Uncertain Trends in Economic Policy Uncertainty

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Abstract

The news-based Economic Policy Uncertainty indices (EPU) of Germany, France, and the United Kingdom have discernible trends that can be found neither in other European countries nor in other uncertainty indicators. Therefore, we replicate the EPU index of European countries and show that these trends are sensitive to a rather arbitrary choice of normalizing the raw counts of news related to economic policy uncertainty by a count of all newspaper articles. We show that an alternative normalization by news on economic policy leads to different long-term dynamics with less pronounced trends and markedly lower uncertainty during recent uncertainty periods such as Brexit or the COVID-19 pandemic. Consequently, our results suggest that the effects of uncertainty related to these events on economic activity could have been overestimated.

1   Introduction

In recent years, there has been a widespread interest in estimating the impact of uncertainty on economic performance. Bloom (2009) and Justiniano and Primiceri (2008), among others, presented theoretical models in which uncertainty fluctuations decrease output growth, increase unemployment, and contribute significantly to overall variations in the business cycles. Fernández-Villaverde and Guerrón-Quintana (2020) provide a comprehensive survey of the literature that estimates the effects of uncertainty shocks. However, measuring uncertainty remains challenging, and multiple conceptually different indicators are used in the literature to track uncertainty in financial markets, forecast disagreements, or more general uncertainty in the economy (see Castelnuovo et al. (2017) and Ferrara et al. (2018) for surveys).

One of the most popular proxies for uncertainty in economic models is the Economic Policy Uncertainty Index (EPU) developed by Baker et al. (2016), with more than 9000 citations collected since its publication.[1] This EPU index is based on the count of newspaper articles containing a set of words associated with uncertainty related to future economic policies. The popularity of this index comes from its success in matching historical data, particularly in the United States, where increases in the EPU index indicate historical periods of economic and political instability. Moreover, the EPU index is available at a monthly frequency and for almost 30 countries, allowing many different types of analysis.

Figure 1. The Economic Policy Uncertainty of European Countries
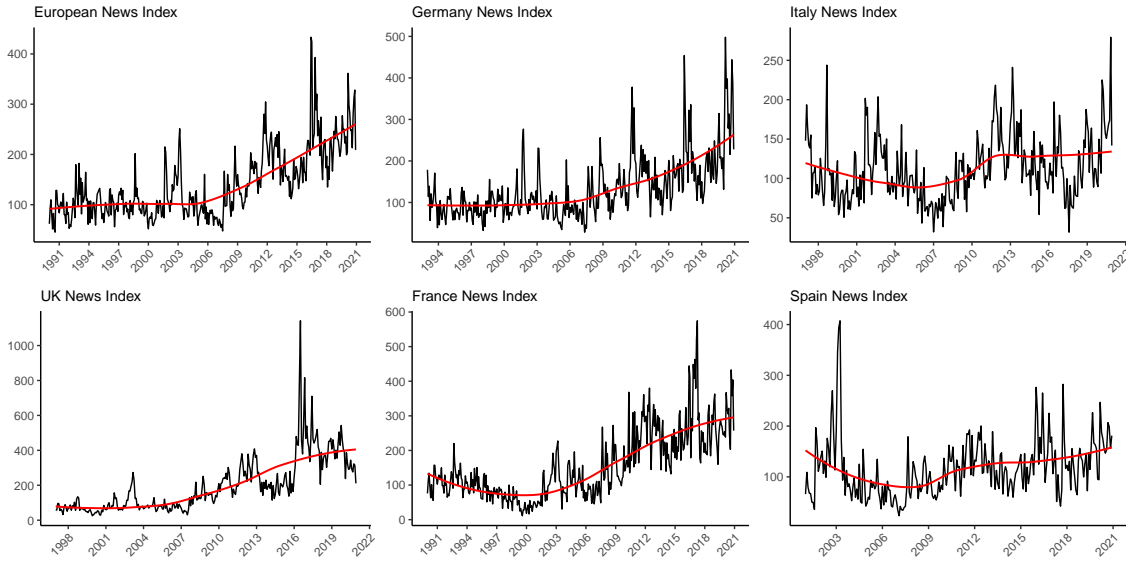
Note: Data from https://www.policyuncertainty.com/europe_monthly.html, retrieved on April 13, 2021. Trends were obtained using Loess non-parametric method.

In this paper, we focus on the properties of the EPU indices of the major European economies - Germany, France, Italy, Spain, and the United Kingdom. In particular, we focus on the long-term trends in the EPU indices that are apparent in the United Kingdom, Germany, France and the aggregate European EPU index, but not in Italy or Spain (Figure 1).[2] However, the absence of trends in Italy and Spain is counterintuitive, considering the turmoil of the EU debt crisis

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[1]Google Scholar, as of March 2023.

[2]The presence of trends is corroborated by conventional stationarity tests (ADF, ADF-GLS, and KPSS) even for the sample ending before 2020, the COVID-19 pandemic. The *KPSS test* rejects the null of stationarity for Europe, Germany, France, and the United Kingdom, but does not reject stationarity in Italy and Spain. The *ADF test* does not reject the unit root for the European EPU, France, and the United Kingdom, but rejects the unit root for Germany, Italy, and Spain. However, when we account for *heteroskedasticity* using the ADF-GLS, the unit root cannot be rejected for Germany, Italy, and Spain as well (For the results of the stationarity tests, see the Appendix, Table A1).

and subsequent political instabilities in both countries. Furthermore, the trends of the EPU are inconsistent with the uncertainty measures derived from implied volatilities in the financial markets (Figure 2), with the World Uncertainty Index of Ahir et al., 2018 (Figure 3)[3] and with other uncertainty indices developed previously.[4] Therefore, the comparison of uncertainty measures constructed through various approaches shows discrepancies and raises doubts about the reliability of increasing trends in the EPU index.

