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# Vladimir vs. the Virus – a Tale of two Shocks

An Update of our Uncertainty Perception Indicator (UPI) to April 2022 – a Research Note

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# 1. Introduction: The next Big One

In a preceding paper (Müller et al., 2021b) we observed that economic uncertainty tends to come in waves. Once tectonic tensions have caused an earthquake, more eruptions are likely to follow. Some coming disturbances already show up on the screen once a shock has occurred, but usually it's not clear, if, how and when they're going to hit. A second type of shock seemingly comes out of the blue, but can easily be interpreted as causally related to earlier events, at least ex post. And then there's a third kind where shocks and aftershocks do not fit clear causes-consequences patterns. Even with the benefit of hindsight, there is no obvious connection – these are the cases that historians will likely wrangle about for generations.

Since the start of the millennium, the period our Uncertainty Perception Indicator (UPI) for Germany covers, we have witnessed a series of shocks (Figure 1). The first two of them were clearly interrelated: the attacks on 9/11 2001 led the US administration and their allies to wage "war on terror" in Iraq in 2003. The financial crisis of 2008 spawned the Euro crisis, peaking in 2011. The populist shocks of 2016 (the Brexit referendum in the UK and the election of Donald Trump to the US presidency) were interrelated, driven partly by the refugee crisis of 2015 and the democracy-deforming power of social media. The trade war, unleashed by the US administration, was a direct consequence of the rise of populism. However, the Covid-19 pandemic of 2020 was different: it was a clearly exogenous shock, a natural disaster, that hit the economic and the political system from outside. Covid-19 constitutes by far the biggest uncertainty event in recent history. Given the shock-aftershock pattern, it seemed likely that other disasters would follow.

In Müller et al. (2021a, pp. 10-12), written in June 2021, we speculated what might come next, namely: "new waves of Covid-19 infections"; "inflation surprises", as we reasoned, that central banks were "prone to miscalculations concerning underlying price dynamics that build up during the post-Covid recovery", potentially resulting in rapidly rising interest rates and "debt crisis in countries with high levels of foreign-currency denominated liabilities". In terms of geopolitics, we envisioned a "destabilization of societies", which could result in "souring international relations" in the wake of the Covid-19 crisis. All of these developments, we concluded, would have repercussions in an open economy such as Germany's.

Admittedly, to consider any of this possible, you didn't have to be a fortuneteller. As far as new Covid variants are concerned, that's what viruses do: mutate and often become more easily transmittable (Delta was already on the rise at the time, Omicron unheard of). Inflation was still low in June 2021, but central banks were already criticized for being too complacent. That a public health crisis of the pandemic's severity could destabilize societies was neither far-fetched nor surprising. And it was a straight forward conclusion that in such an environment international relations could indeed sour.

So, no, we didn't see the next big shock coming, that has since hit the economy – Russia's invasion of Ukraine, starting on 24 February 2022. In the summer of 2021, an aggression staged by Vladimir Putin's regime of such a magnitude was neither on the cards, nor in the newspapers, whose coverage forms the foundation of the UPI; the UPI topic "Geopolitics"

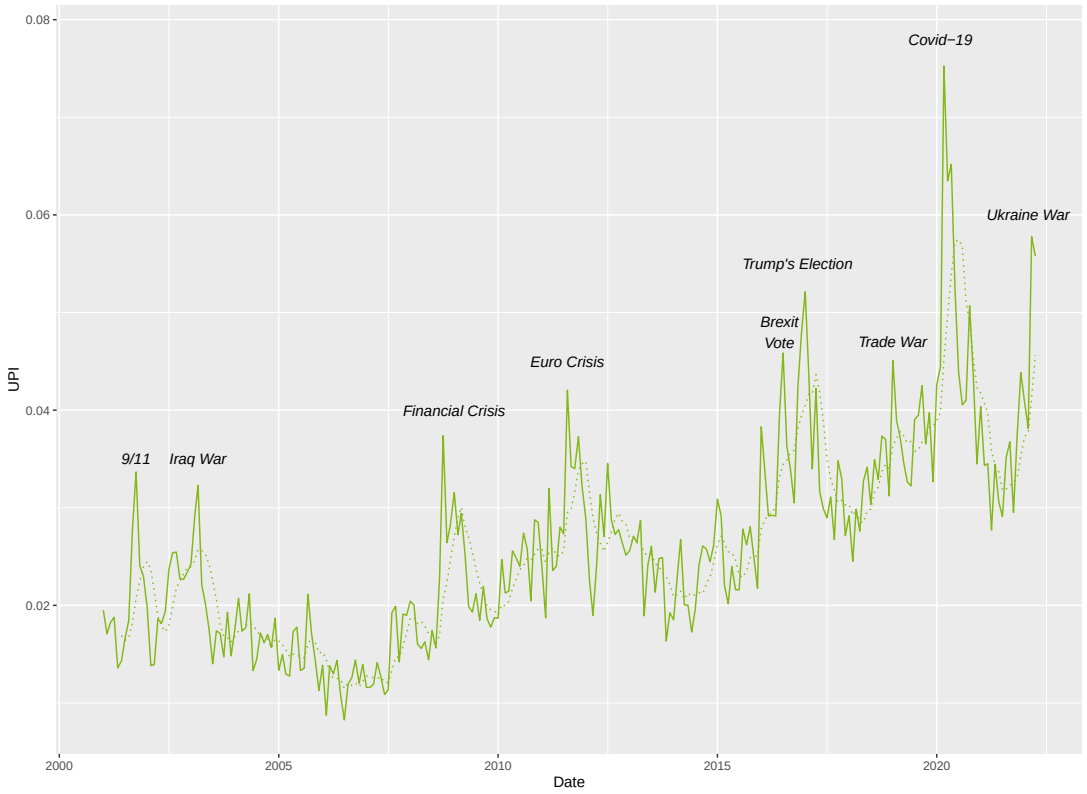


**Figure 1:** UPI overall indicator. Analysis corpus relative to entire corpus. Monthly data and six-month backward-looking moving averages

signaled relative calm (see Figure 3 on page 5).

