenda Setting*, e.g. McCombs 2008). This process used to be centered on journalistic media, it is now driven by social media, too, in “hybrid media systems” (Chadwick 2017).

### *Individuals and Masses*

For all their flaws and biases, news media help citizens make sense of an otherwise incomprehensibly complex world. The news not only informs individuals about matters important to them personally but also about what other people are preoccupied with, which in turn influences expectations and alters behavior. This *third person effect*, as it has become known in communication science, is a powerful channel of influence (Davison 1983; Peiser 2009, p. 147; Bonfadelli and Friemel 2017, p. 217). An individual may deem certain issues unimportant or misinterpreted, but nevertheless influence her or his behavior due to the belief that other people find them important and act accordingly. Typically, people underestimate the influence of news on themselves and overestimate its influence on others (Perloff 2009, p. 253). Even people with expert knowledge in some areas, like business executives, investors, or entrepreneurs, are influenced by economic news, since the third person effect typically increases with social distance (Lischka 2016, p. 63). People with high social status and little direct exposure to average citizens learn what’s driving ordinary folks predominantly by reading or watching the news. By including news data into economic analyses, researchers take account of what moves the nation, a valuable exercise since the ups and downs of issue attention can yield real economic consequences.

### **3. How to measure news, and how to interpret it**

One key question at the outset of any analysis is what the most adequate measuring points could be. Which media should be selected? After all, the choice has the potential to alter results considerably, as Hornig (2019) has shown with respect to the coverage of the diesel car scandal in the German press. Our augmentation of the UPI corpus also shows that changes in the underlying database can shift topic patterns somewhat (sec. 4). A cautionary answer would be, that it all depends on the research questions. For instance, if economic developments in one single region were to be explained, regional media should be considered, not national or international ones. For the analysis of certain segments of financial markets, general newspapers or news websites will be of little use. If macroeconomic movements or changes in consumer or investor sentiment are to be explained, general national media would be appropriate data sources.

### *Leading and Following Media*

In modern media systems, elite media still play a leading role. Classic broadsheets, TV news programs, and their electronic derivatives continue to set many of the issues and frames that other media outlets follow. In a hierarchically structured media market, trusted elite papers that cater to an educated high-income/high-impact audience continue to set parts of the public agenda, even though this position has been somewhat diminished by the rise of social media. Twitter, as well as certain Facebook channels, may also be considered elite media of a new media order. But applying data from these sources to economic analysis has two major shortcomings: social media do not have the long publication history that is needed for econometric analysis of, say, business cycles; and the opaque nature of the underlying algorithms makes it virtually impossible to gauge the representativeness of generated data sets, or to ensure their replicability. Furthermore, due to the above-mentioned spill-overs



between traditional and social media we can expect traditional newspapers to cover major debates on social media as well, albeit with a time-lag.

From a researcher's point of view, broadsheets offer an additional advantage: they cover a variety of issues, partly defying the tendency towards quasi-monothematic news cycles. They still offer their readers a multi-faceted, well-structured overview of current events on dozens of pages each day, far more detailed than digital or televised news could, that researchers can use for their own purposes.<sup>3</sup>

### *Composing a Corpus*

Text mining methods make analyses of vast amounts of media content feasible. While computational power is not much of a limitational factor anymore, data availability still is. Applying media content to business cycle or financial market analysis requires long time series and therefore access to digital archives going back many years, preferably decades. These are rather rare. That's why researchers are tempted to choose data sources opportunistically, according to availability. But not all news media are equal. They may be prone to herd behavior and therefore share some reporting patterns (sec 2), but their content is not identical, or even comparable. After all, newspapers and websites are differentiated products, managed by human beings with individual preferences and prejudices (though the latter factor seems to be diminishing by the ubiquitous use of metrics in editorial rooms).

Different papers make somewhat different editorial choices: some issues may be stressed and covered extensively while others are neglected; editorial spins differ according to a publication's ideological stance. At times, these choices can even be purely arbitrary, driven by the tastes and sources of one single reporter. While such phenomena could be an interesting topic for communication studies, economists' interest in journalistic content is different: after all, they want to get the drivers of overall public sentiment into the equation. By pursuing large-scale content analysis, they expect to isolate prevailing frames and narratives that can be interpreted as manifestations of public opinion. What they are looking for, is some kind of *mean coverage*: what are media outlets talking about *on average*? Such averages should clearly be derived from several media, not just one, in order to offset individual publications' biases. The above-mentioned third person effect calls for including not only expert media but also ones that are received by the general public.

The existence of a media mainstream is an advantage that researchers should exploit where possible. If a broad mainstream exists, there is only a limited number of relevant national media that need to be taken into account. The choice of suitable measuring points is therefore a natural one: elite mainstream newspapers and their digital derivatives from different ideological strands, that are still in visible proximity to the political center. This approach presumes, however, that only a limited degree of political and media polarization prevails, a notion that cannot be taken for granted anymore. In the US, for instance, the traditional median voter model (Downs 1957), where the bulk of politics and media used to be grouped around the center, has been transformed to a twin-peaks model, where polarization in politics coincides with polarization in the media (Pew 2017, 2020). Under these circumstances, the

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<sup>3</sup> News agencies such as Reuters, Bloomberg or Deutsche Presseagentur (DPA), the wholesale suppliers of news, could serve the same purpose, though any analysis would have to take into account the proportions of content that has actually been published by newspapers to arrive at a proper representation of mediated reality.

notion of *mean coverage* could become meaningless. *Mean coverage*, which may be interpreted as the common ground of society, will be hard to locate if there is no common ground but a multitude of tribal echo chambers. Therefore, researchers should be cautious when merging media into one single corpus. To avoid the fallacy of false consensus in the presence of polarization, they need to make sure that the media included are homogenous to a degree that they are comparable. For example, including hard-right and hard-left media into a single corpus is bound to blur the results to unrecognizability. In this paper, we select mainstream newspapers with different political orientations and readerships (see sec. 4).

Comparability is also warranted regarding the reception of content. Text mining techniques are often based on counts of articles that share certain characteristics. It is hence implicitly assumed that all the texts in a corpus have a roughly equal probability to be read or at least noticed. Broadsheet newspapers, that are browsed through from front to back page by their readers, come closest to this assumption. News websites, in contrast, sport quite different perception patterns: user attention is devoted disproportionately to the stories on top of the page, while the content farther below is largely ignored. Periodicity should also be comparable. Weekly magazines like *The Economist* or *Der Spiegel* pursue reporting patterns that differ from dailies; their cover stories impact the public agenda to a far greater extent than, say, a brief news piece somewhere inside of a broadsheet daily. Simply counting the long cover story and the news brief as similar manifestations of the same trend is hardly justifiable.

#### *“Distant Reading”*

Topic modelling approaches such as Latent Dirichlet Allocation (Blei et al. 2003) have become work-horse tools in text mining and have become more and more popular in econometric analyses (e.g. Kozłowski et al. 2020; Larsen and Thorsrud 2019). However, economists tend to treat news-based data like regular statistical time-series, with little regard to its specifics. One example is the preoccupation with measures such as “perplexity” and “coherence” (Mimno et al., 2011). Perplexity is a likelihood-based measure to determine the LDA parameter  $K$ , which has to be set by researchers in advance. Unfortunately resulting “optimal” parameter values often collide with interpretability; human coders may not be able to sufficiently make sense of models created by optimization in a mathematical sense (Chang et al. 2009). Topic coherence is another case in point. While the objective to create LDA models containing clearly distinguishable clusters of texts (“topics”) is certainly a valuable one, mathematical tools can be misleading, sometimes running contrary to human interpretation.

While Natural Language Processing (NLP) may pave the way to enhanced automatization of large-scale content analysis, for the time being human interpretation is still needed at different stages in the research loop. “Distant reading” (Moretti 2010), in our research set-up the interpretation of a model’s topics, their most characteristic words and articles as well as their frequencies over time, needs to yield *sensible* results. If informed human coders cannot make sense of the results, a model should be considered faulty and arbitrary, and different parameter settings should be applied.

#### **4. An Updated Version of the Uncertainty Perception Indicator (UPI)**

In Müller and Hornig (2020), we constructed an Uncertainty Perception Indicator (UPI) for Germany that differs from the popular Economic Policy Uncertainty Index (EPU) (Baker et al. 2016) in three important aspects: a) it uses a more open query that does not specify certain policy areas *ex ante*; b) methodologically it is based on the unsupervised topic modelling

approach LDA that enables us to isolate certain drivers of uncertainty that we call *uncertainty factors*; c) due to limitations of data availability it is based on a corpus composed of two nation-wide broadsheet newspapers, Handelsblatt, a business daily, and Die Welt, a conservative mainstream publication.

The rationale behind this approach follows from the very nature of uncertainty which comes in three varieties. In Müller and Hornig (2020, p. 4-7) we proposed a taxonomy of uncertainty focusing on the sources of disturbances. While *market-based uncertainty* may also be found in market indicators, such as implied volatility, interest rate spreads or survey data like the Ifo index, news content can be expected to capture *economic policy uncertainty*. *Truly exogenous uncertainty*, coming from sources outside of both the market and the political system (e.g. climate change, technology shocks, pandemics), can induce the other two types of uncertainty and may also show up in the news at early stages. Since, by definition, we do not know from which directions the latter type of uncertainty is coming from *ex ante*, the strong focus on business news in the old UPI corpus, due to the large weight of Handelsblatt, could be problematic. To make the indicator more sensitive to exogenous developments, general newspapers that cover a wide scope of issues should be included.

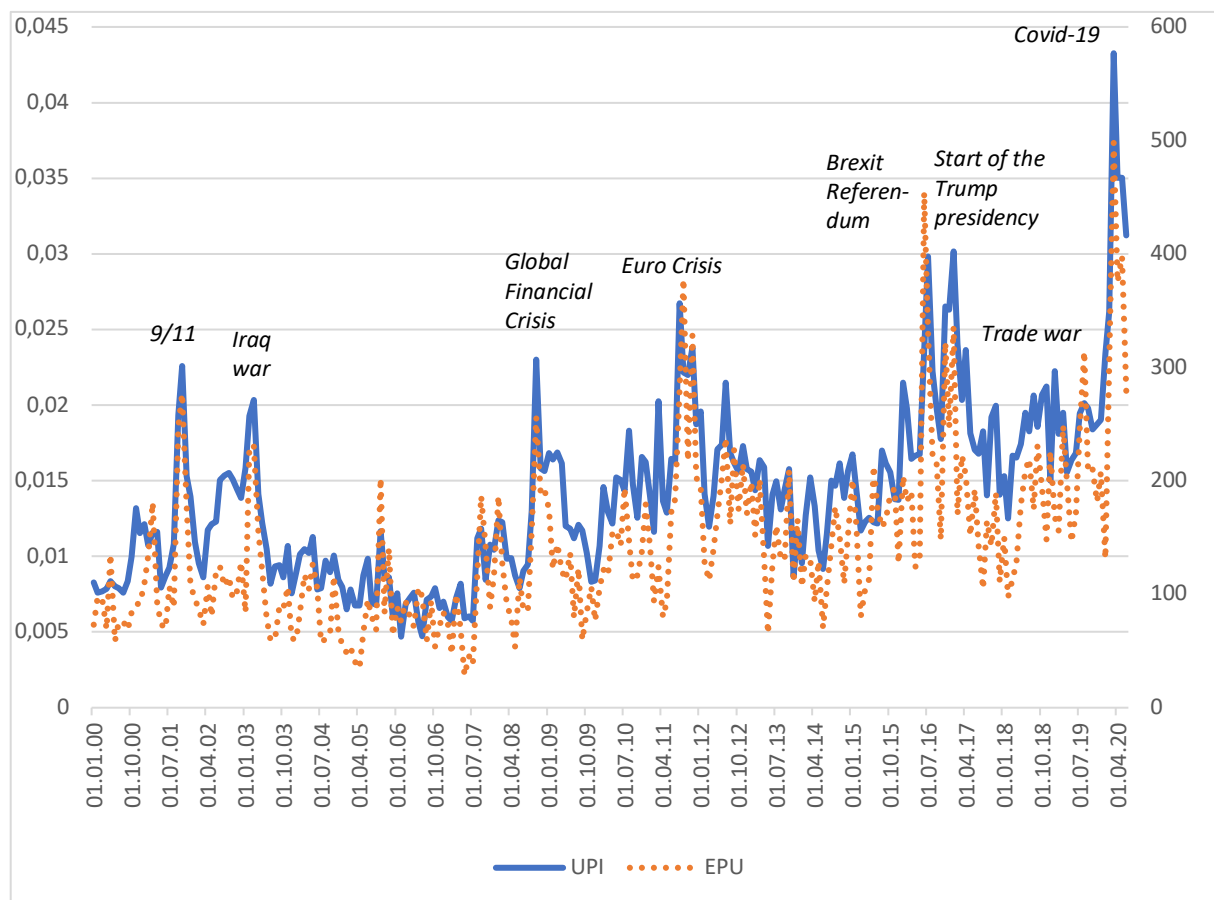
In this paper we present results for an enhanced version of the UPI that is based on a larger corpus also containing articles from Süddeutsche Zeitung, a slightly left-of-center German broadsheet. In line with our reasoning on finding suitable points of measurement (sec. 2 and 3) the new corpus contains three mainstream elite broadsheets positioned around the political center. Furthermore, we extend the time horizon, now starting in 2000 all the way to Q2 2020. Altogether, 2,9 million went into the analysis, with Süddeutsche Zeitung contributing roughly half of them. Applying the query

„unsicherheit« OR »unsicher« OR »unsicherheiten«

AND »wirtschaftlich« OR »wirtschaft«

yields an analysis corpus of 37,000 articles. The frequency pattern is roughly similar to the EPU (fig. 1).