Figure 2: Economic Policy Uncertainty and Implied Volatility Indices in Europe
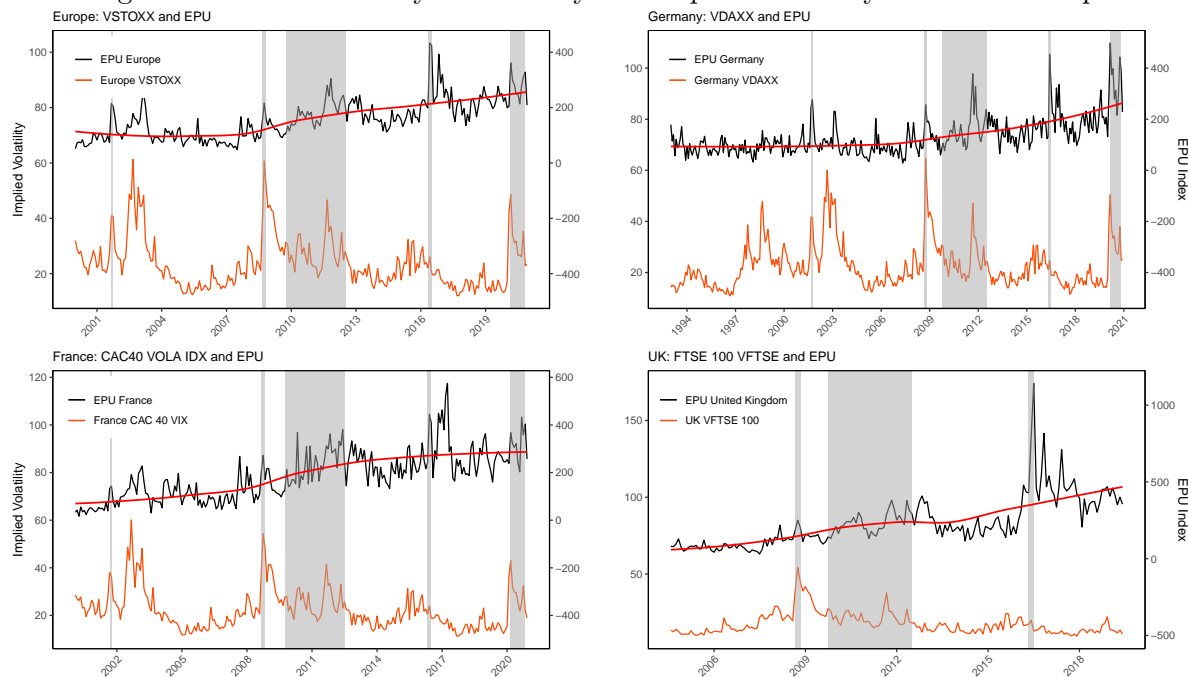
Note: Implied volatilities - red (VSTOXX, derived from the Eurozone's EURO STOXX 50, VDAX based on the German DAX index, CAC40 VOLA IDX (VCAC) based on French CAC40, and FTSE 100 VIX index (VFTSE) based the British FTSE 100 index, left axes. EPU index - **black**, right axes. Notice the trend in EPU that is not present in implied volatilities representing risk assessment on financial markets.

Our goal is to investigate why the trends in EPU arise in some countries and do not arise in others, whether these trends are reliable, and whether the values of EPU can be used for policy guidance as an indicator relevant for short-term predictions of economic activity. Thus, our main attention is devoted to the construction of the EPU index. Baker et al. (2016) first extract the raw counts of articles related to uncertainty from the leading newspapers in the

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[3]Note that in contrast to the EPU, the World Uncertainty Index (WUI) has been calculated for almost all countries in the World, which made this index appealing for cross-country analyses (Ahir et al., 2020 and 2021). However, the WUI also has several drawbacks. First, it is available on a quarterly frequency (EPU is on a monthly frequency), and the spikes in EPU appear (much) earlier than the spikes in WUI, which is admitted by Ahir et al., 2018. On the other hand, in the case of European countries, the WUI leads to more intuitive trends than the EPU.

[4]Other proxies of the uncertainty for EU countries also tend to be mean reversing. Meinen and Röhe, 2017 show the developments of the macroeconomic uncertainty indices of Germany, France, Italy and Spain in two versions of the index, one inspired by Jurado et al., 2015, the second follows Rossi and Sekhposyan, 2015. In all cases, macroeconomic uncertainties returned to pre-2008 levels by 2014. Furthermore, the forecast dispersions in production uncertainties (following Bachmann et al., 2013) returned to their pre-crisis levels in all countries except Germany, where they remained somewhat elevated above the mid-2000s levels. At the euro area level, the only two uncertainty indicators that did not return to pre-Great Recession levels were the EPU and survey-based forecast uncertainties European Central Bank, 2016. The authors link this increased uncertainty with a change in risk awareness after the Great Recession, which was not expected by the majority of forecasters participating in the surveys

countries, then divide these counts by the counts of all articles published each month.[5] This normalization was used to control for part of the variation in the counts of articles related to uncertainty that comes from changes in the count of all articles over time. However, the composition of newspaper articles and their relative counts also evolved markedly due to reasons unrelated to uncertainty. For instance, the counts of German newspaper articles in *Handelsblatt* and *Frankfurter Allgemeine-Zeitung* - which serve to calculate the German EPU - gradually decreased over the past two decades. Their composition shifted toward longer, more in-depth analyses and the overall count of articles related to economic policy increased. These changes in the composition of newspapers were driven by changes in readers', journalists', and editors' preferences due to the rising importance of online editions and social media platforms, along with possibly higher interest in economic policy after the global financial crisis. Although these changes are not necessarily caused by uncertainty, they affect the count of all articles and confound the EPU index through the denominator.