Nevertheless, comparing the uncertainty impact of the Ukraine war and the Covid-19 pandemic respectively is of tremendous importance. After all, gauging the size of an uncertainty shock and measuring it against past ones provides economists with an idea of how badly economies could be hit this time – and what an appropriate economic policy response could look like. As of 30 April 2022, the Ukraine shock is the second biggest we have measured yet[1]. Only the Covid-19 pandemic had a stronger impact, resulting in GDP losses of roughly 5 per cent in 2020. However, the beginning of the Trump presidency in 2016 caused an uncertainty shock almost as big as the Ukraine war, without having much of an immediate economic effect – which illustrates that uncertainty shocks differ in nature and consequences. Hence, it's not only the size of a shock that matters, but also the direction from where it's coming. The UPI is designed to capture such structural aspects of uncertainty.

In this brief research note, we present an update of the UPI. Section 2 provides the most recent results, up to 30 April 2022, two months into the Ukraine war, and compares the two latest major uncertainty shocks – Vladimir vs. the Virus. Section 3 draws some conclusions. An appendix provides information on the method and the data.

[1] On a global scale, the impact of the Ukraine war is even less pronounced, as the IMF's global uncertainty indicator suggests (Ahir et al., 2022)

# 2. Results: Shocking Deconstructions

Three types of economic uncertainty can be distinguished: *market-based uncertainty* originates in the economy itself and is the result of our, at times, insufficient understanding of market mechanisms; *economic policy uncertainty* leads to economic consequence of developments in the realms of politics; *truly-exogenous uncertainty* originates outside of both politics and the economy (Müller and Hornig, 2020). News-based indicators like the UPI capture only little of the latter type. There are two reasons for this: first, the data base – journalistic articles – focusses on politics and markets. Science and culture sections of major news media may also highlight truly-exogenous developments, but they only contribute a minor share to overall news coverage. Second, indicators like the UPI are precisely constructed to detect developments that are likely to affect the economy. Hence, researchers need to filter out rather distant hypothetical threats to ensure that an indicator does not signal false alarms frequently.

Baker et al. (2016), who have popularized the use of news coverage related to economic policy uncertainty, decided to limit their Economic Policy Uncertainty Index (EPU) to pre-defined policy areas, such as monetary, fiscal and trade policy. In earlier writings, we have augmented their approach by applying a topic modelling procedure, Latent Dirichlet Allocation (Blei et al., 2003), which enables us to use a broader query and allows for the possibility of detecting not just *known unknowns* in the data, but also *unknown unknows*, emanating from beyond the realms of the economy and politics (Müller and Hornig, 2020; Müller et al., 2018). Furthermore, we have introduced a dynamic topic modelling method, RollingLDA (Rieger et al., 2021), that produces consistent time series of uncertainty-related topics (Müller et al., 2021b). Hence, the UPI does not only measure the magnitude of overall uncertainty, but also its thematic origins. (For a description of the UPI model's individual topics see Table 1 in the appendix.)

Figure 2 shows a decomposition of the UPI by Uncertainty Factors. It underlines the importance of the secular rise of the indicator after the Financial Crisis, that has largely been driven by political uncertainty. This is also true for the Covid-19 crisis, as it was not just the (truly-exogenous) virus that created uncertainty, but for and foremost the political response to it (shutdowns, border closures etc.). Pandemic-related policy measures had severe economic effects, as the other two segments of the indicator show. The pattern related to the Ukraine war looks fairly similar, though not quite as severe. In contrast, Trump winning the presidential election in November 2016 caused a *political* earthquake, but its direct effects on economic uncertainty perception were limited, as Figure 2 shows.

At first glance, it may be astonishing that the Ukraine war-related spike in the indicator is not as pronounced as the Covid-19 one, or even more so. However, consider the differences in the media narrative: the key protagonist of the pandemic was an invisible particle of RNA that brought a potentially deadly disease. The Ukraine war, in contrast, features real people: visible, relatable protagonists that perfectly fit in a friend-foe/good-bad pattern. There are heroes, villains, and victims. Media users in the West are witnessing a real-time drama, and they are inclined to pick a side. The shock is accompanied by images that are emotionally arousing and scary, given that one side in the conflict is armed with nuclear