Figure 1: UPI vs. EPU for Germany, Jan 2000 to June 2020



Source: [www.policyuncertainty.com](http://www.policyuncertainty.com), left scale: analysis corpus share of entire corpus, right scale: index points; authors' calculations

Pronounced uncertainty events include the terror attacks of September 11 2001, the US invasion of Iraq in March 2003, the global financial crisis of 2008/09, the Euro crisis of 2011/12, the Brexit referendum in June 2016 and the beginning of the Trump presidency in the US in Jan 2017, followed by escalating trade conflicts from 2018 kicked-off by the US administration, and the Covid-19 crisis of 2020. As classic news values (sec. 2) would suggest, the indices react to negative events, to their proximity, to the prominence of leading proponents, the severity of conflicts, and the accessibility of an issue. For instance, while the Brexit vote is far more important to the German economy than the immediate effects of the Trump presidency, the polarizing former reality TV star ticks many boxes: negativity, conflict, prominence, and accessibility (i.e. simplicity of argument). The result is a peak of equal size as the one triggered by the Brexit referendum. The trade war, in contrast, is vital to the German economy, particularly to its large export-focused manufacturing sector. But apart from being fueled by Donald Trump, the issue lacks essential aspects of newsworthiness. Furthermore, the trade conflicts can be interpreted as part of the Trumpian *Issue Attention Cycle*, that was already at a later stage, typically associated with declining public attention, when the trade war started. That's why the ensuing movements in the overall UPI are less pronounced. The Covid-19 crisis differs from earlier events since it does not only have economic, political or social implications of historic proportions but also very direct personal ones. Hence the outsized height of the initial Covid peak, which started petering out in Q2.

### *Comparing results*

We ran several LDAs with different values for the parameter  $K$ , i.e. the number of clusters of articles (“topics”) the algorithm is set to produce. Reviewing different models, we found that a value of  $K=14$  yields the most coherent topics; in the earlier version with a smaller corpus a  $K$ -value of 12 was found to be the most coherent.

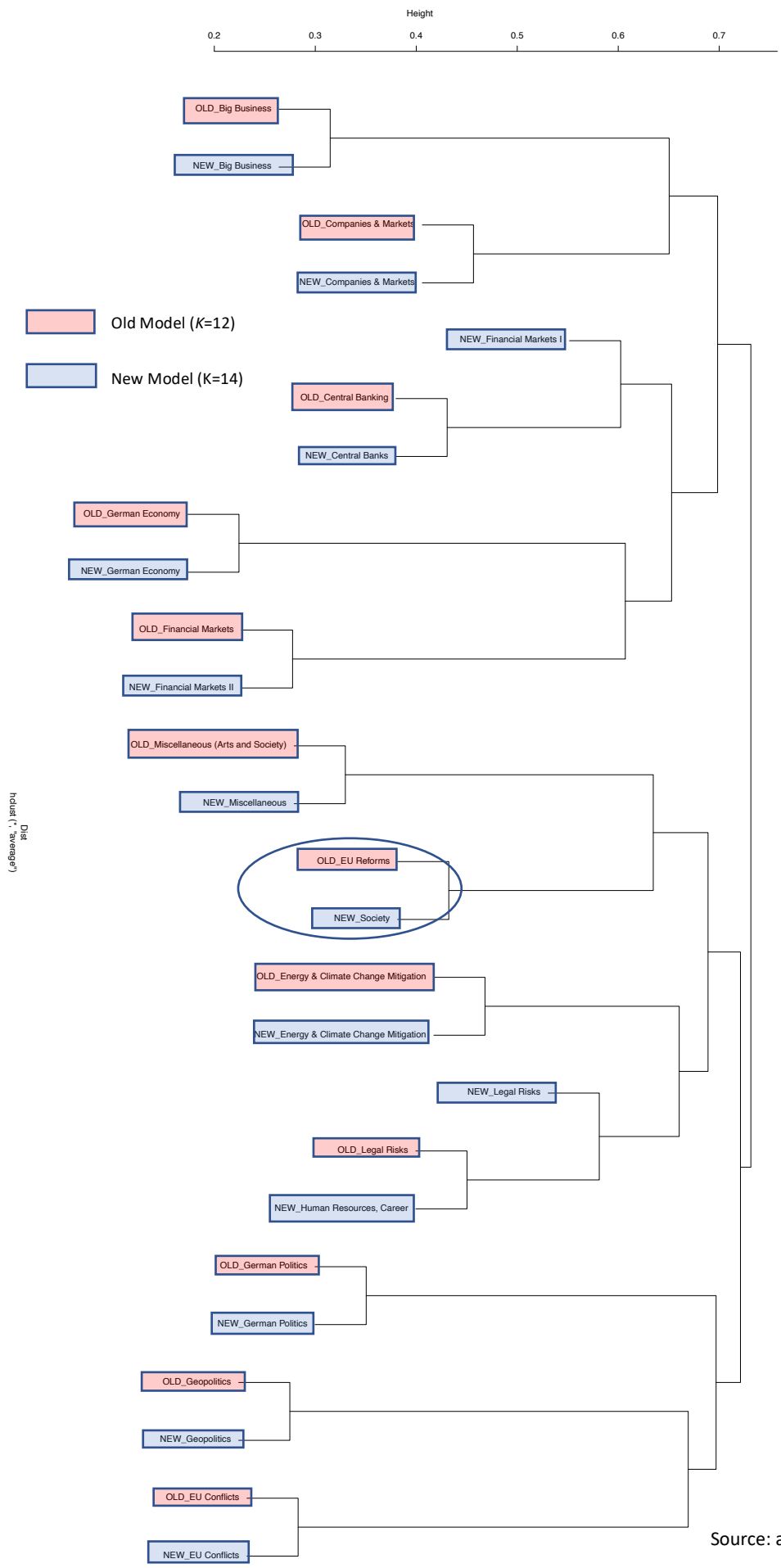
Even though the three-newspaper corpus is more than twice as large as the one used before, and even as a period of specific uncertainty events in the 2000s is added, the two models are closely related, pointing to the relative robustness of the LDA approach. For 10 out of 14 topics equivalents could be found in the earlier version (table 1, second column, equivalents in the old model in brackets).

Table 1: Overview of Topics and Labels (K=14)

| Topic No. | Label (equivalent to topic no. in old LDA#)   | Share in analysis corpus (per cent) | Content   | Type of uncertainty                          | Part of Uncertainty Factor... |
|-----------|---|-------------------------------------|---|--|-------------------------------|
| 1         | German Politics (equ. T 4)                    | 6                                   | Political developments in Germany (national level)  | Economic Policy                              | UPI Politics                  |
| 2         | Financial Markets I (no direct equ.)          | 7                                   | Private Investing, financial market developments  | Market-based                                 | UPI Financial Markets         |
| 3         | Human Resources (no direct equ.)              | 7                                   | Education and Knowledge, Career issues  | Market-based, Economic Policy                | UPI Real Economy              |
| 4         | Central Banks (equ. T 2)                      | 6.8                                 | ECB, Fed etc. actions against crises  | Economic policy                              | UPI Politics                  |
| 5         | EU Conflicts (equ. T 11)                      | 5.6                                 | Brexit, Greece debt etc.  | Economic policy                              | UPI Politics                  |
| 6         | Miscellaneous                                 | 10.9                                | Diverse   | –  | –                             |
| 7         | Companies & Markets (equ. T 1)                | 3.5                                 | German Corporates in trouble  | Market-based                                 | UPI Real Economy              |
| 8         | Society (partly equ. T 12)                    | 11                                  | Debates on Capitalism, Globalization, Democracy, Populism, Immigration, national identity | Economic policy                              | UPI Politics                  |
| 9         | Energy & Climate Change Mitigation (equ. T 7) | 6.14                                | Energy market developments, transition to sustainables etc.                               | Economic policy/market-based/truly exogenous | UPI Real Economy              |
| 10        | German Economy (equ. T 5)                     | 7.7                                 | Business cycle developments, forecasts, surveys   | Market-based                                 | UPI Real Economy              |
| 11        | Geopolitics (equ. T 9)                        | 7.1                                 | Conflicts involving US, China, Russia, Turkey, Middle East...                             | Economic policy                              | UPI Politics                  |
| 12        | Financial Markets II (equ. T 10)              | 7.6                                 | Up and down at the bourses  | Market-based                                 | UPI Financial Markets         |
| 13        | Big Business (equ. T 1)                       | 6.55                                | Developments at quoted international corporates   | Market-based                                 | UPI Real Economy              |
| 14        | Legal Risks (equ. T 6)                        | 7.18                                | Regulations and court rulings affecting businesses  | Economic policy                              | UPI Politics                  |

# see Müller and Hornig (2020, p. 12). We combine 1 and 14, 2 and 12, 7 and 13 due to their proximity. For topics highlighted in gray equivalents in Müller and Hornig (2020) can be traced.

Grouping the topics of the old and the new LDA model according to their statistical relatedness broadly confirms their comparability. The dendrogram (fig. 2), whose twigs and branches represent the proximity of topics (measured in terms of Hellinger distance), shows pairs of topics from the old and new model.



Source: authors' calculations

Figure 2: Dendrogram – Comparing old and new LDA models (Hellinger Distance)

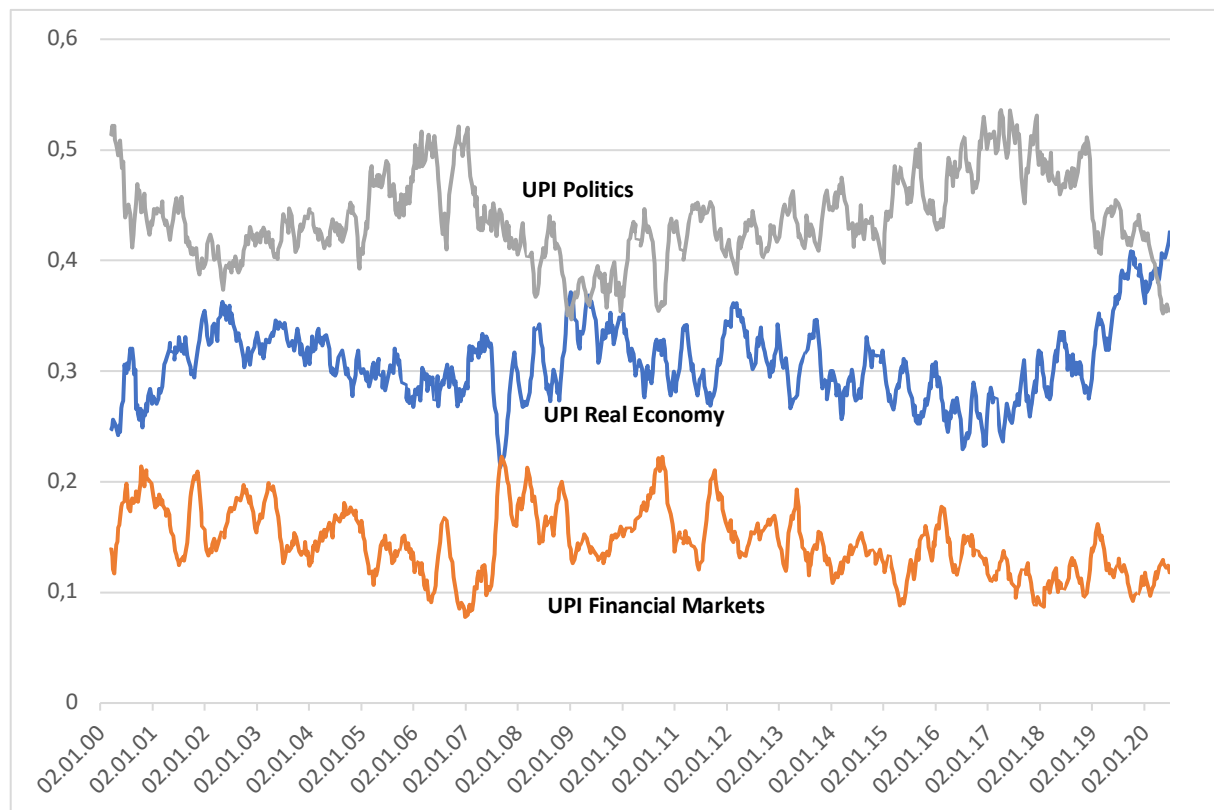
However, there are a few differences between the two models. The most important one concerns topic 8 (“Society”). It contains debates about fundamental issues such as political and economic reform necessities, populism, national identity, or immigration. With a share of 11 per cent of the analysis corpus it is of non-negligible size. There is no direct equivalent to this topic in the old model. The most closely related topic (“EU Reforms”, see fig. 2) contains stories about fundamental questions, albeit rather from a European angle than from a national one. An explanation for this difference is the inclusion of *Süddeutsche Zeitung* into the corpus. As mentioned above, not all news media are equal. That’s precisely why the composition of a corpus matters. In this case, with *Süddeutsche Zeitung* we include a newspaper that takes a more progressive stance on many policy issues and is more focused on domestic politics than *Handelsblatt* in particular. Since we are interested in *mean coverage* at the national level, as explained above (sec. 3), including a slightly left-of-center paper like *Süddeutsche* is essential for capturing the mainstream of publicized opinion. In contrast, limiting the analysis to newspapers business types prefer would lead us to overlook certain aspects and would be prone to biased results.