Figure 3: Economic Policy Uncertainty and World Uncertainty Indices in Europe
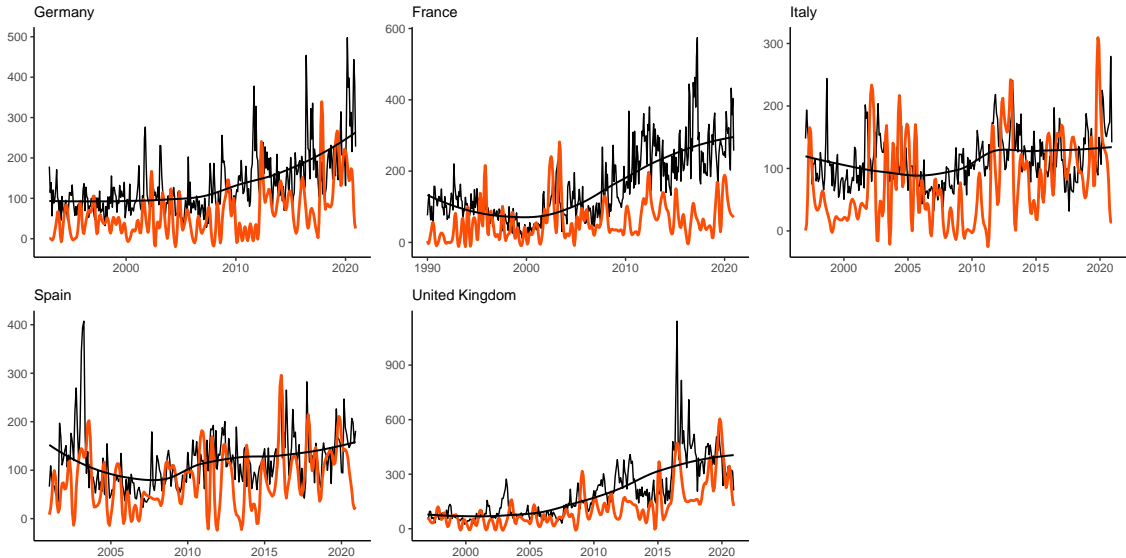
Note: The World Uncertainty Index was introduced by Ahir et al. (2018). The WUI index reflects the frequencies of the word "uncertainty" in the reports by the Economist Intelligence Unit that are scaled by the total count of words in each report. It is available on a quarterly frequency for all countries covered by the EIU reports. The values of the WUI were multiplied by 1000 to make the scale comparable with the EPU.

To disentangle the changes driven by fluctuations in uncertainty-related articles from those in the count of all articles, inputs used for scaling Baker et al. (2016)'s EPU index, we rerun the text mining procedure for the major European economies. Next, we test the sensitivity of the EPU index to alternative normalization. We take the ratio of the raw count of uncertainty-related articles to the count of economic policy-related articles instead of all articles. This alternative scaling removes the effects of structural changes in the publication policies of newspapers, as well as changes in the share of articles not related to economic policy. Although this alternative has pros and cons, the comparison between EPU indices based on two alternative normalizations shows the sensitivity of the EPU to the scaling factor that has not been discussed previously. Furthermore, we discuss the robustness of the index in relatively arbitrary changes in the selection of newspapers and databases used for text mining. To anticipate our results, we find that the trends of the EPU index are relatively sensitive to these changes, and the overall index is difficult to replicate.

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[5]To facilitate interpretation, this ratio is normalized so that the pre-2010 mean equals 100.

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Our work is closely related to the literature that discusses the properties of the EPU index and addresses potential biases in the index by refined algorithms to select articles related to uncertainty[6]. This literature employs language processing methods to select the most appropriate keywords and eliminate irrelevant articles from simple text searches. Azqueta-Gavaldón (2017) uses machine learning to eliminate irrelevant articles from those selected by a simple text search by Baker et al. (2016) for the United States; however, the differences between his uncertainty index and the original EPU are relatively minor. Then, Azqueta-Gavaldón et al. (2023) use machine learning to develop an EPU index for the euro area, Tobback et al. (2018) for Belgium, and Larsen (2021) for Norway. Charemza et al. (2022) construct the EPU index for Russia, where they extend the approach of Azqueta-Gavaldón et al. (2023) for the so-called sentiment analysis. They add specific positive and negative weights to the relevant keywords to control whether articles about uncertainty indicate increasing or decreasing uncertainty. Overall, this literature implies that a more precise extraction of uncertainty-related articles' raw count leads to EPU dynamics closer to those obtained by human evaluation of the articles. Nevertheless, this literature takes the normalization of the number of uncertainty articles with all articles as given, while our analysis shows that for some countries and the overall European EPU, the choice of the scaling factor matters.

Finally, we recommend several adjustments to the calculation of the EPU index of European countries to improve its reliability. The EPU index has the advantage over alternative uncertainty indicators in that it captures different types of uncertainty than uncertainty indices calculated based on dispersion in predictions or associated with financial instability. First, we recommend scaling the raw count of uncertainty-related articles by economic policy articles rather than all articles. Such adjustment in normalization leads to less pronounced trends and more consistent searches across databases, especially since Factiva does not allow extraction of the count of *all* articles.[7] We show that the EPU index with alternative normalization leads to a quantitatively smaller impact of uncertainty shocks on economic activity and implies lower estimates of Brexit- and COVID-related economic policy uncertainty. Second, we suggest expanding the coverage of newspapers. In the current editions, the EPU indices of European countries are based only on two leading newspapers of the respective country. Considering that adding or changing the selection of newspapers affects the overall index, two newspapers seem insufficient for reasonable, robust, and credible approximations of uncertainty. Third, preferably, the same database should be used for text mining of uncertainty-related articles to ensure consistency across countries.

The remainder of the paper is organized as follows. Section two provides more details on the construction of the Economic Policy Uncertainty Index. Section three presents a replication of the EPU index and examines the impact of alternative normalizations and newspaper selections. Section four studies the implications of alternative EPU normalizations on the quantitative effect of uncertainty shock on economic activity and Brexit-related uncertainty. Finally, section five concludes with several recommendations for handling the EPU indices.

2   The Economic Policy Uncertainty index

Baker et al. (2016) constructed the EPU index for Germany, France, Italy, Spain, and the United Kingdom from a relative frequency of articles reflecting uncertainty of economic policy

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[6]The other biases treated in this literature are related to the pitfalls connected with selecting the appropriate keywords for constructing the EPU index in non-English speaking countries. These biases are related to linguistic differences, differences in journalistic styles, conventions, and the overall social context (Charemza et al., 2022).