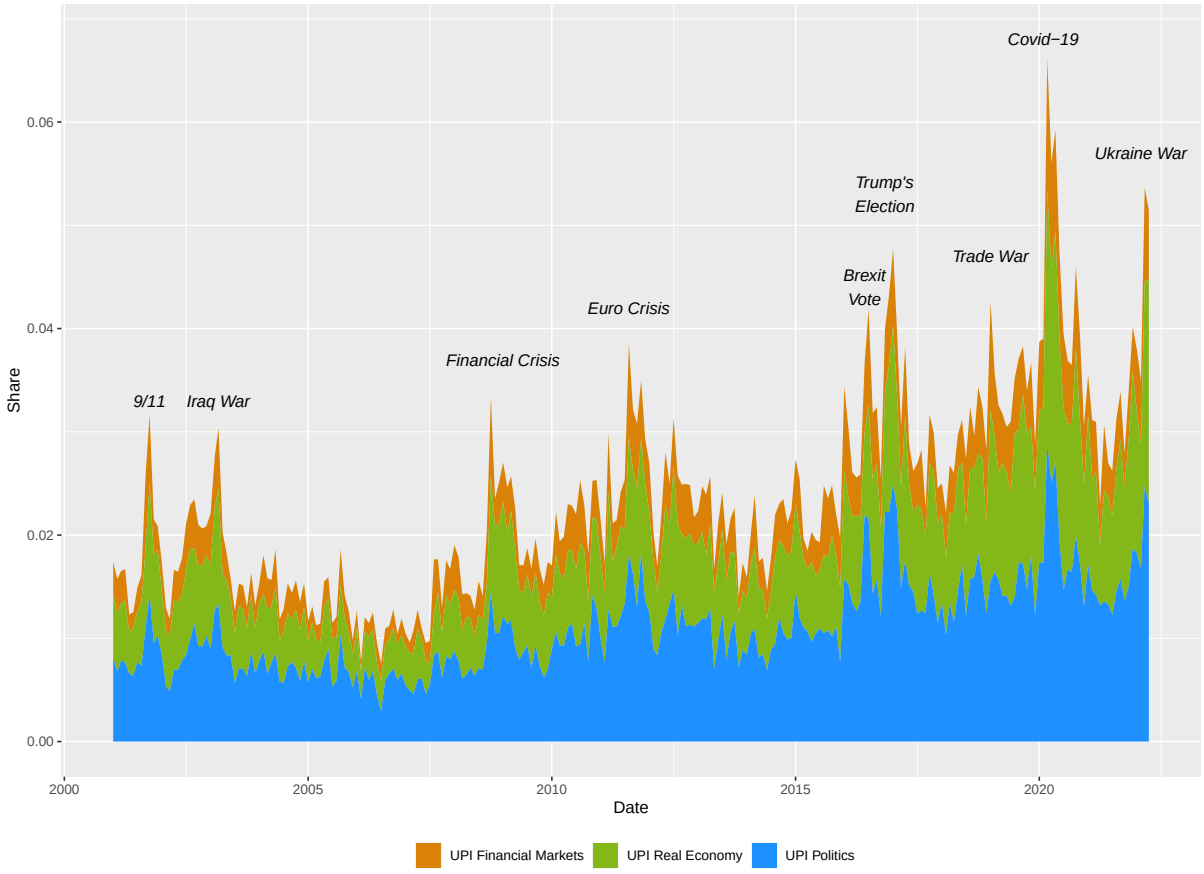


**Figure 2:** UPI – Decomposition by Uncertainty Factors. Source: Authors' calculations

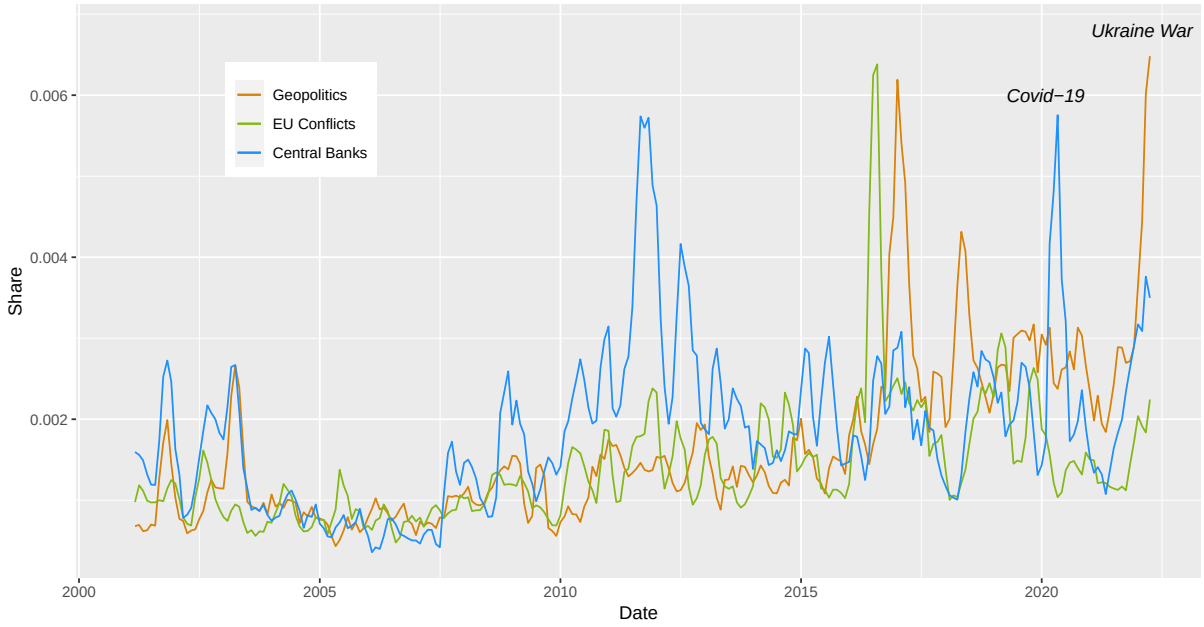


**Figure 3:** UPI Politics – European and International topics, key events. Three-month backward-looking moving average. Source: Author's calculations

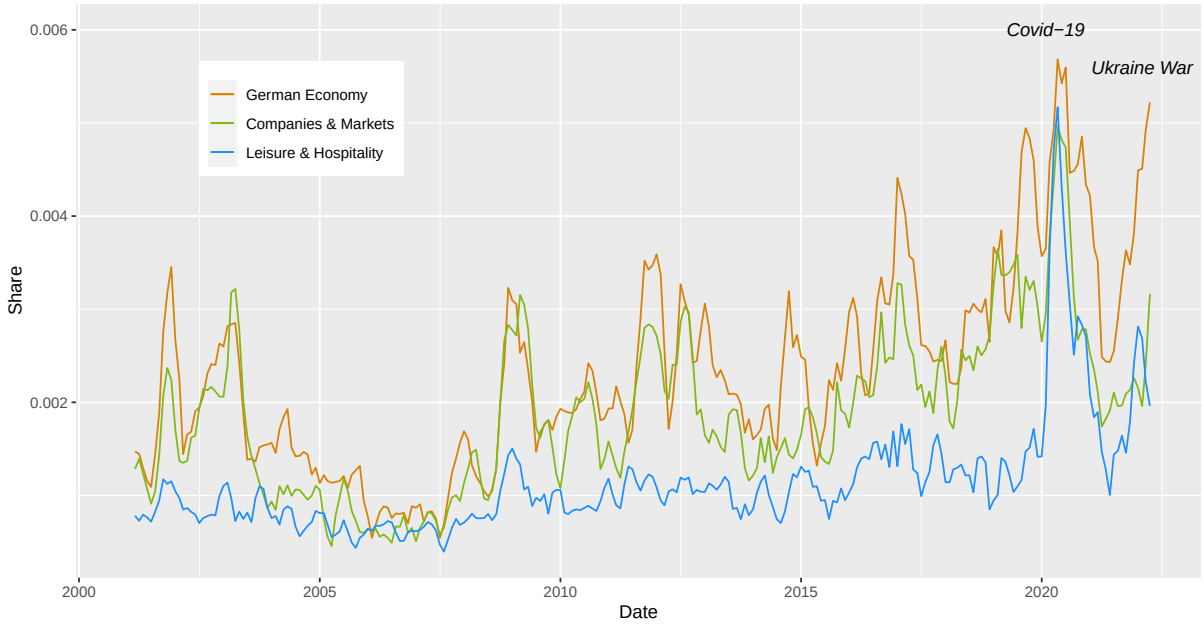


**Figure 4:** UPI Real Economy – Business Cycle-sensitive Topics. Three-month backward-looking moving average. Source: Author's calculations

weapons. Media users' personal affectedness conveyed by the war narrative magnifies the impression of the Putin shock. But in economic terms its severity is not quite as pronounced – at least not yet.