Aggregating the topics to *uncertainty factors* (fig. 3) provides the familiar picture of overwhelmingly politics-driven uncertainty (Müller and Hornig 2020, fig. 4). However, towards the end of the time horizon an overall shift of uncertainty towards the real economy can be observed, a development not seen since the Great Recession of 2008/09, although this time the shift is even more pronounced, underlining the severity of the Covid-19-induced recession.

Note, though, that uncertainty levels in the real economy already start rising in early 2019. At this time, the impact of aggravated political uncertainty, particularly due to the trade war and Brexit, becomes manifest. Not the pandemic should be seen as the root cause of the current uncertainty crisis, but the destabilization of the political system that preceded it.



Figure 3: Decomposition of the UPI by Uncertainty Factors\*



\*shares in analysis corpus; three-month moving averages; source: authors' calculations

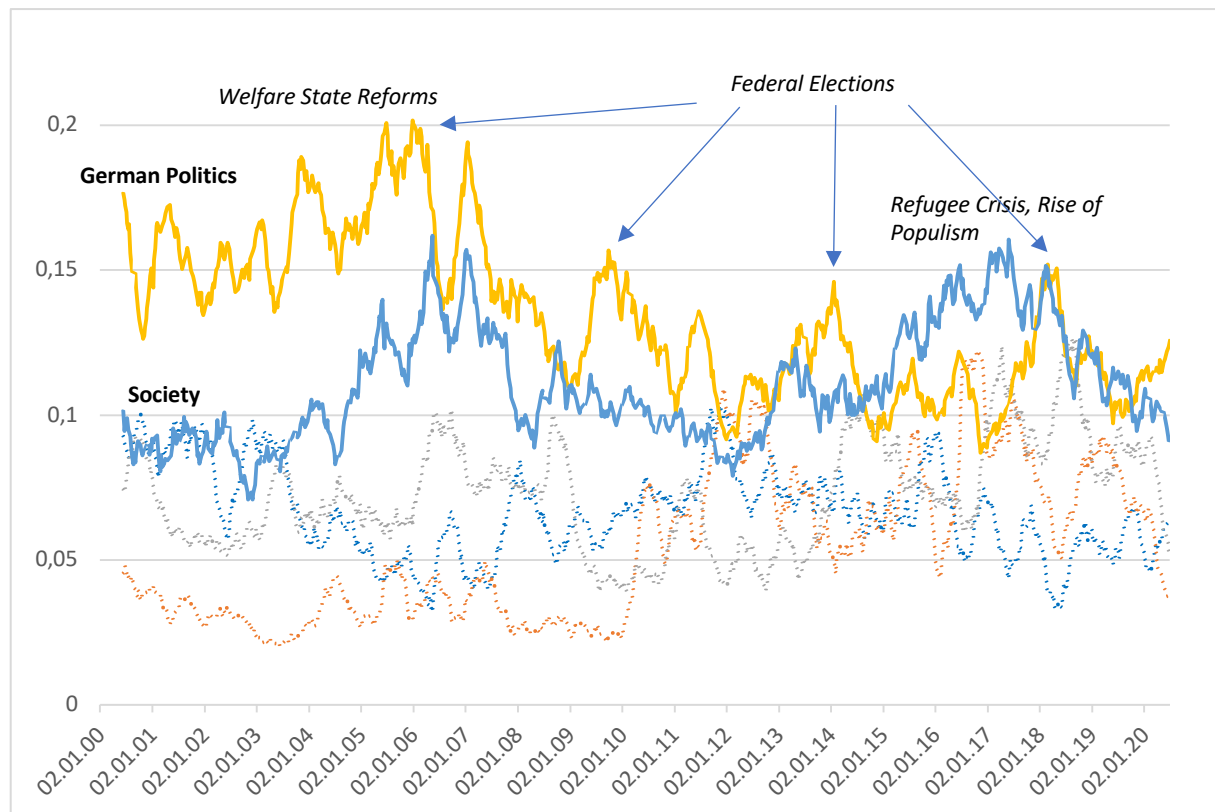
### Political Uncertainty

According to our model, political uncertainty originates from three levels: domestic, EU, and international. The *UPI Politics* comprises of five topics: two related to domestic politics (“German Politics”, “Society”), two related to EU politics (“EU conflicts”, “Central Banks”, the latter dealing with the ECB but with other major central banks as well), one related to international conflicts (“Geopolitics”). Fig.4a highlights the two domestic topics and related specific events. As the blue line shows, “Society” has been the topic that was among the drivers of increasing economic policy uncertainty in Germany over the past decade, with the refugee crisis and the rise of populism as its main items. In earlier years, increases can be traced to the German reform episode (particularly welfare state reforms, or “Hartz-Gesetze”) between 2003 and 2005 and the financial crisis after 2007.

On the other hand, the relative importance of domestic politics in a narrow sense – i.e. party politics, laws introduced by the government – has declined since the late 2000s (yellow line). While reforms of the welfare state and the labor market in the early 2000s triggered uncertainty surrounding domestic politics, uncertainty subsided markedly after 2005, when Angela Merkel assumed the chancellorship. Peaks in the 2010s involve national elections, resulting in a change of coalition partners in the fall of 2013 and the failing coalition talks after the 2017 elections that left Germany with a care-taker government without a majority in parliament for almost half a year – a novel experience for post-war Germany.<sup>4</sup> The rise of the topic at the very end of the time horizon is driven by the response to the Corona crisis and the ensuing political conflicts within Germany’s federal structure.

<sup>4</sup> We found similar results in Müller et al. 2018 and Müller 2020a.

Figure 4a: UPI Politics – National Topics (highlighted, dotted: European and International Topics), selected events\*



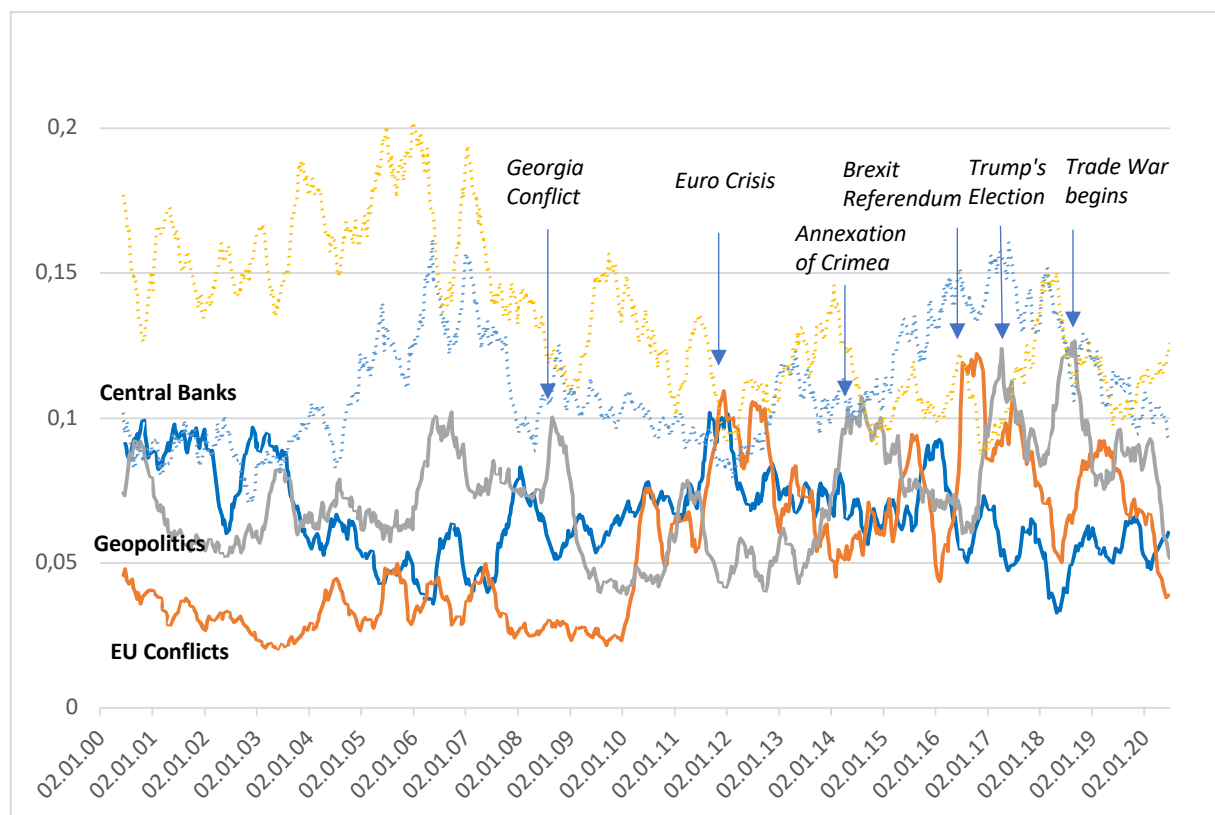
\* shares in analysis corpus, six-month moving averages; authors' calculations

Turning to the *European and international aspects* of policy-related uncertainty, we find a marked increase in the past decade resulting from conflicts within the EU and increasingly unstable international relations (fig. 4b). The rising trend in “EU Conflicts” (orange line) represents Europe’s dreadful 2010s. After the Euro crisis began in 2010 a series of political shocks hit the EU, that spread economic policy uncertainty, particularly the sovereign debt crisis between 2010 and 2012, the Greek episode culminating in 2015, and the Brexit crisis, with the referendum in June 2016 marking this topic’s absolute peak. Since the stalemate in the British parliament was resolved, the topic has declined in relative importance.<sup>5</sup>

The fundamental shift in geopolitical conditions is captured in the topic “Geopolitics” (grey line). A series of detrimental events can be interpreted as materializations a deteriorating world order. The US invasion of Iraq is associated with a smallish peak in 2003, the Russian aggressions against Georgia (2008) and Crimea (2014) produce bigger ones. The election of Donald Trump in the Fall of 2016 induces a steep rise in geopolitical uncertainty, reaching its highest level yet with the trade war launched in 2018.

<sup>5</sup> In an earlier version of the UPI “EU Conflicts” commanded a bigger share, 18 per cent of the analysis corpus, compared to just 5,6 per cent in this model. Two factors can explain this difference: parts of basic political debates, now captured in “Society”, concern the future of European integration which in the old model was captured in a distinct topic “EU Reforms”, that is missing here. Also, the big weight of Süddeutsche Zeitung in this corpus with its focus on national politics contributes to the relative light weight of European issues in this model.

Figure 4b: UPI Politics – European and international Topics (highlighted, dotted: National Topics), selected events\*



\* shares in analysis corpus, six-month moving averages; authors' calculations

As noted elsewhere (Müller 2020b) central bank action, though intended to soothe markets, may well spread uncertainty as market participants try to gauge the effects and the timing of measures, or their withdrawal. This is particularly the case when new policy instruments, such as quantitative easing, starting in the Eurozone in 2015, are applied. Periodically heightened uncertainty can result as markets speculate about the implementation of additional measures, or about the withdrawal of stimulus. After a peak during the Euro crisis in 2011 central bank uncertainty has played a minor role in recent years.