[7]Factiva's search engine does not allow "blank" searches to obtain all articles published in a given month. Baker et al. (2016) address this issue by searching for the word "today" instead; however, it appears that when we search for an article "a" (for Italian and French "la"), the count of retrieved articles differs (is larger) from the search results using "today."

in two leading newspapers of each country. Thus, the authors turned to full-text databases of newspaper articles and counted the articles retrieved with the following search query for each month:

> *(economic OR economy OR business OR industry OR commerce OR commercial) AND (spending OR policy OR deficit OR budget OR tax OR regulation OR "Bank of England" OR war OR tariff) AND (uncertain OR uncertainty)*[8]

This query implies that an article is considered an indicator of economic policy uncertainty if it contains at least one word from all three parts of the search query. The first subset of keywords implies that the selected articles are related to economic affairs, the second to policy, and the final refers to uncertainty.[9] To account for shifts in newspaper composition, the count of articles is normalized by the total count of articles published in a particular newspaper in a given month, that is, $x_{it} = uncertainty\ articles_{it}/all\ articles_{it}$. The ratio is further normalized by the variance of x_{it} until December 2009 to avoid the effect of new observations on the historical values of the index. Next, the ratio x_{it}/σ_i^2 is averaged across newspapers within a given country or, in the case of European EPU, across all newspapers of European countries. Finally, these averages are rescaled, so the mean until December 2009 is 100. Therefore, the EPU value of 100 reflects the average level of uncertainty in a country of interest until the Great Recession. Since the EPU for European countries usually starts in the 1990s, it mainly reflects the uncertainty during the NICE (noninflationary, consistently expansionary) decade before 2007.

The construction of the index relies on relatively strong implicit assumptions. First, it is assumed that the same keywords consistently represent the uncertainty of economic policy over time. However, the use of contemporary vocabulary for keyword selection can lead to increasing trends, as some words are used more frequently than at the beginning of the sample, for example, because of evolving importance of various institutions for the economy. Nevertheless, this assumption is not as problematic for samples spanning over a few decades as for historical EPU indices, with samples ranging over many decades. The second and more important assumption is that the relative frequency of keywords represents changes in uncertainty related to economic policy and not surges in pure interest in macroeconomic factors. Duca and Saving (2018) exploit this point and show that the EPU is not exogenous to macroeconomic developments. They argue that macroeconomic fundamentals and political fragmentation cause around 40% of long-run and short-run fluctuations in the EPU index of the US and Europe.[10] In line with these findings, Ludvigson et al. (2021) assert that uncertainty is not only a source, but also

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[8]These keywords are used for the calculation of the index for the United Kingdom. The queries for other countries are equivalent, but obviously in the languages of that particular newspaper. The exact specification of the keywords is provided in Baker et al. (2016) and this paper's Appendix.

[9]Baker et al. (2016) explain their selection in Section 2 of their paper: *"We aim to capture uncertainty about who will make economic policy decisions, what economic policy actions will be undertaken and when, and the economic effects of policy actions (or inaction) – including uncertainties related to the economic ramifications of "noneconomic" policy matters, e.g., military actions. Our measures capture both near-term concerns (e.g., when will the Fed adjust its policy rate) and longer-term concerns (e.g., how to fund entitlement programs), as reflected in newspaper articles."* To what extent the selection of keywords affected the index has been explored by Brandt (2021).

[10]*"Nevertheless, the Baker et al. (2016) index is often met with skepticism by economists who are concerned that EPU either reflects other economic factors or is so endogenous as to be meaningless. One particular and common shortcoming of studies that analyze EPU is that long-term trends in EPU are ignored or omitted. Accounting for these trends is important because they could shed light on the factors underlying time series, helping social scientists better interpret and gauge short- and long-term movements in economic policy uncertainty."* (Duca and Saving, 2018). Some skepticism toward the EPU index was also expressed in the Deutsche Bank report: *"For the European EPU index, the BBD weights the EU countries equally and does not distinguish between local and international policy uncertainty. Put differently, German newspapers writing about Brexit and associated economic uncertainty in the UK are counted towards an increasing EPU in Germany and contribute to the European index. International news coverage in local newspapers probably inflates index values during major events such as Brexit. Another caveat is the representativeness of the newspapers taken for index construction. BBD uses two major newspapers from each country which usually have a specific economics and finance focus*

a consequence of business cycle fluctuations. They highlight the importance of uncertainty in propagating other macroeconomic shocks in addition to being the primary cause of business cycle fluctuations.

Finally, Baker et al. (2016) do not control the structural changes in the newspaper industry that affect the composition and content of newspapers and thus affect the count of all articles that serves as the denominator of the EPU index. However, the composition of newspapers has evolved dramatically over the past decades partly because the Internet and social networks have taken up a large part of the market share of printed media. The online space led to a continuous decrease in the circulation of newspapers and gradual changes in their content. Short articles, such as sports news and news often reprinted from press agencies, moved to online editions. In addition, journalists shifted to more detailed and lengthy analyzes than before. Consequently, the count of articles has mostly decreased, although with varying intensity across countries and newspapers. However, even a modest drop in the count of sports articles, for example, affects the denominator, the count of all articles, and increases the EPU index independently of the count of articles related to uncertainty (nominator).[11] In addition, to attract readers, new sections were introduced; for example, new lifestyle sections were incorporated into newspapers with an exclusive focus on business and economy.[12] Overall, a significant shift in the preferences of readers, journalists, and editors materialized in the structural changes of newspapers. These changes could affect the developments of the EPU independently of the fundamental uncertainty fluctuations.[13]

3 Replication of the EPU index

3.1 Text mining exercise

To investigate the reasons behind the cross-country differences in EPU trends, we replicated the construction of the EPU index. We performed a full-text search of articles related to uncertainty as specified by Baker et al. (2016) and selected the newspapers and period as close to theirs as possible. However, minor modifications were inevitable, given the availability (or lack thereof) of newspaper archives and databases to us. Notably, the composition of the newspapers used for the EPU index also changed with time. The current edition of the European EPU available on https://www.policyuncertainty.com/europe_monthly.html is based on different newspaper selections than the index in Baker et al. (2016). We follow the EPU available online, which is regularly updated and used in the literature. Therefore, we use the term "original EPU" for the EPU on the EPU website, despite some small differences to the EPU in the published paper.