Comparing the effects on distinct political aspects, it's noteworthy that the topic "Geopolitics" has shot up to an all-time high (Figure 3). During the pandemic, however, the initial policy response was action by central banks, sending the related "Central Banks" topic upwards in crisis mode, signaling a direct impact of the shock on economic activity. The latest uptick in the "Central Banks" topic is due to the rise in inflation that took off, before the war started, in the second half of 2021. Uncertainty about the speed and effects of monetary tightening is part of the current uncertainty panorama, but to date it's rather a side-show than the main act.

At the same time, domestic politics in Germany and the EU as a whole have stayed rather calm, contrary to the Covid-19 shock when dissonances about the appropriateness of measures were considerable (Figure 7 in the appendix). The Russian aggression seems to be met with a sense of national unity and soberness, as the low levels of the fear gauge (Figure 8 in the appendix) confirm.

The impression that the Ukraine war is economically not quite es severe as the Covid-19 shock is underlined by topics related to real economic activity (Figure 4). The topic "German Economy", dealing with business cycle news and forecasts, is approaching pandemic levels, though it's driven not just by the war, but also by monetary tightening and renewed lockdowns in China as well. Other topics remain rather subdued. In contrast, during the pandemic each and every business cycle-sensitive topic shot up in sync. A sharp rise of the blue line in Figure 4 at the very end of the observation period reflects the bleak outlook that many companies gave when they presented their (mostly excellent) 2021 results in the spring of 2022. Hence, there may be more uncertainty directly affecting

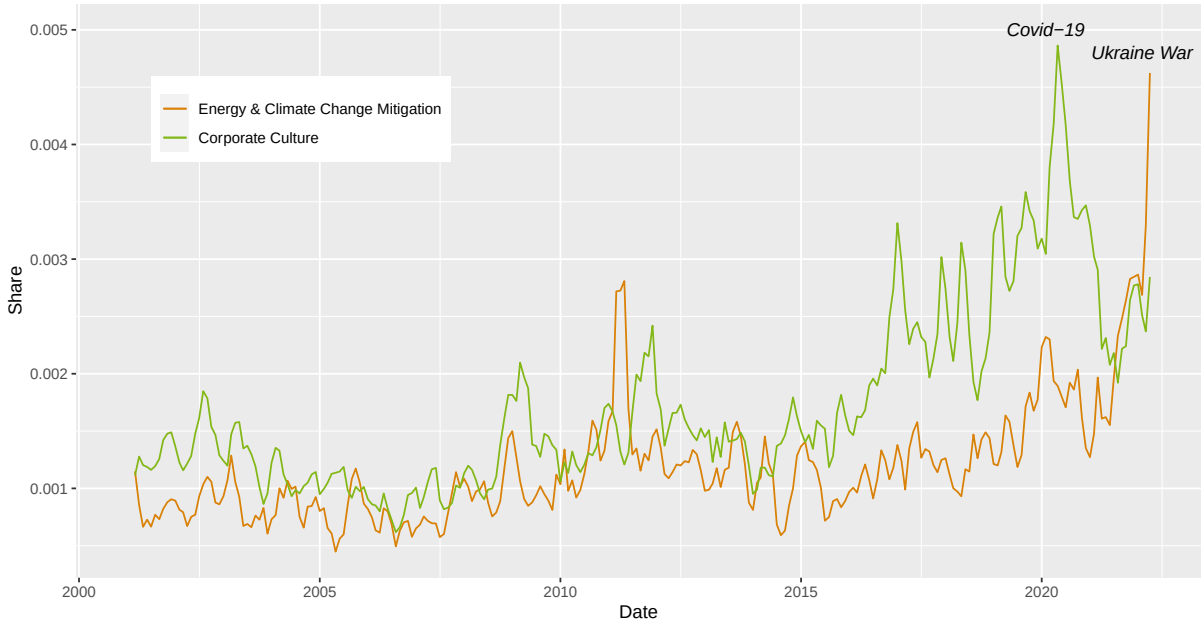


**Figure 5:** UPI Real Economy – Structural Topics. Three-month backward-looking moving average. Source: Author's calculations

the real economy coming.

The most immediate impact of the Ukraine war shock is that it's directly related to energy security and the transition towards climate neutrality. Since about half of German natural gas imports came from Russia by pipeline before the war, a cut-off, or even a slowdown, could have severe effects. This is reflected by the topic "Energy and Climate Change Mitigation" shooting up dramatically with the outbreak of the war (Figure 5). This topic laid dormant for many years. A temporary peak was caused by the nuclear disaster at Fukushima (Japan) in 2011, which led the federal government to phase out German reactors earlier than originally planned. Towards the end of the 2010s, the Fridays for Future protests triggered a heightened awareness of climate change, resulting in uncertainty concerning the social acceptability of traditional forms of power generation and prospective regulations. Now the Russian aggression has put the issue on top of the agenda.

"Corporate Culture", dealing with workplace relations and the effects of digitalization, was clearly propped up by the pandemic, but attention has turned elsewhere since.

Figure 6 provides a snapshot of the differences of the initial uncertainty impacts of the Covid-19 and the Ukraine war. The size of the columns reflects the relative deviation from long-term pre-pandemic averages during the first four months of 2020 and 2022 respectively. It's obvious that the initial uncertainty perception shock of Covid-19 is somewhat larger. Certainly, interpreting these results warrants caution as they only reflect the very beginning of the two crises.