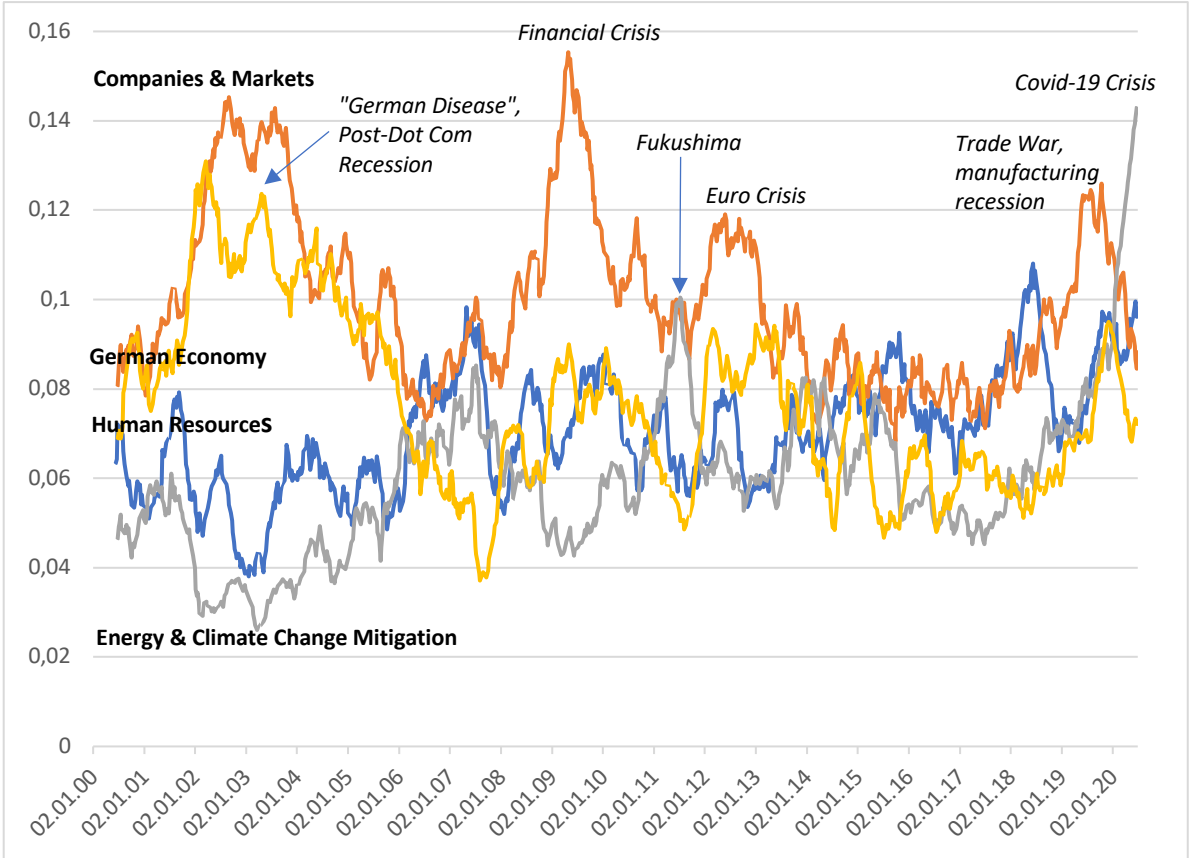
### *Economic Uncertainty*

In the past, the *UPI Real Economy* has been driven by market developments such as the dismal performance of the German economy in the early years of the new millennium, the financial crisis, the Euro crisis, and the deteriorating global outlook due to trade tensions and a simmering manufacturing recession, as the peaks in “Companies & Markets” show (fig. 5), a topic that deals with uncertainty at the firm and sector level. As we saw in Müller and Hornig (2020, p. 14), the topic “Companies & Markets” seems to be a predictor to business cycle-related uncertainty as captured by the topic “German Economy”; what we see in reports on individual firms and sectors can later be detected in the economy as a whole. In the second quarter of 2020, though, it was the Covid-19 crisis that has driven overall uncertainty.

Interestingly, Corona-related events show up in a topic that in the past dealt mainly with energy and climate change issues, hence the label “Energy & Climate Change Mitigation” (ECCM). Before the current crisis hit, the major event of this topic was the disaster at the

Japanese nuclear plant of Fukushima and the resulting turnaround in German energy policy in 2011. Now it is Covid-19 and its economic fall-out that pushes the grey line to all-time highs. What may seem odd at first glance, makes sense because the big issues this topic comprises of – climate change, energy technology and now a pandemic – all are in the category of *truly exogenous uncertainty* that is global in character with hard-to-predict but potentially catastrophic consequences (“Green swan events”, Bolton et al., 2020). The links between these issues are plentiful: the shutdowns have reduced global emissions, resulting in the question whether mankind shouldn’t phase out carbon-intensive energy production sooner rather than later, which has become a recurring issue in economic policy debates. Even though the world is hit by the worst recession on record, the climate issue is not dead. Quite the contrary, debates about a more rapid exit from carbon-intensive production have been amplified by the pandemic. News reports about the deteriorating prospects of energy companies, car producers and suppliers have multiplied. In contrast to other uncertainty factors this one may not go away anytime soon.<sup>6</sup>

Figure 5: UPI Real Economy, individual topics and topics\*



\* shares in analysis corpus, six-month moving averages; authors’ calculations

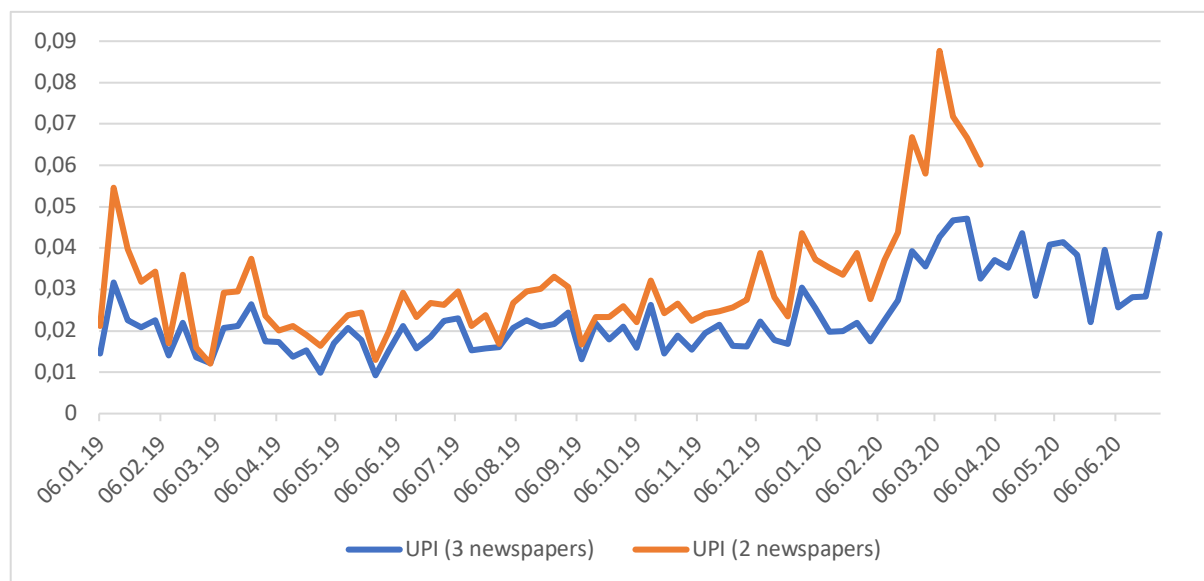
<sup>6</sup> Note that in the earlier UPI version (Müller and Hornig 2020) Covid-19 related uncertainty showed up in the “Central Banks” topic as monetary authorities were the first line of defense against the rapid downturn. In the new model, however, the central banking is captured by narrower topic while ECCM is of more prominence. This considerable difference between the two models is a result of the refined corpus: while in the old corpus business daily Handelsblatt and its focus on central banking and financial markets had considerable weight, now the progressive broadsheet Süddeutsche Zeitung adds aspects of public discourse that have been neglected by the earlier UPI version.

Additionally, the new model isolates a topic not present in the old one: “Human Resources” (figure 5, blue line) deals with labor market developments from a business perspective, particularly with shortages of highly skilled workers, but also laws, regulations and court rulings. Its peaks, most pronounced in 2007 and 2018, are associated with large positive output gaps when job vacancy rates were high. The hike at the very end of the time horizon points to Covid-induced workplace adjustments.

### Recent developments

Developments in the past six quarters were analyzed separately using weekly data. Fig. 6 depicts the overall frequencies of the old and the new model. Again, the new model behaves somewhat differently due to the more diverse corpus it is based on.

Figure 6: UPI (weekly data) – old vs. new model, overall frequencies\*



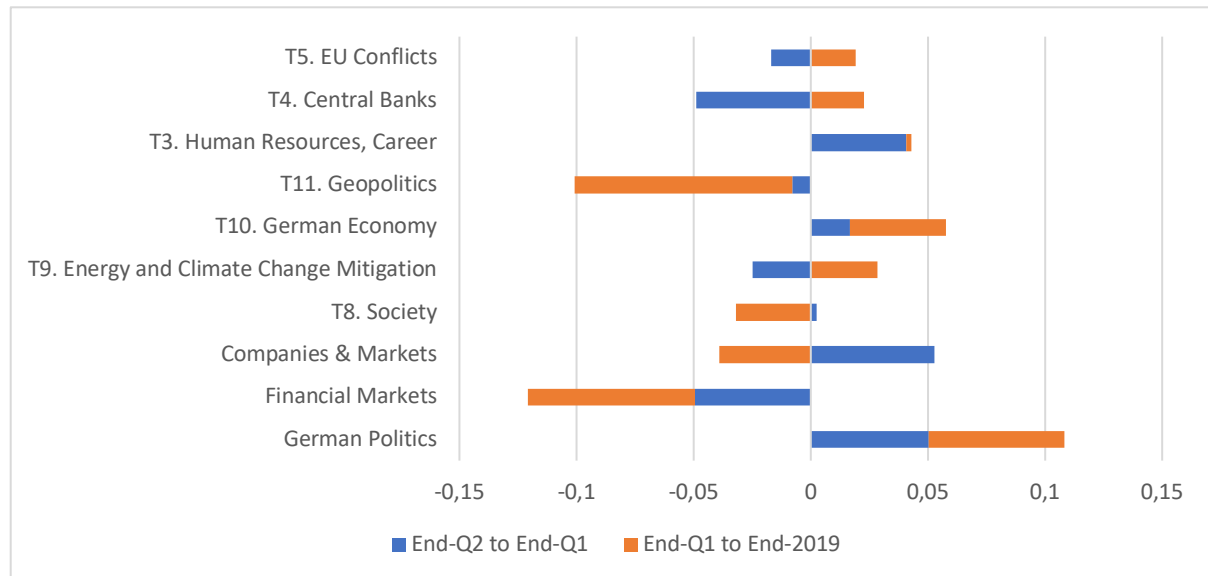
\*share of analysis corpus relative to entire corpus; authors' calculations

The hike in February 2020, due to the Corona crisis, is still visible, albeit less pronounced than in the smaller corpus. This comes at little surprise as Süddeutsche reports on all kinds of issues with sections devoted to culture, arts and sports, while in the old corpus business daily Handelsblatt contributed a large share of articles that were selected by the UPI's business-focused query. Still, in the first 26 weeks of 2020 the new corpus indicates persistently elevated levels of uncertainty, too.

Figure 7 shows how uncertainty patterns in the press have evolved since the beginning of 2020. Orange segments represent first-quarter developments, when the world first became aware of the Corona virus; blue segments depict developments in the second quarter. There are three uncertainty topics that increase in both quarters: “German Politics”, “German Economy” and to a lesser extent “Human Resources”. Other aspects stirred uncertainty at first, but receded in the second quarter as the dust settled (or media users – and newspaper editors – got bored with the old themes). “EU Conflicts” was an issue in Q1 as tensions between EU countries rose over border closures and trade restrictions for medical supplies; in Q2 these conflicts were mostly resolved, resulting in a decline of the respective topic. When the Corona crisis hit, it was at first unclear how central banks would react, causing uncertainty to rise; in Q2 their willingness to opt for unprecedented interventions was not in doubt

anymore and led to a relative decline of media attention. Other prominent topics, such as “Geopolitics” and “Society”, declined relative to their end-of-2019 levels. Even ECCM, the topic that helped drive overall uncertainty levels upwards, lost some steam in the second quarter.

Figure 7: Uncertainty Topics: Change of relative importance in Q1 and Q2 2020\*



\*percentage point changes of shares in analysis corpus; source: authors' calculations

## 5. Conclusions

In this paper we presented an updated version of our Uncertainty Perception Indicator (UPI). We used an enlarged corpus, including the slightly left-of-center broadsheet *Süddeutsche Zeitung*. Now based on more diverse mainstream newspaper content, the UPI captures several aspects of the national debate that were absent in an earlier version (Müller and Hornig 2020). While the overall intensity over time produces the familiar picture of uncertainty cycles characterized by distinct event-induced peaks that follow a rising long-term trend, our topic modelling approach yields some interesting additional insights.

Most notably, the Covid-19 crisis re-enforces a topic dealing primarily with climate change and energy issues. It is the only topic that contains aspects of what we call *truly exogenous uncertainty*, i.e. unpredictable developments outside of both the market and the political system. Natural and technical disasters fall into this category, now also the pandemic. This could mark the beginning of lasting changes in uncertainty perception: while in the past decade or so economic uncertainty was seen as mainly coming from the realm of politics, with the rise of populism and a less stable global order as the most important developments, the recent pandemic experience leads to a re-focusing to more fundamental factors. Put differently, the green narrative about limited natural resources, and catastrophes resulting from their over-use, is augmented by a new chapter on pandemics. This remarkable change has the potential to feed into the politico-economic system via a host of transmission channels, consequently altering political priorities, relative prices, consumption patterns, migration flows or macroeconomic variables (Müller and Hornig, 2020, p. 5). The landscape of uncertainty perception seems to be shifting in fundamental ways. Strategists in politics and

business should be aware of this transformation when preparing their institutions for the future.

As far as the most recent past is concerned, the overall indicator rose to unprecedented levels in Q1 of 2020, but declined markedly in Q2, even though the second quarter was the one when the most severe shutdowns were in place. A typical media pattern: negative items attract plenty of attention as long as they are new, but attention already fades when the situation still worsens. Three issues could be detected that rose most markedly in this period: conditions in individual companies and sectors, the German economy and German politics, the latter being the result of the unforeseeable reactions of federal and state governments to a virus of largely unknown properties.

In this study we extended the time horizon considerably, stretching from January 2000 to June 2020. The UPI now covers almost two decades and three business cycles which could make the overall indicator and its components valuable inputs to econometric models. On this basis we keep working on building reliable time-series and extending the exercise to other countries.