The original EPU relies on Le Monde and Le Figaro for France, Handelsblatt and Frankfurter Allgemeine Zeitung for Germany, Corriere Della Sera and La Stampa for Italy[14], El Mundo and

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Table 1: Text mining specifications of EPU

| | Newspapers | | Database | |
	Baker et al. 2016	*Replication*	*Baker et al. 2016*	*Replication*
Germany	Frankfurter Allgemeine Zeitung, Handelsblatt		Newspapers' online archives	
France	Le Monde Le Figaro	Les Echos Le Figaro	Lexis Nexis Factiva	Factiva Factiva
UK	The Times Financial Times	The Times The Guardian	NewsBank Access World News Database	Factiva Factiva
Italy	Corriere Della Sera, La Stampa		Factiva	
Spain	El Mundo, El País		Factiva	
France Sensitivity Check	Le Monde Le Figaro	Le Monde Le Figaro Le Monde Le Figaro Les Echos	Lexis Nexis Factiva	Online Archive Factiva Online Archive Factiva Factiva

Note: This table summarizes the differences in text mining between Baker et al. (2016) and this paper. For France, we performed three alternative searches, the text mining in Les Echos and Le Figaro was used as a baseline. The other searches with Le Monde served for the sensitivity analysis presented in section 3.4 for the details.

El Pais for Spain, and The Times of London and Financial Times for the United Kingdom. In the case of German newspapers, we use their online archives in line with Baker et al. (2016). For other countries, we used the Factiva database. Given the license restrictions, the selection of newspapers was adjusted. In particular, Le Monde is not available under our Factiva license, so we replaced it with the leading economic newspaper in France, Les Echos.[15] For the same reasons, instead of Financial Times, we opt for The Guardian, which Baker et al. (2016) used in calculating the Historical index for the United Kingdom.[16] Moreover, The Guardian represents a progressive political stance, while the Times of London leans towards a more conservative side. Therefore, the replicated EPU index encompasses conservative and progressive perspectives. Additionally, for the United Kingdom, Baker et al. (2016) use the NewsBank Access World News database instead of Factiva used in our replication. Consequently, the replicated indices in this paper are not based on exactly the same underlying data as those used by Baker et al. (2016). On the other hand, the changes document the sensitivity of the EPU indices, including differences in the search engine and newspaper selections. The text mining specifications are summarized in Table 1.

In contrast, we used the same search queries to obtain uncertainty-related articles as Baker et al. (2016):

[15]Baker et al. (2016) used the Lexis Nexis database to access the archive of Le Monde. However, this database was not available to us either. As a sensitivity check, we scrapped the online archive of Le Monde, and these results show the sensitivity of the EPU index on a choice of the database of newspaper articles.

[16]The Historical index for the United Kingdom is available on www.policyuncertainty.com.

Query 1: *(economic OR economy OR business OR industry OR commerce OR commercial) AND (spending OR policy OR deficit OR budget OR tax OR regulation OR "central bank" OR war OR tariff) AND (uncertain OR uncertainty)*[17]

The count of articles obtained from Query 1 was then scaled by the count of all articles or, in the case of Factiva, by articles containing the word "today" because Factiva does not permit search for all articles in a given period. To address the role of changes in newspaper composition, we propose an alternative index, referred to as *adjusted EPU* that differs from the original EPU in the denominator. Instead of dividing the count of uncertainty articles by all articles, we used the count of articles discussing economic policy, obtained using query 2, as the denominator.

Query 2: *(economic OR economy OR business OR industry OR commerce OR commercial) AND (spending OR policy OR deficit OR budget OR tax OR regulation OR "central bank" OR tariff OR war[18])*

Query 2 is equivalent to Query 1 up to the third part, with uncertainty-related keywords excluded from Query 2.

The benefit of our adjusted EPU is that normalization removes articles not related to economic policy from the denominator and infers uncertainty from fluctuations of uncertainty articles relative to the writings on economic policy. The underlying assumption of this choice of normalization is that the words in Query 2 are related to economic policy in general and do not necessarily indicate uncertainty. The first set of words *(economic OR economy OR business OR industry OR commerce OR commercial)* is less debatable than the second set of policy-related words *spending OR policy OR deficit OR budget OR tax OR regulation OR "Bank of England" OR tariff)*, and in the case of the United Kingdom, *war*. The context matters, and noise and arbitrariness are inherent in all text-mining exercises. Although there are attempts to tackle this problem with machine learning techniques, see Azqueta-Gavaldón (2017) or Charemza et al. (2022), we stick to straightforward text mining due to its transparency and for direct comparison of the impact of modified specification with the original index by Baker et al. (2016). Additionally, the counts of economic policy articles either do not increase with major events, such as the European debt crisis, or the pattern is similar to that of *all* articles. The only exception is Germany during the COVID pandemic at the end of the sample.

Our adjusted EPU, with uncertainty articles normalized by economic policy articles, is similar to Baker et al. (2014). Their work is one of the earlier iterations of the EPU index papers, where the authors discuss the long-term trends in the US EPU index. As a robustness test, they normalized the EPU index by the frequency of articles with the words *(economic OR economy)* instead of all articles. With this alternative normalization, the rise of the EPU after 2007 in the United States is not as prominent as with the baseline EPU index normalized by *all* articles. We use a more restrictive search query for the adjusted EPU to increase the chance that uncertainty fluctuations are driven primarily by articles related to economic policy uncertainty and that the impact of the evolving composition of newspapers is minimized. The comparison between replicated EPU and adjusted EPU provided in the following sections of this paper reveals qualitative and quantitative differences and how the policy implications of both indices differ.

3.2 Case studies: Raw counts for Germany, Italy, and the United Kingdom

Figure 4 presents the raw results of the three search queries to demonstrate the trends in the inputs of the EPU index for Germany, Italy, and the United Kingdom. To keep the discussion

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[17]The country-specific queries can be found in Appendix.

[18]Following Baker et al. (2016), the keyword *war* is used only for the United Kingdom and not for other countries, presumably because military spending is associated mainly with increased military spending and expansionary fiscal policy rather than with uncertainty.

concise, we skip the presentation of the raw counts of France and Spain, as their patterns are similar to those of Germany (France) and Italy (Spain). The "uncertainty-related articles" are the nominator of the index ratio, while the "all" and "Economic Policy" articles are two alternatives for the denominator.