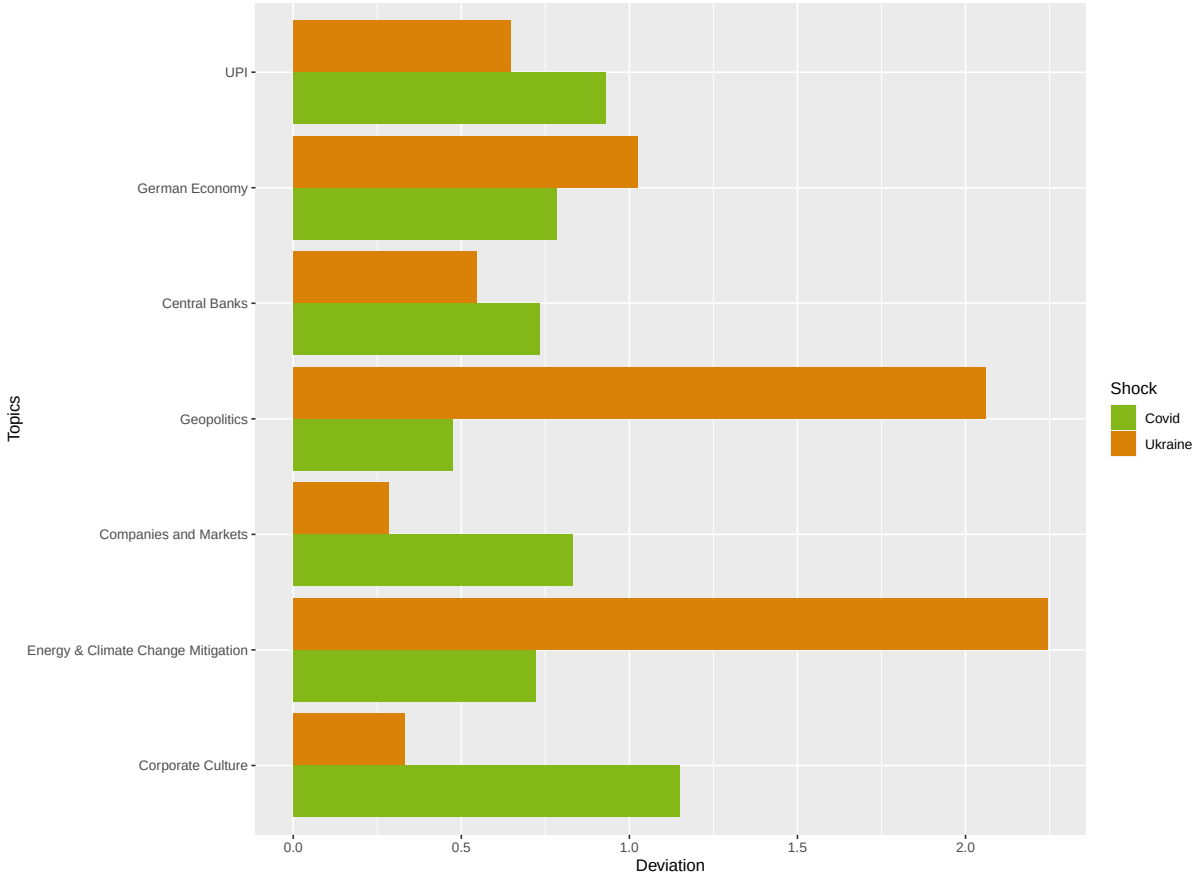


**Figure 6:** Comparing two uncertainty shocks – the Covid-19 and the Ukraine War (selected topics). Relative deviation of Jan-Apr averages in 2020 and 2022 respectively from long-term averages (Jan 2010 – Dec. 2019). Source: Author's calculations

# 3. Conclusion: The Fading of International Order

In this short research note we provide an update on the Uncertainty Perception Indicator for Germany, incorporating data to 30 April 2022. With the Ukraine war and its fall-out, the next major uncertainty shock has hit the economy, almost exactly two years after Covid-19 began spreading throughout Europe. The increase in over-all uncertainty, as measured by the UPI, is considerable, making it the second-biggest uncertainty event in our time series to date. But its characteristics suggest that the economic impact will differ from earlier political uncertainty shocks. The Brexit vote or Donald Trump's election, though they were perceived as major negative surprises at the time, had limited immediate economic effects, which came about only later, when these more fundamental political shifts resulted in concrete policies, like the trade war kicked off by the Trump administration and the UK's actual exit from the European common market. The Ukraine war, in contrast, is having more immediate consequences, illustrated by the more pronounced increases in topics associated with the real economy. Compared with the all-encompassing Covid-19 shock, the war's effects are likely to be less severe. However, this is an early preliminary assessment. At the time of writing, a further escalation of military action, energy supply disruptions, trade frictions with other economies such as China, even a

nuclear confrontation, are not out of the question, potentially worsening the economic impact to levels not experienced in generations.

At the outset of this short paper, we noted that uncertainty shocks tend to come in waves: a shock may be followed by aftershocks, as they have a causal connection. Some shocks, though, are largely independent of one another. Even with the benefit of hindsight, there doesn't seem to be a causal connection. The Russian invasion of Ukraine is a case in point. We're sure that future historians will propose explanations for the interrelatedness of both events. At the time of writing, as the war rages on, the two most recent major uncertainty shocks strike us as basically unrelated developments. The Covid-19 pandemic clearly is an outlier, the only crisis in our series that didn't originate in the economy or politics, though it had, and still has, grave economic consequences.

Seen this way, Russia's invasion is the latest manifestation of a long-term trend: a deteriorating international order, resulting in a secular increase in economic uncertainty. In earlier writings (Müller et al., 2021b) we subsumed the evidence provided by the UPI exercise and formulated an uncertainty narrative that goes like this:

> *Globalization in its different manifestations poses a threat to German society and its economy. The problems are becoming more pressing as its effects move closer to home... Germany needs to prepare for this disorderly world, but there is no consensus (yet) how to tackle the challenges.*

Episodes of this narrative include 9/11, the US invasion of Iraq, the Financial Crisis and the Euro Crisis, Brexit and the election of Trump, the trade war, and currently the Ukraine war [2]. We are witnesses of a fundamental tectonic drift in geopolitics, that is accompanied by earthquakes every once in a while, and Germany does not have a strategy to deal with this situation. Grammatically speaking, we are objects rather than subjects.