We started out with a discussion about news as an input to economic and econometric analysis and advised considerable caution: news is a product with its own inherent biases that must not be mistaken for a pure representation of social reality. By including news data into the analyses, researchers take account of what moves the nation at a given point in time, a valuable exercise since the ups and downs of issue attention can yield real economic consequences. Still, the media representation of social reality is different from the real thing. That's why we talk of uncertainty *perception*, not of uncertainty itself (or policy uncertainty). From this starting point, we discussed which news publications should be considered for economic analyses, how to compile a corpus, and how to apply the topic modelling approach Latent Dirichlet Allocation (LDA) according to our research experience.

What should we expect regarding the *perception of uncertainty*? People's convictions are sticky; when the facts change it takes a while until perception follows. A time-lag occurs because processing information is costly, and fully appreciating the implications takes time and effort. Following Kahneman (2011) one would assume a two-phase pattern: immediate reactions to news should be pronounced, if they are negative, attached to easy-to-grasp images and/or prejudices, if they fit into a narrative we are already familiar with – i.e. if they are driven by “system 1” thinking, the more atavistic cerebral mode that is fast and impulsive. In order to change our perception of uncertainty, humans need time to process new information; the reasoning mode of “system 2” thinking is slow, considerate, and skeptical; furthermore, it lets people adapt to a new situation and plan accordingly. Reading shocking news in the morning paper should induce immediate reactions, which can prompt individuals to resort to inactivity. After a while they start adapting, both in their perception and their actions.

Hypothesizing about the effects of the UPI on individuals, we would think that they most likely react to *changes in the level of uncertainty*. After a time-lag which they need to recognize the shock and realize the effect it may have, they tend to adapt to a given level of uncertainty, absent extreme circumstances such as outright war. The effects of a *one-off uncertainty shock* on economic behavior should peter out over time. Furthermore, the *size* of a shock matters.

An attention-grabbing event that marks a profound and lasting change in extra-economic conditions – say, the Brexit vote of 2016 – should have economic consequences. In contrast, surprising election outcomes after which things get back to normal soon just result in *uncertainty blips* whose economic implications will hardly be noticeable. What matters is *volume* and *persistence*. An uncertainty shock must be loud and lasting to have an effect. That's why we gauge the proportion of articles that deal with economic uncertainty relative to the entirety of content, i.e. the *volume* of uncertainty relative to the surrounding noise.

Again, "A Day in a Life" offers a handy metaphor. At the very end of the Beatles song, before the noise starts hitting the ears, the singer informs us that "I'd love to turn you on".



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## **7. Appendix**

*The appendix presents the characteristics of individual topics of the model (K=14). For each topic a brief description is provided concerning its content and its relationship to our taxonomy of different kinds of economic uncertainty and the UPI. "Top Words" and "Top Texts" are mentioned, i.e. the ones with the best statistical fit to the model as provided by the algorithm.*

## Topic 1: "German Politics"

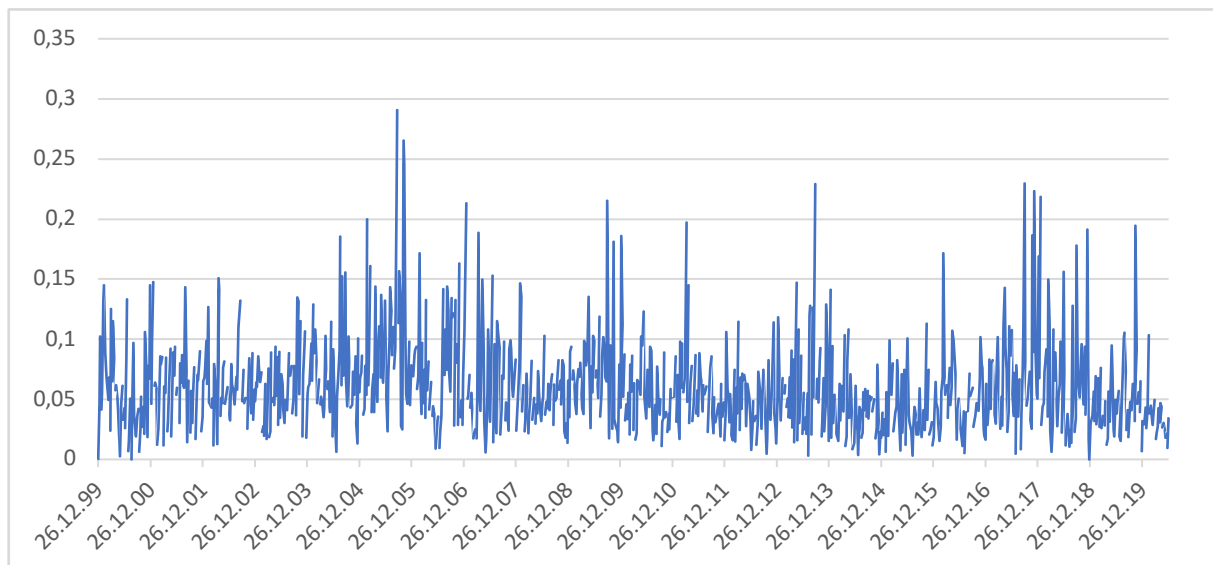
Content: Political developments in Germany

Share of corpus: 6 per cent

Type of uncertainty: Economic Policy

Part of Uncertainty Factor: UPI Politics

Fig. A.1 and Table A.1: German Politics



| Top Words | Top Texts |                 |  |
|-----------|-----------|-----------------|--|
|           | Medium    | Publishing Date | Headline   |
| SPD       | SZ        | 2009-09-05      | SPD und Linke verabreden sich mit den Grünen; Sondierungsgespräche in Thüringen sollen zu dritt geführt werden - CDU-Veteran Vogel wirkt auf große Koalition hin           |
| Merkel    | Welt      | 2001-09-17      | Otto Schily führt die SPD in die Bundestagswahl  |
| CDU       | Welt      | 2001-11-26      | Hasenclever verlässt die Grünen  |
| Partei    | Welt      | 2010-08-03      | „Noch Fragen?“   |
| Koalition | Welt      | 2012-05-15      | Seehofer rebelliert gegen Merkel   |
| FDP       | Welt      | 2005-11-02      | CSU bangt um ihren Einfluss  |
| Union     | Welt      | 2003-12-10      | Koalition geplatzt Neuwahlen in Hamburg  |
| Grünen    | SZ        | 2002-10-09      | Steinbrück wird neuer Ministerpräsident in NRW; Der jetzige Finanzminister soll am 6. November zum Nachfolger von Wolfgang Clement gewählt werden - Entscheidung fiel spät |
| Schroeder | HB        | 2004-02-16      | Burgfrieden  |
| CSU       | SZ        | 2003-09-29      | SPD-Rebellen droht Rauswurf; Abgeordnete fordern Mandatsverzicht - Schröder warnt vor Verlust der Regierungsmacht  |



## Topic 2: Financial Markets I

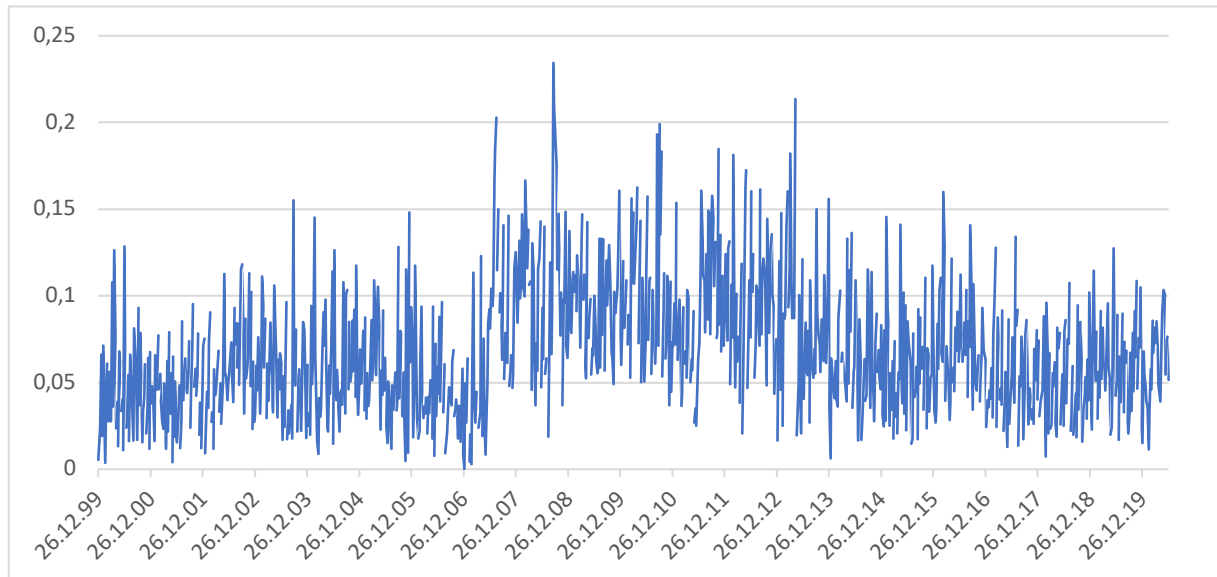
Content: Private Investing, financial market developments

Share of corpus: 7 per cent

Type of uncertainty: Market-based

Part of Uncertainty Factor: UPI Financial Markets

Fig. A.2 and Table A.2: Financial Markets I



| Top Words  | Top Texts |                 |   |
|------------|-----------|-----------------|---|
|            | Medium    | Publishing Date | Headline  |
| Banken     | HB        | 2012-07-27      | Die langfristige Alternative  |
| Bank       | Welt      | 2011-09-07      | Lebensversicherungen bringen immer weniger  |
| Fonds      | Welt      | 2010-08-11      | Rendite sinkt deutlich  |
| Anleger    | Welt      | 2018-01-29      | Schön in der Theorie  |
| Geld       | HB        | 2000-09-08      | Die Rückkehr der Hedge-Fonds  |
| Euro       | SZ        | 2010-04-16      | Desaster bei Morgan Stanley schockiert Anleger; Experten geben Entwarnung: Massive Verluste sind bei deutschen Immobilienfonds und Portfolios der Rentenversicherer nicht zu befürchten |
| Investoren | Welt      | 2011-10-29      | In Ruhe überlegen   |
| Kunden     | HB        | 2002-06-17      | GELDTICKER  |
| Aktien     | HB        | 2011-10-11      | Anleger achten in der Eurokrise auf die Bonität   |
| Anleihen   | Welt      | 2016-09-12      | Baustein im Depot   |

### Topic 3: Human Resources, Career

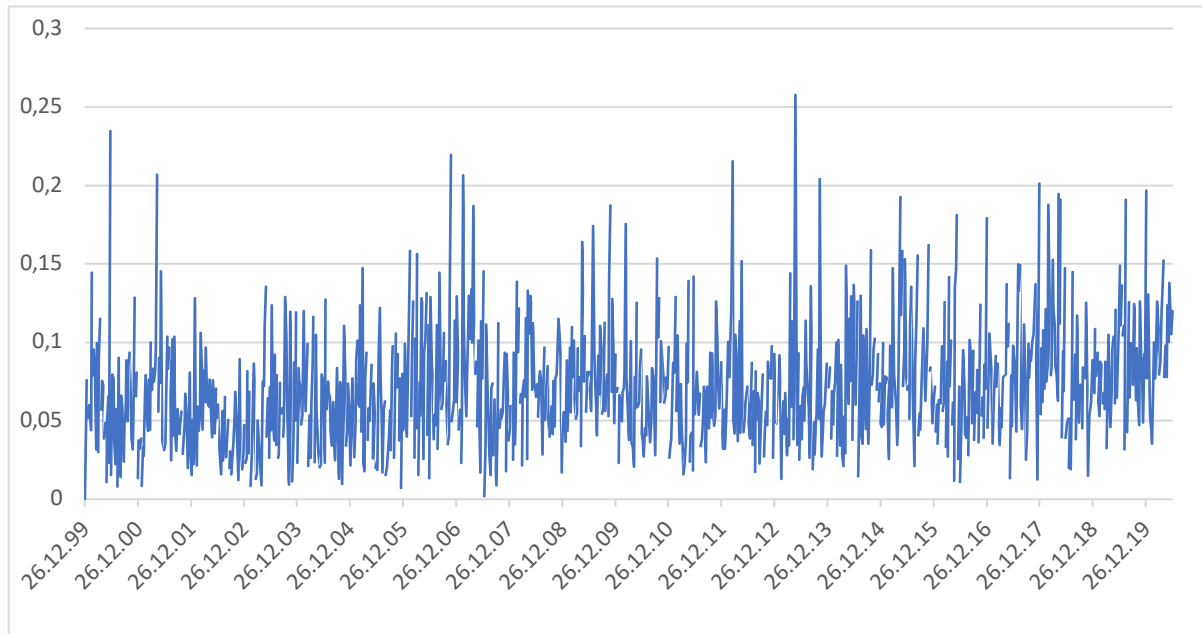
Content: Education and Knowledge, Career issues