In Figure 4a, we present the raw counts of the components of the EPU index for Germany. Since the mid-2000s, the count of uncertainty articles has increased in both German newspapers (Frankfurter Allgemeine Zeitung and Handelsblatt), in line with the EPU index, while the count of all articles decreased. Thus, the ratio of uncertainty-related articles to all articles increased partly due to a decrease in the denominator and not just because of the count of articles directly pointing towards uncertainty. Conversely, the number of articles related to economic policy, the second candidate for the denominator, increased, moving opposite the count of all articles. This result indicates that the EPU index calculated using the count of all articles as a denominator is, to some extent, driven by changes in the composition of newspapers.

Italy is an entirely different case, as shown in Figure 4b. Unlike Germany, for Italy, the dynamics of articles containing the word "Oggi" (Italian for today) resembles that of economic policy articles.[19] Furthermore, the series act counterintuitively, given that the future of economic policies was somewhat unpredictable during the 2010s.[20] The Italian economy descended to an unprecedented triple-dip recession, unemployment, and banking crisis that even threatened its membership of the Eurozone.[21] Despite political turmoil and instabilities after the Great Recession, the count of uncertainty-related articles remains fluctuating around its mean throughout the sample (particularly in La Stampa). These developments contrast with those of Germany, where we observe a significantly higher increase in the count of economic policy uncertainty articles, although its economy evolved relatively smoothly under Chancellor Angela Merkel and recovered quickly from the 2008 Great Recession. The comparison of the German and Italian raw counts shows that the evolution of articles related to uncertainty does not necessarily reflect the intuition behind long-term changes in the uncertainty of economic policy in different countries.

In the case of the United Kingdom (Figure 4c), the count of uncertainty articles peaks with the Brexit referendum and subsequent negotiations. Whereas the count of "economic policy" articles, compared to articles with the word "today," evolves differently across newspapers. Thus, fluctuations in the denominator contribute to the dynamics of the overall EPU index. Furthermore, the count of economic policy articles is higher than that of articles with the word "today." Therefore, we can conclude that the search result for the word "today" is not equivalent to the count of all articles published in a given month. The approach to scale the count of searches related to uncertainty by the count of articles that contain the word today is different from the scaling by all articles, contributing to the inconsistencies between countries.[22]

Overall, the raw counts underlying the EPU index reveal non-trivial differences across coun-

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[19]A strong seasonal pattern appears particularly at Corriere della Sera. The periodic drops in the count of articles appear systematically in August, a holiday season in Italy.

[20]In response to the crisis, the Italian government led by Mario Monti adopted strict austerity policies that were opposed by the general public and led to a rise of both left and right-wing populist parties (Five Star Movement and the League). After the 2013 snap elections following Monti's resignation, Italy experienced a series of political crises. The cabinet was led first by Enrico Letta and then by Matteo Renzi (both members of the Democratic party). The government passed several structural reforms and gradually softened some austerity measures. At the same time, Renzi ran a campaign to change the Italian constitution; however, the new constitutional rules were rejected in a referendum in December 2016. Renzi resigned and Paolo Gentilioni was appointed as the new prime minister. Their Democratic party gradually lost public support. The 2018 elections were won by two populist and eurosceptic movements (the League and the Five Star Movement), which formed the government led by an independent prime minister Giuseppe Conte. The government collapsed in 2019; however, Conte continued as prime minister in a new coalition of the Five Star Movement with the Democratic Party until 2021.

[21]In particular, Beppe Grillo, the leader of the Five Star Movement, attempted to initiate a referendum over the Italian Eurozone membership in 2014.

[22]Similarly, searching for articles such as "la" in Italian results in a higher count of articles than with the equivalent of "today."

Figure 4: Counts of Articles Underlying the EPU Index (monthly frequency)

4(a). Germany
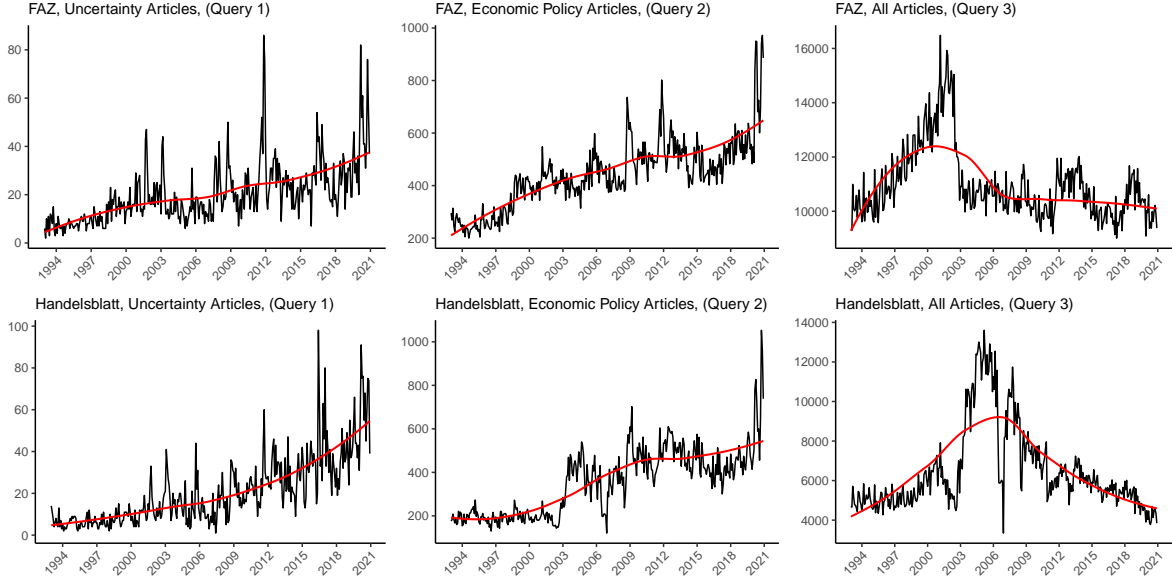
Note: The counts of articles of the three search queries used to construct the EPU index. Each country is represented by two leading newspapers. The first column shows the results for the first query of uncertainty-related articles. The second column shows the count of all articles (Germany) and articles containing the word "today" (Italy and the U.K.). The third column depicts the series used for an alternative normalization via the third query (economic policy-related articles). The sample is given by the availability of the articles in archives. Trends: Loess non-parametric method.

tries and normalization choices. The cross-country differences are most prominent between Italy and Germany's EPU indices. Moreover, there are significant differences in the developments of the scaling factors ("all," "today," or "economic policy" articles) used in normalizations of the raw count of uncertainty articles. These findings cast doubt on the reliability of the EPU index in representing uncertainty since it is not clear how much of the EPU fluctuations are caused by uncertainty per se and how much by the evolving structures of the newspapers.