Further inquiries will focus on the econometrics of the UPI and its applications to other national public spheres. We are happy to share the data with other researchers.

[2] The pandemic, too, is the result of intensive international exchange that facilitated the virus to spread quickly around the globe. But its origins were not political.

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# Appendix

## A. Data and Method

The UPI is based on a corpus of three leading nation-wide German newspapers: Süddeutsche Zeitung (center left), Die Welt (center right) and Handelsblatt (business). The data was obtained from LexisNexis and from the publishing houses. Articles published between 1 January 2001 and 30 April 2022 are considered. The entire corpus has a size of 2.9 million texts. Following a number of preprocessing steps, an issue-specific analysis corpus is produced by applying a rather open query (Müller and Hornig, 2020):

"unsicherheit" OR "unsicher" OR "unsicherheiten"
AND "wirtschaftlich" OR "wirtschaftlich"

The subsequent analysis corpus has a size of 39 058 articles.

Methodically, the UPI is calculated by applying the topic modeling method Latent Dirichlet Allocation (Blei et al., 2003), albeit in a modified way. We identified a number of $K = 14$ topics as the most appropriate for our purpose. Accordingly, here we model $K = 14$ topics and choose as Dirichlet parameters $\alpha = \eta = 1/K$ as common, while the Gibbs sampler iterates 200 times over the dataset. The original LDA method has the far-reaching disadvantage, that the random initialization of the Gibbs sampler (Griffiths and Steyvers, 2004) can result in fundamentally different models, when run several times on the same data with identical parameter sets. To overcome this problem, for the UPI model the selection method LDAPrototype (Rieger, 2020) is applied at several stages of the process. The method solves the problem of arbitrary selection and thus improves the reliability of findings (Rieger et al., 2022). The methodology is implemented in the corresponding R package ldaPrototype (Rieger, 2020).

In addition to the LDAPrototype method for initial estimates of the model, we employ an implementation of LDA that uses preceding LDA results as an initialization for subsequent months. We make use of the method RollingLDA (Rieger et al., 2021) that iterates the collapsed Gibbs sampler over the new data only: the topic assignments of all the previously modeled articles remain constant and we obtain assignments to the existing topics solely for all new articles. The process of fitting new data to a predefined topic model is known as "seeding". For the UPI we refine the initialization approach by implementing it on a rolling basis. The first modeling step is limited to all the articles published between 1 January 2001 and 31 December 2005. These texts from the first five-year-period are modeled using the LDAPrototype procedure as described. In a second modeling step we consider the articles from the subsequent first month of 2006, i.e. the 121 articles published between 1 January and 31 January 2006. By applying the "seeding" procedure described above, we model the topic assignments to these 121 articles. However, we only use the last three quarters as memory, i.e., we initialize the model with the 1014 articles from April to December 2005. And so on. The methodology is implemented in the corresponding R package rollinglda (Rieger, 2021).

**Table 1:** Overview of Topics and Labels *(RollingLDA, prototyped, 30 April 2022, K=14)*

| No. | Label | Share (per cent) | Content | Part of Uncertainty Factor... |
|---|---|---|---|---|
| 1 | Corporate Culture | 6.6 | Trust, Technology, Entrepreneurship, Digitalization, Knowledge, Workplace, Career | UPI Real Economy |
| 2 | EU Conflicts | 5.3 | Brexit, Greece debt, democratic values, Russia, Turkey etc. | UPI Politics |
| 3 | Energy & Climate Change Mitigation | 4.6 | Energy market developments, transition to sustainables etc., Fukushima disaster (2011) as focal event | UPI Real Economy |
| 4 | Companies & Markets | 7.2 | Developments at quoted international corporates | UPI Real Economy |
| 5 | Geopolitics | 6.2 | Geopolitical tensions | UPI Politics |
| 6 | Society | 11.1 | Debates on Capitalism, Globalization, Democracy, Populism, Immigration, national identity | UPI Politics |
| 7 | Financial Markets I | 6.0 | Trouble concerning financial institutions (banks, insurance...), retail investor aspects | UPI Financial Markets |
| 8 | German Politics I | 7.0 | Structural Reforms, Labor Markets, Welfare State | UPI Politics |
| 9 | Miscellaneous | 10.1 | Diverse | – |
| 10 | Leisure & Financial Markets II | 9.4 | Retail Investor perspective | UPI Financial Markets |
| 11 | Leisure & Hospitality | 4.4 | Entertainment, arts, sports, travel, Corona-related peak | UPI Real Economy |
| 12 | Central Banks | 7.2 | ECB, Fed etc. actions against crises | UPI Politics |
| 13 | German Economy | 9.0 | Business cycle developments, forecasts, surveys | UPI Real Economy |
| 14 | German Politics II | 5.8 | Parties and governments | UPI Politics |

We combine 7 and 10, 8 and 14, due to their thematic proximity.