Share of corpus: 7 per cent

Type of uncertainty: Market-based, Economic Policy

Part of Uncertainty Factor: UPI Real Economy

Fig. A.3 and Table A.3: Human Resources, Career



| Top Words   | Top Texts |                 |  |
|-------------|-----------|-----------------|--|
|             | Medium    | Publishing Date | Headline   |
| Unternehmen | HB        | 2008-03-14      | Wirtschaft unterstützt Schüler bei der Studienwahl   |
| Mitarbeiter | SZ        | 2015-04-11      | Bildung Kompakt Studium: Neuer Bachelor Angewandte Informatik ++ Berufswahl: Pläne nach der Schule durch Ausprobieren konkretisieren   |
| Internet    | Welt      | 2015-11-12      | Sich finden lassen   |
| Frauen      | SZ        | 2010-03-12      | Auf der Suche nach den eigenen Talenten: Unternehmerin hilft Jugendlichen bei der Entdeckung ihres beruflichen Potenzials - Doppelter Abiturjahrgang kann besonders von professioneller Beratung profitieren |
| Kunden      | SZ        | 2004-10-27      | Keine Angst vor dem Bachelor; Absolventen der neuen Studiengänge haben gute Aussichten auf einen Job   |
| Daten       | SZ        | 2018-11-06      | Kooperiert jetzt!  |
| Studenten   | Welt      | 2010-10-14      | Businessplan statt Stundenplan   |
| Firmen      | Welt      | 2010-11-11      | Mehrfachbewerbungen machen Planung schwer  |
| Arbeiten    | HB        | 2008-04-25      | Pauken bis zehn Uhr abends   |
| Arbeit      | SZ        | 2018-11-06      | Kooperiert jetzt!; Noch hat die Mehrheit der Mittelständler keinen Kontakt zu den Start-ups. Das muss sich ändern, meinen beide Seiten   |

## Topic 4: Central Banks

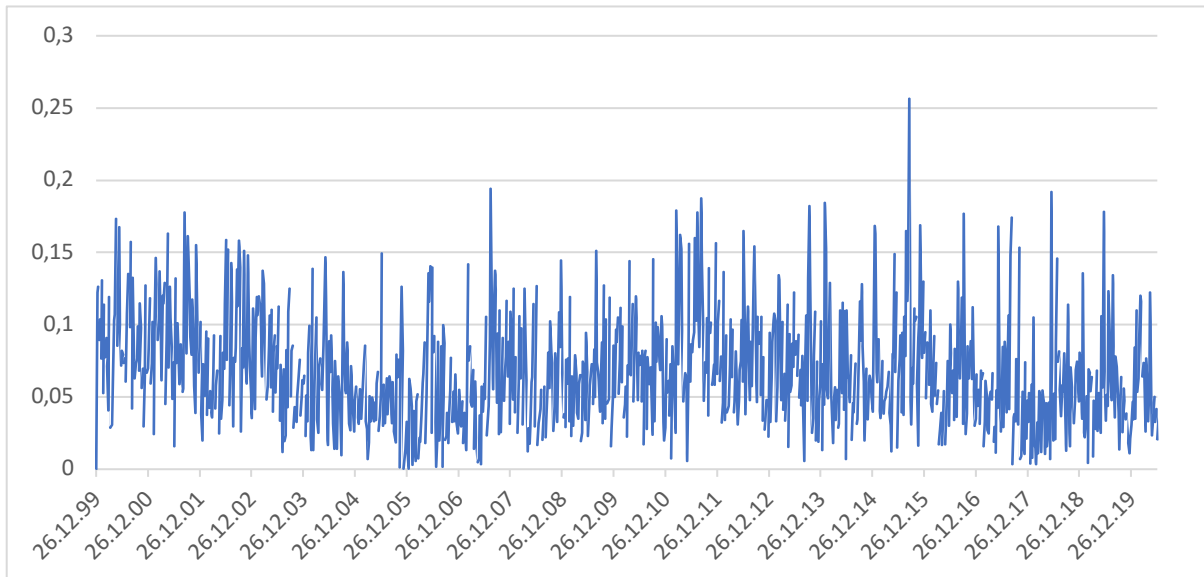
Content: ECB, Fed etc., actions against crises

Share of corpus: 6,8 per cent

Type of uncertainty: Economic Policy

Part of Uncertainty Factor: UPI Politics

Fig. A.4 and Table A.4: Central Banks



| Top Words   | Top Texts |                 |  |
|-------------|-----------|-----------------|--|
|             | Medium    | Publishing Date | Headline   |
| EZB         | HB        | 2009-01-08      | US-Notenbank belebt Debatte um Inflationsziel  |
| Dollar      | HB        | 2002-11-13      | EZB hält Irak-Krieg für größtes Wirtschaftsrisiko  |
| Zinsen      | SZ        | 2007-09-07      | EZB verzichtet auf Zinserhöhung; Zentralbank will Finanzkrise bekämpfen - Inflation weniger bedrohlich   |
| Zentralbank | Welt      | 2004-10-08      | Konstante Leitzinsen in der Euro-Zone  |
| Geldpolitik | Welt      | 2015-07-16      | Pessimismus in Japan   |
| Notenbank   | HB        | 2009-11-06      | Trichet erwartet für 2010 leichte Erholung   |
| Fed         | HB        | 2013-07-05      | Draghi's nächstes Versprechen  |
| USA         | HB        | 2015-09-18      | "Niedrigzinsen können kein Dauerzustand sein"  |
| Inflation   | HB        | 2007-10-17      | Bernanke: "Lage etwas besser"  |
| IWF         | SZ        | 2007-03-07      | EZB lässt sich von Börsen-Turbulenzen nicht beirren; Ökonomen rechnen mit Fortsetzung des Zinserhöhungskurses am Donnerstag - Noch kein Ende des Straffungszyklus in Sicht |

## Topic 5: EU Conflicts

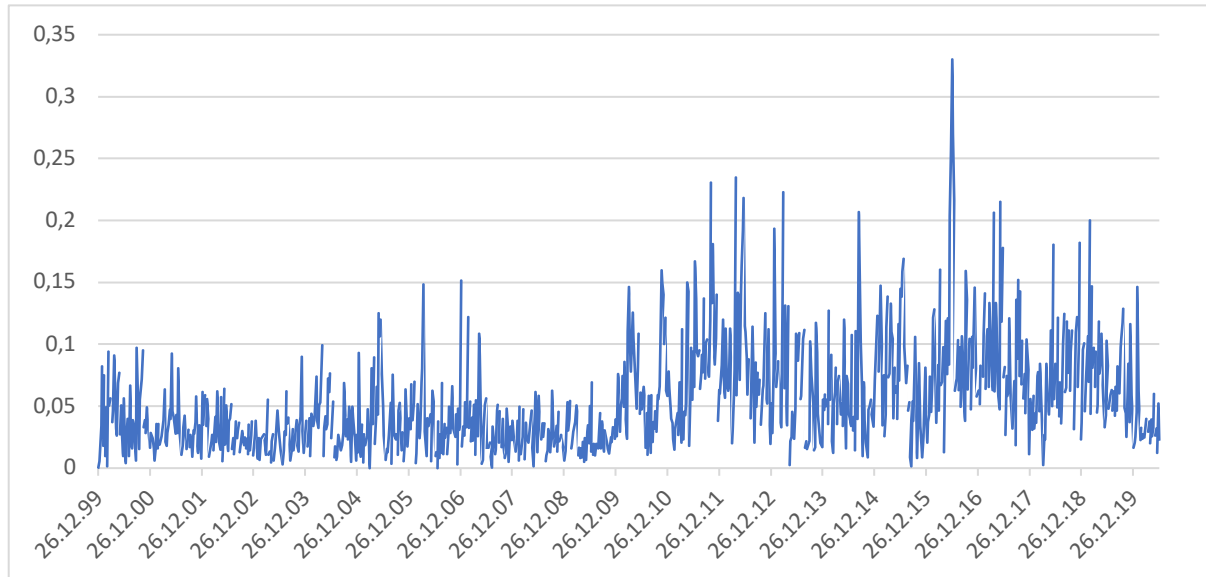
Content: Brexit, Greece debt etc.

Share of corpus: 5,6 per cent

Type of uncertainty: Economic Policy

Part of Uncertainty Factor: UPI Politics

Fig. A.5 and Table A.5: EU Conflicts



| Top Words      | Top Texts |                 |  |
|----------------|-----------|-----------------|--|
|                | Medium    | Publishing Date | Headline   |
| EU             | Welt      | 2019-02-28      | Ungarns Rating in Gefahr                                   |
| Griechenland   | Welt      | 2010-07-24      | EU und London feilschen um die nächste Brexit-Verschiebung |
| Regierung      | SZ        | 2019-04-06      | May macht Weg für Brexit-Aufschub frei                     |
| Europa         | HB        | 2019-02-27      | EU billigt Brexit-Vertrag                                  |
| Brexit         | Welt      | 2018-11-26      | Griechische Linkspopulisten beunruhigen die Euro-Zone      |
| Italien        | HB        | 2014-12-17      | Brexit-Verhandlungen stecken fest                          |
| europäischen   | HB        | 2017-07-31      | Chaos in London, Zweifel in Europa                         |
| Großbritannien | HB        | 2018-12-13      | May sieht keine Chance auf Abstimmungserfolg               |
| Brüssel        | SZ        | 2019-03-26      | David Cameron droht mit EU-Ausstieg                        |
| Frankreich     | HB        | 2013-01-24      | In der Sackgasse   |

## Topic 6: Miscellaneous

Content diverse, share of corpus: 10,9 per cent

**Topic 7: Companies & Markets**

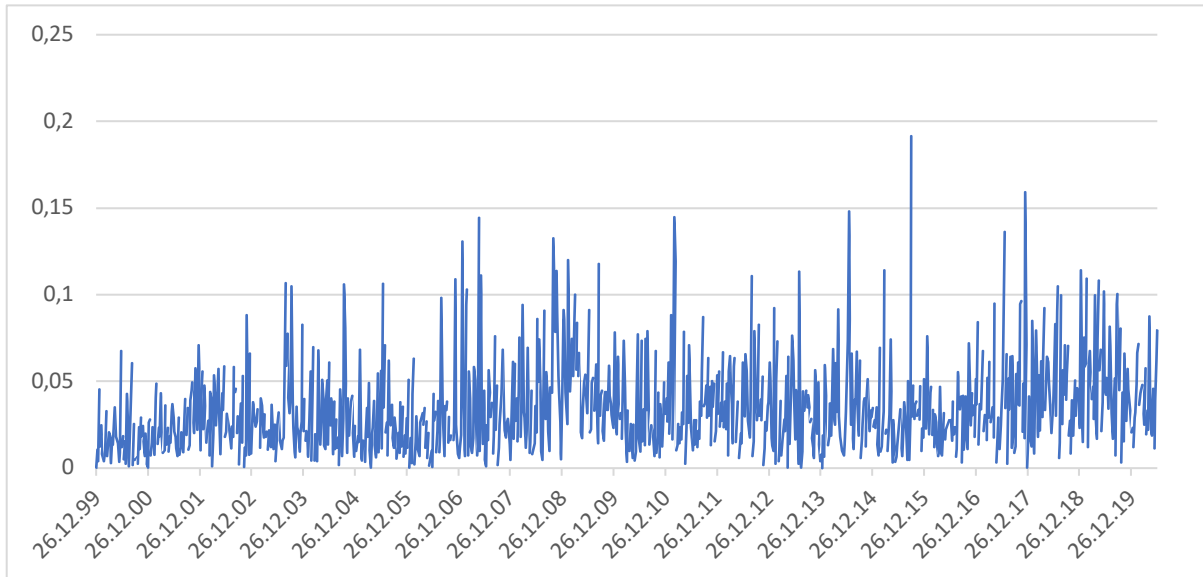
Content: German Corporates in trouble

Share of corpus: 3,5 per cent

Type of uncertainty: Market-based

Part of Uncertainty Factor: UPI Real Economy

Fig. A.7 and Table A.7: EU Conflicts



| Top Words  | Top Texts |                 |   |
|------------|-----------|-----------------|---|
|            | Medium    | Publishing Date | Headline  |
| Autos      | Welt      | 2007-08-10      | EADS-Belegschaft verunsichert   |
| VW         | Welt      | 2008-11-22      | Boeing kündigt Stellenabbau an  |
| BMW        | Welt      | 2016-11-24      | Aus der Ketchup-Flasche   |
| Daimler    | Welt      | 2001-03-24      | Bald mehr Aufträge für den Airbus A380  |
| Volkswagen | SZ        | 2003-01-15      | Airbus baut elf Maschinen im Monat; Konstante Produktion in Finkenwerder geplant - 300 Auslieferungen in 2003 |
| Semens     | Welt      | 2008-09-16      | Mehr Volt   |
| Metall     | SZ        | 2008-10-16      | Airbus nimmt Tempo raus; Flugzeugbauer stoppt geplanten Ausbau der A320-Fertigung                             |
| IG         | Welt      | 2016-09-15      | Rückschlag für „A380“   |
| Opel       | Welt      | 2008-03-01      | IG Metall fürchtet neue Kündigungen   |
| Hersteller | Welt      | 2001-07-10      | Mehr Macht im Süden   |