3.3 Replicated EPU indices

We present our replicated EPU indices in Figure 5, along with the series provided by Baker et al. (2016) on the webpage https://www.policyuncertainty.com/. In the case of European EPU, our replicated EPU (a gray area) closely matches the original index, although some discrepancies appear in the severity of several uncertainty peaks, including during the EU debt crisis and the Brexit referendum. These discrepancies arise from text mining specifications and time periods different from those used to calculate the European EPU. Although Baker et al. (2016) constructed their index from 1987, it is based only on a subset of countries and newspapers up to 2001. In addition, the period between 1987-1990 is based solely on the French newspaper Le Monde. Our approach was different, we construct the European EPU only for the period based on the complete set of newspapers and countries. This difference in the time period before 2009 implies that the standard errors and averages used to scale the index differ.[23]

The alternative *EPU adjusted* relies on normalization with the "economic policy" articles. It mimics the original and replicated indices reasonably well until the global financial crisis of the late 2000s. However, the gap between the two differently normalized EPU indices widens

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[23]However, we do not have access to the raw data used by Baker et al. (2016), so we cannot assess how much difference in time periods contributes to the differences in the resulting EPUs.

Figure 4: Counts of articles underlying the EPU index (monthly), Cont.

4(b): Italy

4(c): United Kingdom
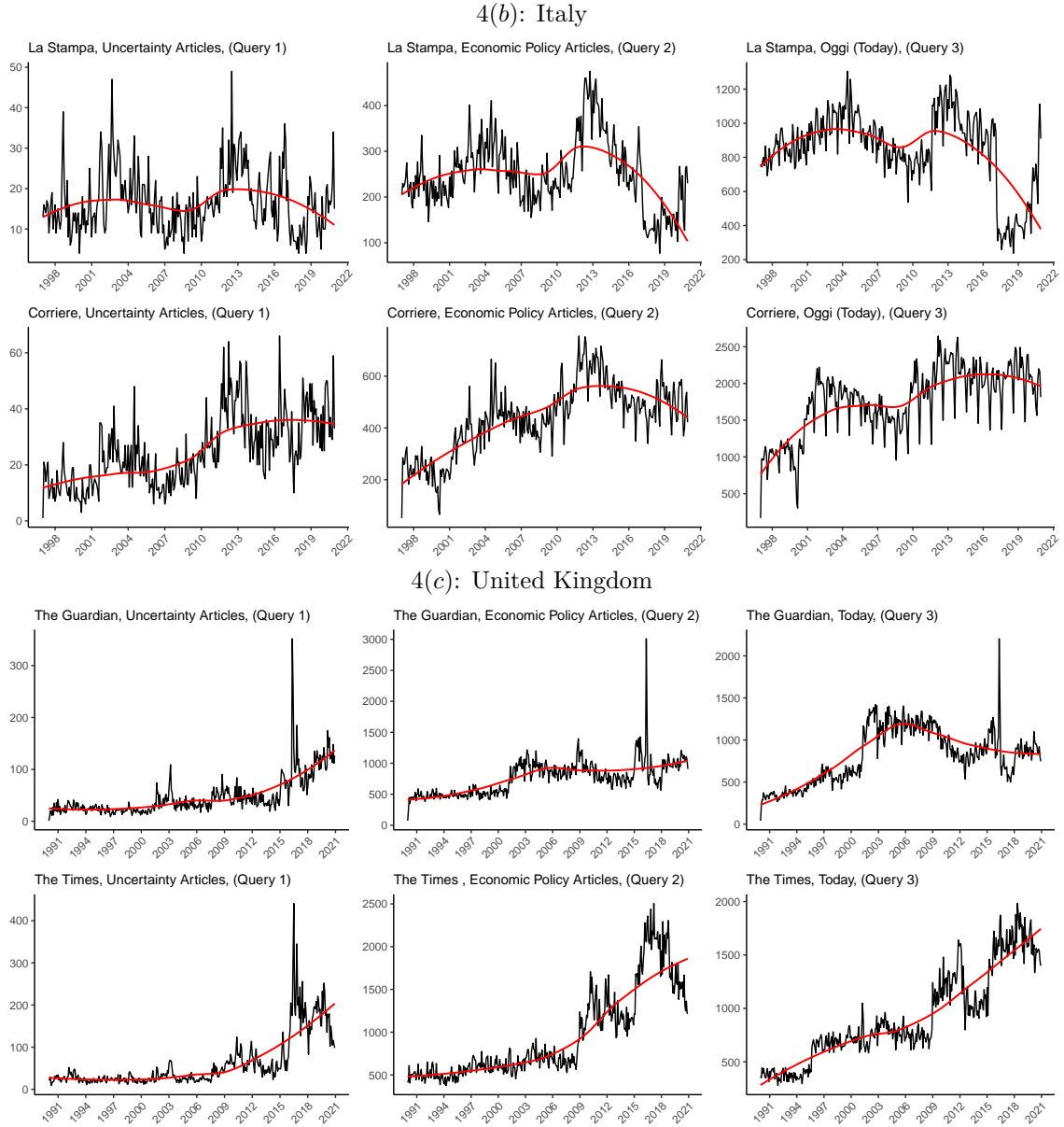
Note: The counts of articles of the three search queries used for the construction of the EPU index. Each country is represented by two leading newspapers. The first column shows the results for the first query of uncertainty-related articles. The second column shows the count of all articles (Germany) and articles containing the word 'today' (Italy and the United Kingdom). The third column depicts the series used for an alternative normalization via the third query (economic policy-related articles). The sample is given by the availability of the articles in the archives. Trends: Loess non-parametric method.

after 2009. Our "EPU adjusted" index increases with the 2007 financial crisis and remains at a similar level in the following years despite the turmoil of the European debt crisis. Furthermore, no additional major increases are visible in the original index until all EPU indices peak with the Brexit referendum. However, the adjusted EPU index peaks around 270 points, while the original index reaches 440 points (60% higher).