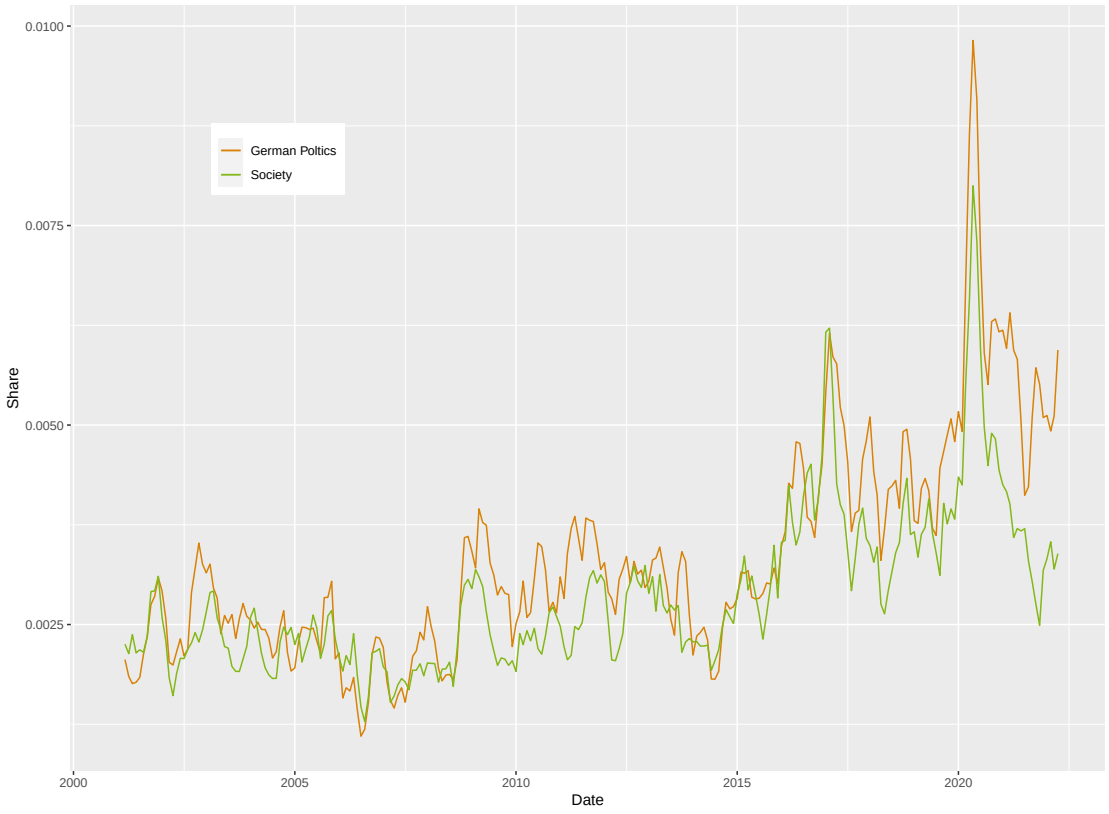


**Figure 7:** UPI Politics – Domestic Topics. Three-month backward-looking moving average. Source: Author's calculations

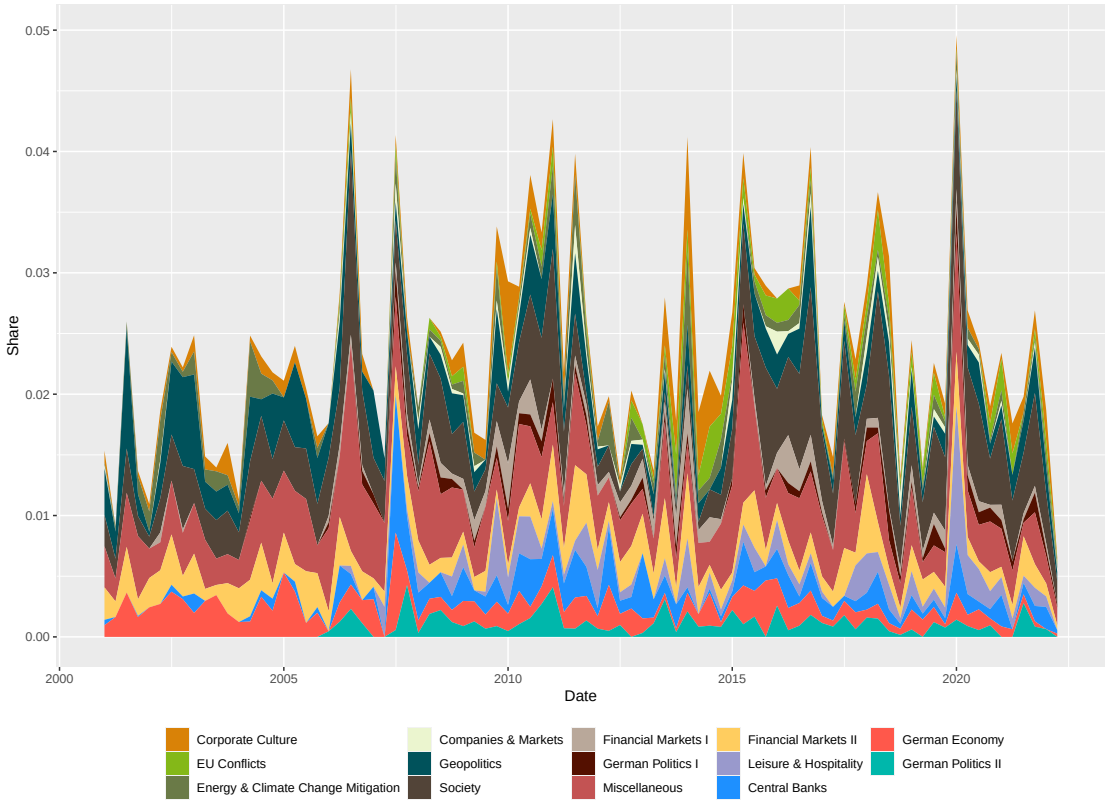


**Figure 8:** Fear Gauge. Shares of articles in UPI topics comprising the word "angst" and synonyms. Source: Author's calculations

# B. Testing the Model's Stability

Since the RollingLDA method allows topics to change over time, testing for self-similarity is warranted to ensure that no structural breaks in the underlying data render the LDA model obsolete. Figure 9 shows the similarity of the topics' word distributions over time using cosine similarity. The quarter-to-quarter similarities are shown in black, the month-to-month similarities in gray. In addition, the quarter-to-quarter similarity of the respective topic at the first time point (2001 Q1) to all following quarters is shown in blue, as well as the corresponding similarities of the last quarter (2022 Q2) to all preceding quarters in orange. It should be noted that the 2022 Q2 quarter in this case consists only of the month of April 2022. This specific calculated quarter-to-quarter similarity may therefore still change in later publications.