## Topic 8: Society

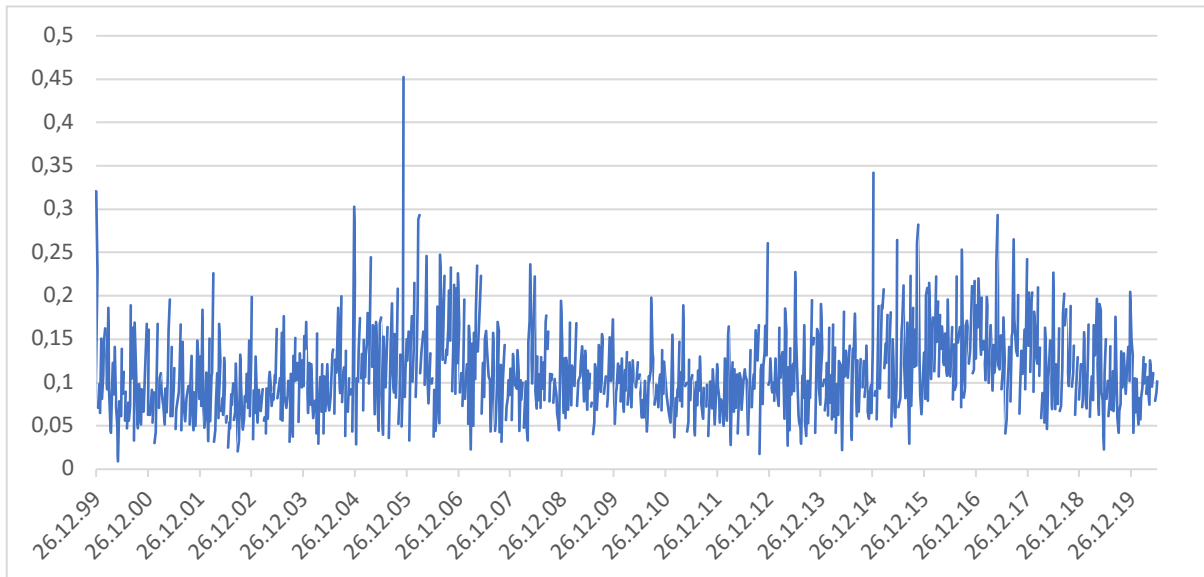
Content: Debates on Capitalism, Globalization, Democracy, Populism, Immigration, national identity

Share of corpus: 11 per cent

Type of uncertainty: Economic policy

Part of Uncertainty Factor: UPI Politics

Fig. A.8 and Table A.8: Society



| Top Words    | Top Texts |                 |  |
|--------------|-----------|-----------------|--|
|              | Medium    | Publishing Date | Headline   |
| Menschen     | Welt      | 2006-01-28      | „Der Staat schützt und stärkt“   |
| Gesellschaft | Welt      | 2002-05-13      | Amerikanisches Radieschen  |
| Politik      | Welt      | 2003-08-02      | Unerfüllbarer Wunsch nach Sicherheit   |
| Welt         | SZ        | 2000-12-23      | Wir wollen Gemeinsamkeit und Vielfalt; Was wir sind und sein wollen, das haben wir in unserem Grundgesetz mit seinen freiheitlichen Grundrechten verankert; Leitkultur-Debatte   |
| leben        | Welt      | 2006-07-22      | Die Sub-Identität bewahren   |
| heute        | SZ        | 2000-12-23      | Wir wollen Gemeinsamkeit und Vielfalt; Was wir sind und sein wollen, das haben wir in unserem Grundgesetz mit seinen freiheitlichen Grundrechten verankert   |
| Staat        | SZ        | 2018-11-01      | Es lebe der Liberalismus!; Weltweit geraten Liberale unter Druck. Gerade die FDP muss die Bedürfnisse nach Sicherheit und Zugehörigkeit ernst nehmen und lernen, sozialer zu denken, statt alles dem Markt zu überlassen |
| Deutschland  | SZ        | 2009-02-26      | Deutschlands beste Jahre kommen noch; Unsere Gesellschaft und Wirtschaft muss mehr vom Zutrauen in die menschliche Leistungskraft und dem Willen zur freiheitlichen Lebensführung getragen werden; Essay                 |
| Freiheit     | SZ        | 2001-03-21      | Was konservativ sein bedeutet  |
| Demokratie   | HB        | 2013-07-09      | German Angst   |

## Topic 9: Energy & Climate Change Mitigation

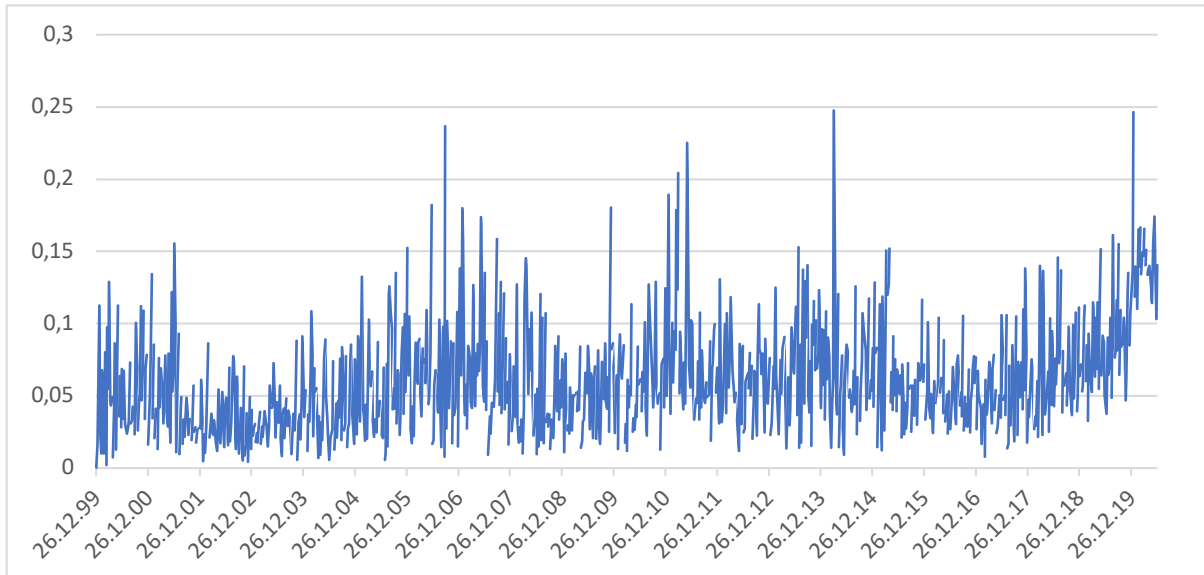
Content: Energy market developments, transition to sustainables etc.

Share of corpus: 6,1 per cent

Type of uncertainty: Market-based/Economic Policy/truly exogenous

Part of Uncertainty Factor: UPI Real Economy

Fig. A.9 and Table A.9: Energy & Climate Change Mitigation



| Top Words     | Top Texts |                 |  |
|---------------|-----------|-----------------|--|
|               | Medium    | Publishing Date | Headline   |
| Strom         | HB        | 2005-11-02      | Nur ein größeres Netz macht den Ausbau der Windkraft möglich   |
| Deutschland   | Welt      | 2019-05-11      | Warum so viele Arten aussterben  |
| Unternehmen   | SZ        | 2006-08-26      | "500 Gigatonnen Kohlenstoff sicher lagern"   |
| Energien      | Welt      | 2013-12-17      | Klimawandel konkret  |
| Industrie     | Welt      | 2007-06-05      | Andere Energien sind notwendig   |
| Energiewende  | SZ        | 2002-02-01      | In Europa nehmen heftige Regenfälle zu; Wissenschaftler verglichen 19 Klimamodelle - Überflutungsgefahr wächst |
| Energie       | Welt      | 2002-08-20      | Frieden schaffen mit Wind, Wasser und Sonne  |
| Investitionen | SZ        | 2013-02-18      | Falsche Prioritäten  |
| Gas           | SZ        | 2019-05-21      | Auf der Suche nach Alternativen zur Plastikverpackung  |
| Produkte      | HB        | 2012-11-20      | Kraftwerke werden knapp  |

**Topic 10: German Economy**

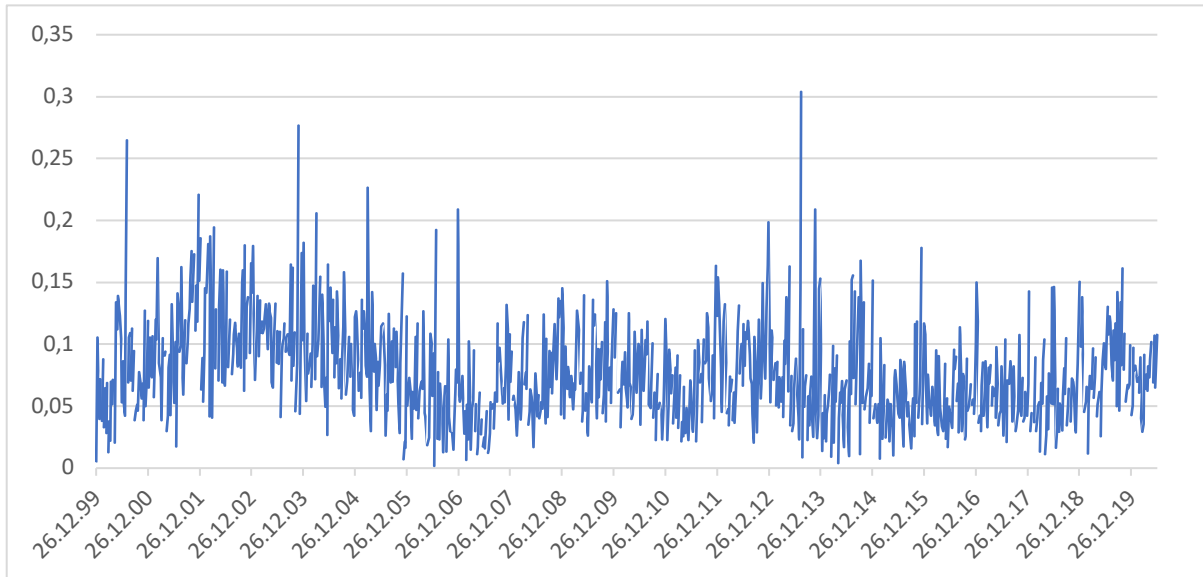
Content: Business cycle developments, forecasts, surveys

Share of corpus: 7,7 per cent

Type of uncertainty: Market-based

Part of Uncertainty Factor: UPI Real Economy

Fig. A.10 and Table A.10: German Economy



| Top Words   | Top Texts |                 |  |
|-------------|-----------|-----------------|--|
|             | Medium    | Publishing Date | Headline   |
| Jahr        | HB        | 2003-05-08      | Nachfrage nach Industriegütern dramatisch eingebrochen   |
| Wachstum    | HB        | 2010-09-29      | In Amerika bricht das Konsumklima im September ein       |
| Wirtschaft  | HB        | 2011-10-10      | Im vierten Quartal geht's abwärts                        |
| Deutschland | HB        | 2011-10-20      | Die Krise schüchtert die Firmen kaum ein                 |
| Quartal     | HB        | 2000-11-07      | Konjunktur schlägt in Deutschland langsamere Gangart ein |
| Unternehmen | HB        | 2001-11-22      | Stimmung bleibt schlecht                                 |
| Deutschen   | HB        | 2003-11-24      | US-Wachstum fällt noch höher aus                         |
| Konjunktur  | HB        | 2000-12-18      | Ifo-Klima deutet auf labile Konjunkturlage               |
| Deutsche    | HB        | 2000-12-28      | Deutsche Unternehmen verhalten optimistisch              |
| Rückgang    | HB        | 2018-08-06      | Das Geld sitzt wieder lockerer                           |



## Topic 11: Geopolitics

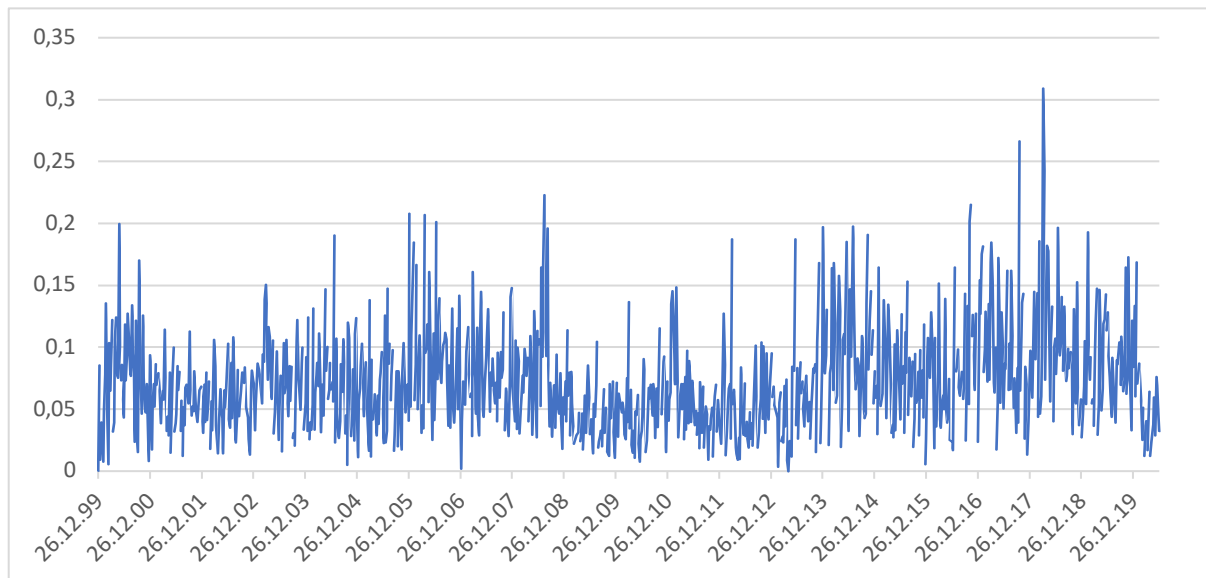
Content: Conflicts involving US, China, Russia, Turkey, Middle East...