It is obvious that the topic "Corporate Culture" remains very stable over the entire observation period. In addition to the high similarity from quarter to quarter (between 0.75 and 0.9), a high similarity of 0.71 between the word distribution in Q1 2001 and the word distribution in Q1 2022 can be observed, i.e., there is only a slight gradual change in the topic. Topic 2 "EU Conflicts" forms the counterpart. The quarterly similarities show a rather consistent vocabulary until mid-2016 with already medium gradual change. Then, in mid-2016, a strong short-term change in the vocabulary can be observed. Subsequently, the vocabulary is much more homogeneous until the end of 2020, i.e. the topic is more stable than before. By Q1 2021, the quarterly similarity then decreases again to the level of before. This break can be explained by the strong focus of the topic on Brexit during the period before.

As an example of a topic that is subject to permanent change in the specific topic setting, Topic 3 "Energy & Climate Change Mitigation" shows the expected patterns. Driven by individual events, the topic changes comparatively strongly on a quarterly basis. A striking pattern is the declining quarterly stability of the topic from mid-2014 to mid-2018. This pattern suggests that coverage of energy and climate change related to uncertainty changed significantly from quarter to quarter. Between the second and third quarters of 2018, the vocabulary in this topic underwent a strong change due to the reporting around Greta Thunberg and subsequently stabilized increasingly until the beginning of 2022. This is likely to be due to the fact that currently the same words are frequently used in reporting on uncertainty in the energy industry.

Topic 5 "Geopolitics" reflects Russia's invasion of Ukraine. Between Q4 2021 and Q1 2022, the topic records a drop in similarity due to a major change in reporting. This is followed by a sharp increase in similarity, i.e. the vocabulary used changed little between Q1 2022 and April 2022. The impact of the Covid-19 pandemic on vocabulary can be observed most strongly in topic 11 "Leisure and Hospitality". In the first quarter of 2020, the vocabulary changed drastically. In contrast, starting in Q2 2020, it was very stable until Q1 2021 at a quarterly cosine similarity of around 0.75. For topic 8 "German Politics I" we can observe a similar pattern in a weakened form for the time of the pandemic.

All 14 topics show sufficient topic stability to be able to describe them as appropriately interpretable. All interpretable topics show no abnormalities at the current month.

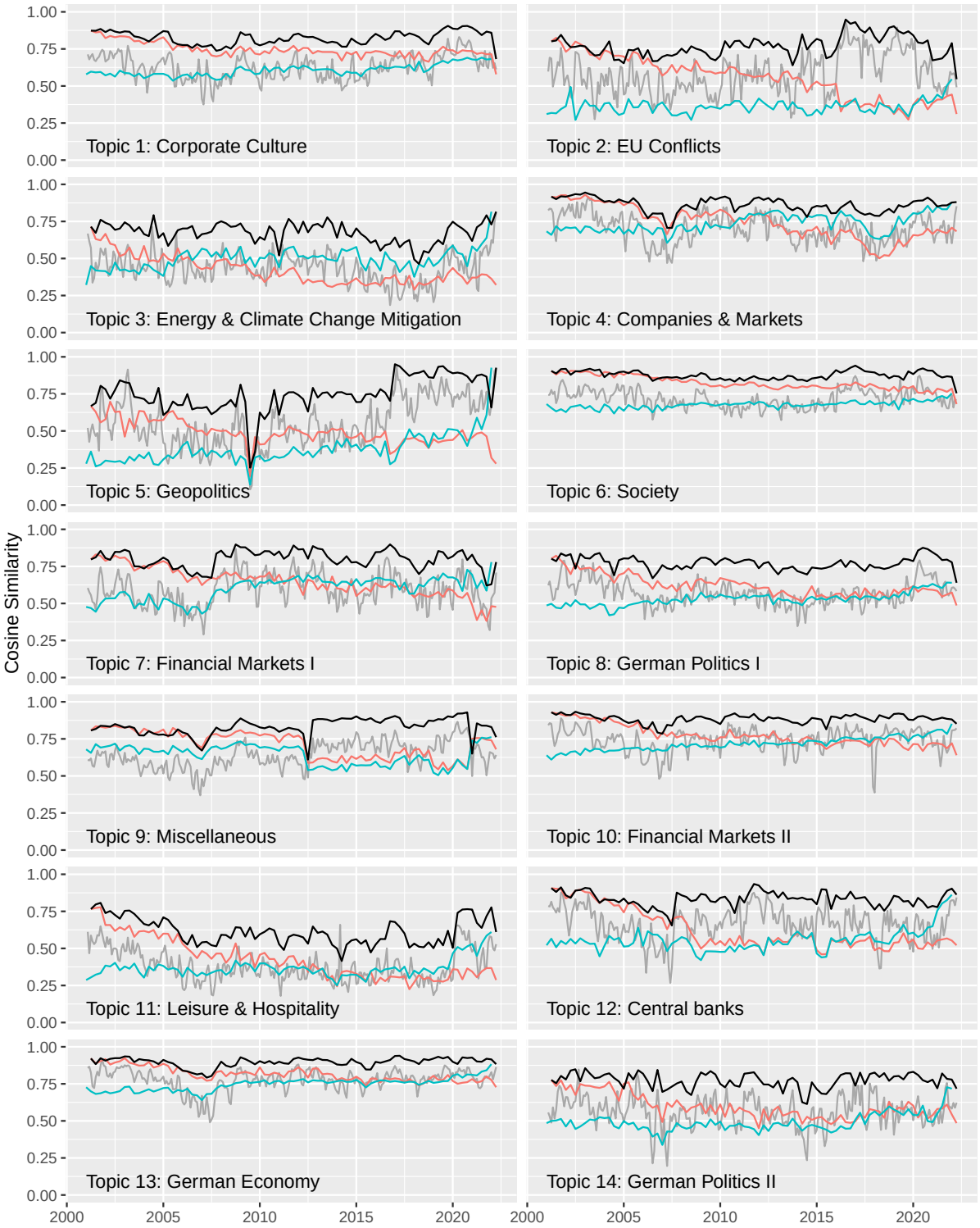


**Figure 9:** Cosine similarity of topics across different time points. Source: Authors' calculations