Share of corpus: 7,1 per cent

Type of uncertainty: Economic Policy

Part of Uncertainty Factor: UPI Politics

Fig. A.11 and Table A.11: Geopolitics



| Top Words | Top Texts |                 |  |
|-----------|-----------|-----------------|--|
|           | Medium    | Publishing Date | Headline   |
| China     | Welt      | 2010-05-27      | Moskau attackiert Teheran  |
| Trump     | Welt      | 2016-08-13      | Ans Rückgrat   |
| Russland  | Welt      | 2020-03-18      | Neuer Regierungschef im Irak   |
| USA       | Welt      | 2000-10-28      | Moskau sieht Belgrad als wichtigsten Balkan-Partner  |
| Regierung | SZ        | 2018-11-30      | Amerikas Abschied als Weltpolizist; Beim G-20-Gipfel in Argentinien sehen sich die Führer der Welt mit einer neuen Herausforderung konfrontiert: einer immer fähiger agierenden Ordnungsmacht USA, die keine globalen Normen mehr durchsetzen will |
| Land      | HB        | 2000-08-25      | In Afrika trifft Bill Clinton auf bekannte Probleme  |
| Türkei    | Welt      | 2011-12-27      | Südkorea nutzt die Chance nicht  |
| Präsident | Welt      | 2013-04-05      | Irakischer Flächenbrand  |
| Dollar    | Welt      | 2016-10-22      | Philippinen auf Schlingerkurs  |
| Peking    | Welt      | 2018-06-04      | Trumps Nordkorea-Volte   |

## Topic 12: Financial Markets II

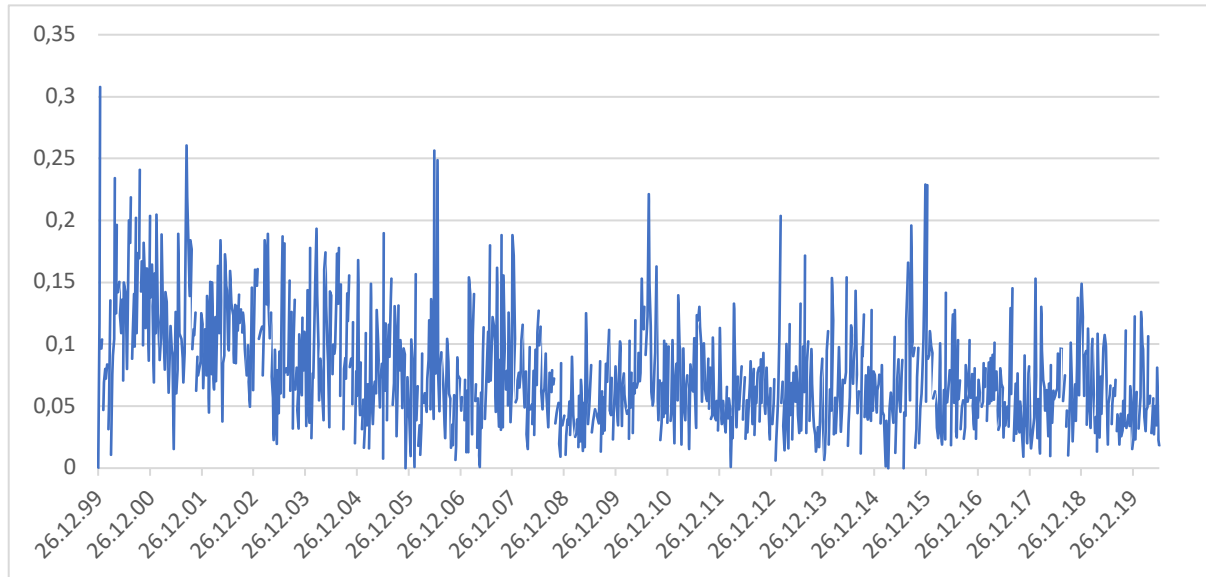
Content: Up and down at the bourses

Share of corpus: 7,6 per cent

Type of uncertainty: Market-based

Part of Uncertainty Factor: UPI Financial Markets

Fig. A.12 and Table A.12: Financial Markets II



| Top Words  | Top Texts |                 |   |
|------------|-----------|-----------------|---|
|            | Medium    | Publishing Date | Headline  |
| Aktien     | HB        | 2003-01-27      | Skepsis bestimmt Aktienmärkte                                       |
| Anleger    | HB        | 2000-09-22      | Hertz-Titel steigen nach Angebot von Ford                           |
| Dax        | HB        | 2000-10-11      | Anleger halten sich weiter zurück                                   |
| Dollar     | SZ        | 2012-06-02      | Aktienmärkte brechen drastisch ein; Euro sinkt auf Zwei-Jahres-Tief |
| Analysten  | Welt      | 2000-12-02      | Euro über 0,87 US-Dollar  |
| Börse      | Welt      | 2001-03-15      | Baisse rund um den Globus   |
| Börsen     | Welt      | 2001-09-20      | Aktien geben nach   |
| Kurse      | Welt      | 2002-04-27      | Wall Street unentschlossen  |
| Investoren | Welt      | 2003-01-23      | Dax gibt nach   |
| Gold       | Welt      | 2003-02-08      | Dax auf Tiefstand   |

### Topic 13: Big Business

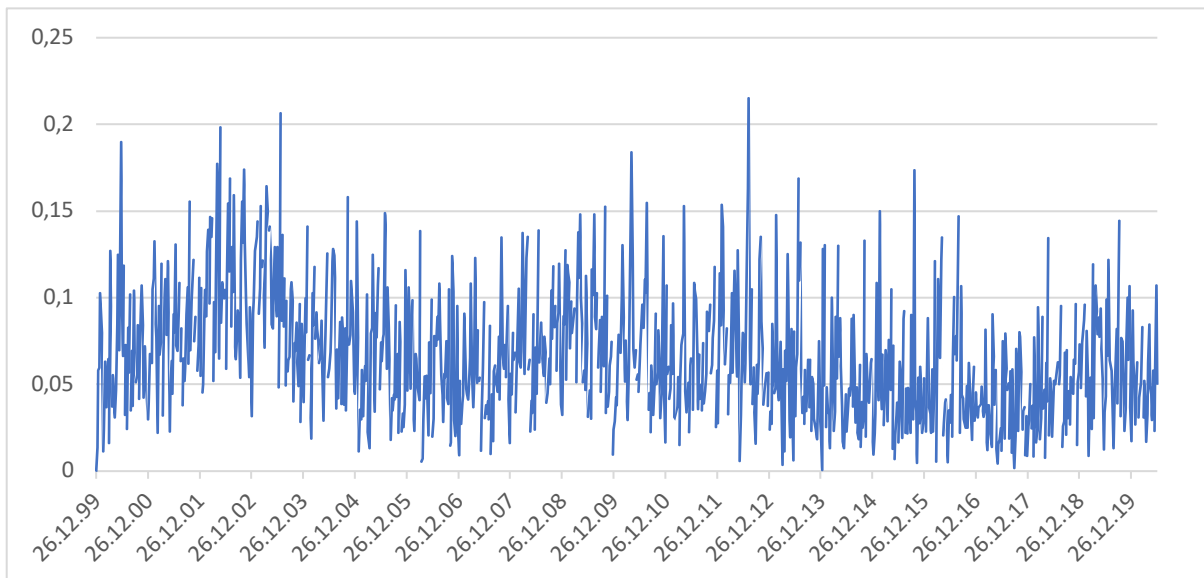
Content: Developments at quoted international corporates

Share of corpus: 6,6 per cent

Type of uncertainty: Market-based

Part of Uncertainty Factor: UPI Real Economy

Fig. A.13 and Table A.13: Big Business



| Top Words   | Top Texts |                 |   |
|-------------|-----------|-----------------|---|
|             | Medium    | Publishing Date | Headline  |
| Euro        | HB        | 2002-04-29      | Bayer startet schwach ins neue Jahr   |
| Konzern     | HB        | 2001-10-11      | Motorola streicht weitere 7 000 Stellen   |
| Mrd         | HB        | 2000-11-08      | Infineon trotz guter Bilanz an der Börse unter Druck  |
| Milliarden  | HB        | 2009-11-18      | Nortel verbucht Verlust - Insolvenzverfahren verunsichert Kunden  |
| Umsatz      | HB        | 2012-07-31      | TNT Express kappt einen Teil seiner Kapazitäten in Europa   |
| Quartal     | SZ        | 2002-06-03      | EM.TV senkt die Verluste nach Sanierungsprogramm; Besseres erstes Quartal - Rechtehandel und Merchandising weiterhin in der Konjunkturlaute |
| Mio         | SZ        | 2002-04-20      | Sun Microsystems meldet hohen Quartalsverlust   |
| Unternehmen | SZ        | 2008-10-14      | Philips kündigt nach Gewinnrückgang weitere Einsparungen an   |
| Dollar      | Welt      | 2001-01-19      | Harley-Davidson fährt neue Rekorde ein  |
| Millionen   | Welt      | 2001-03-02      | ING steigert den Ertrag um ein Viertel  |

## Topic 14: Legal Risks

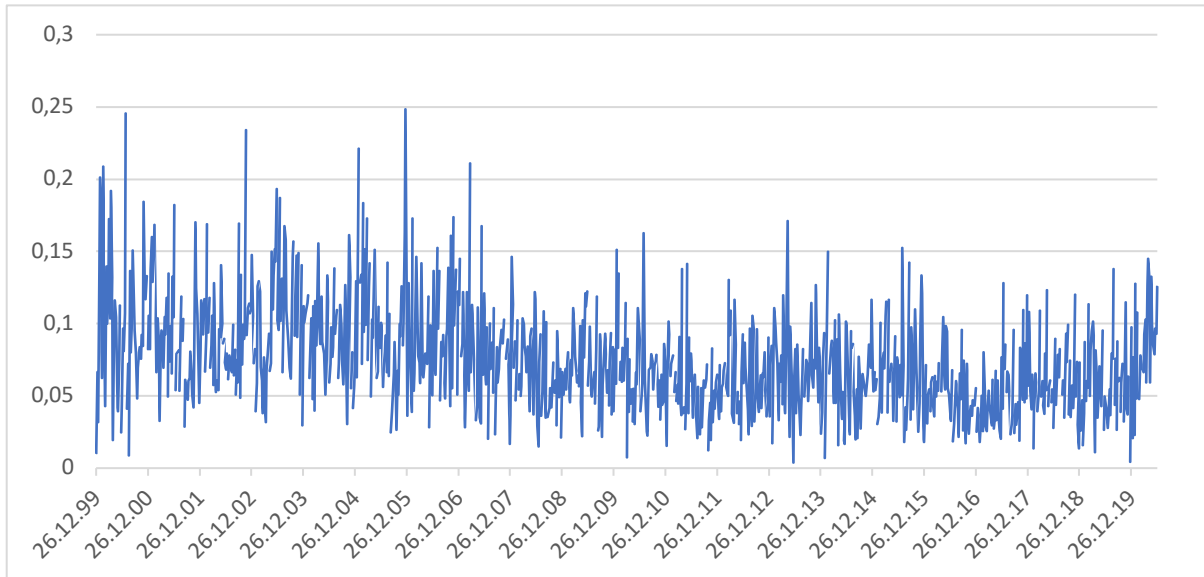
Content: Regulations and Court Rulings affecting business

Share of corpus: 7,2 per cent

Type of uncertainty: Economic policy

Part of Uncertainty Factor: UPI Politics

Fig. A.14 and Table A.14: Legal Risks



| Top Words       | Top Texts |                 |   |
|-----------------|-----------|-----------------|---|
|                 | Medium    | Publishing Date | Headline  |
| Euro            | SZ        | 2005-02-02      | Kusch startet zwei Initiativen im Bundesrat   |
| Bundesregierung | SZ        | 2002-11-19      | GAL wirft Uldall Wortbruch bei Arbeitsmarktpolitik vor  |
| Gesetz          | HB        | 2005-03-02      | Clement lenkt im Streit mit Kommunen ein  |
| Bund            | HB        | 2001-05-04      | Union lehnt Pläne zur neuen Erbschaftsbesteuerung für Betriebe ab   |
| Berlin          | SZ        | 2002-09-12      | Juristisches Tohuwabohu nach Dosenpfand-Urteil; Bund und Ländern droht Prozesslawine - 100 Verfahren anhängig - Trittin hält an Einführung fest |
| Reform          | SZ        | 2002-01-10      | Bauabzugsteuer womöglich verfassungswidrig; KPMG meldet erhebliche rechtliche Bedenken an - Grenze des Zumutbaren überschritten?                |
| Unternehmen     | SZ        | 2004-10-18      | Haus & Grund: Gesetzesnovelle bringt Erleichterungen für Wohnungseigentümer   |
| SPD             | SZ        | 2001-02-07      | Wohnungswirtschaft fordert Reform des Eigentumsgesetzes   |
| Arbeitnehmer    | HB        | 2001-05-09      | Däubler-Gmelin will Bauräger-Verträge retten  |
| Milliarden      | HB        | 2012-07-17      | Koalition plant Firmensteuerreform light  |