More apparent discrepancies arise at the country level between the original, replicated, and adjusted EPU indices. The most striking case is Germany. Despite relying on the same newspapers, archives and queries, we were unable to closely replicate the Germany EPU index by Baker et al. (2016). Although the short-term fluctuations are very similar, the long-term growth in the original EPU that motivated our analysis is even more pronounced in the replicated index. To achieve closer replication to the original EPU, we performed thorough checks of our search exercise, repeated web-scraping, and tried some additional sample restrictions in March 2023. Although such modifications are not mentioned in Baker et al. (2016), we repeated text mining with additional restrictions on search specifications. We selected only printed articles and excluded additional media that are covered by the archives of Handelsblatt and Frankfurter Allgemeine Zeitung, such as the business weekly Wirtschaftswoche and the regional FAZ edition Rhein-Main-Zeitung. However, we were unable to reproduce the original index. Our tentative explanation for these differences is the limited reliability of search results within newspapers' online archives, with possibly unstable article counts over time. The repeated check in March 2023 led to different article counts in the Frankfurter Allgemeine Zeitung and slightly changed the trajectory of the German EPU. Baker et al. (2016) also experienced this phenomenon with the New York Times archive. These additional results are provided in Appendix C.[24]

The alternative adjustment of the German EPU removes a large portion of the long-term trends compared to the original and replicated EPU indices. Moreover, unlike the other two indices, in the adjusted EPU, the implied level of uncertainty of the 2010s appears to be higher than in the previous decade. This is despite a relatively broad consensus on macroeconomic policy and a successful rebound of the German economy from the Great Recession. However, the increase of EPU with the COVID pandemic is less pronounced than in original and replicated EPUs. The dynamics of adjusted EPU is also reasonably robust to additional restrictions to only-printed articles and a strict focus on Handelsblatt and Frankfurter Allgemeine Zeitung without additional resources that appear in their online archives (Appendix C).

The French case illustrates the sensitivity of the EPU index to newspaper selection. Our sample is shorter than that of Baker et al. (2016), and we replaced the leading newspaper Le Monde with the leading economic newspaper Les Echos. These two largely arbitrary changes are enough to produce very different long-term trends in the French EPU. Even our replicated EPU lacks most of the trend increase of the original EPU, whereas the normalization of uncertainty-related articles by economic policy articles removes an additional portion of trend growth (adjusted EPU). In the next section, we will show that this result remains robust even after the inclusion of Le Monde in the sample.

For the United Kingdom, the results are similar to those of France. Changes in the selection of newspapers - note that we have replaced the Financial Times with the Guardian - and in the database lead to persistently lower EPU index in the latter part of the sample. We do not observe prominent peaks during the European debt crisis, and the uncertainty related to Brexit decreased compared to the original EPU. On the other hand, the difference between the replicated series and the alternative normalization is relatively small.

Finally, in the cases of the two southern countries, Italy and Spain, both replicated and adjusted EPU indices produce similar dynamics to the original series without apparent increases in the long-run trend. We attribute this similarity to a perfect match of our search specifications

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[24]We performed both automated scrapping and manual searching, and the results were identical. We have also experimented with different logical operators to verify whether the search engine interprets them as we expect, but even this exploration did not uncover the cause of the differences.

to Baker et al. (2016), who also rely on the Factiva database. However, even in this case, our replicated EPU index does not align with the original EPU index perfectly.

3.4 Sensitivity analysis: French EPU based on alternative newspapers.

In our replication of the French EPU, we rely on the newspapers Le Figaro and Les Echos, since both are available in the Factiva database. As a sensitivity check, we regenerate the index for France with Le Monde, retrieved through the online scraping of its archives. This option allows exploring the impact of different sets of newspapers and databases on the EPU index.[25] Interestingly, replacing Les Echos with Le Monde results in an even greater difference between the replicated and original EPU indices (Figure 6 (a)). Despite the same composition of the newspapers as in Baker et al. (2016), the long-term trend is much less apparent in the replicated index. Furthermore, contrary to the original EPU index by Baker et al. (2016), the European debt crisis does not stand out as a major period of uncertainty.

We also calculated the French EPU from all three newspapers, Le Monde, Les Echos and Le Figaro, to present the impact of extended newspaper coverage. This index of three newspapers is between the indices based on two newspapers. Therefore, the EPU index is sensitive to newspaper selection, but the difference is not as prominent as the utilization of different archives and search engines. Along with the original EPU index, the bottom panel of Figure 6(b) shows adjusted EPU indices normalized by "economic policy" articles for different combinations of French newspapers. The rising trend of the original EPU index almost completely disappears in the replicated indices.

3.5 Implications

Our calculations show that it is not easy to replicate the EPU index by Baker et al. (2016). We obtained the closest but not perfect correspondence between our replication and the original index in the cases of Italy and Spain, where we used identical newspapers and databases. Additionally, although we used the exact specification of text mining and sources for Germany, our replicated index is very different. The selection of the database appears to be more important than the selection of the newspapers for the French EPU replication. However, a change in the selection of newspapers also impacts the EPU.

Lastly, we show that the alternative normalization of the count of "uncertainty" articles with "economic policy" articles leads to less pronounced trends in the EPU indices of Germany and France while remaining relatively inconsequential to indices in the other countries. Furthermore, the most prominent differences between the original and adjusted EPUs appear in recent years, around the Brexit referendum and at the beginning of the COVID-19 pandemic. In the cases of Germany, France, and the United Kingdom, the peaks of the adjusted EPU are about one-half of the peaks of the original EPU.[26] On the positive side, all variants are highly correlated, notably at higher frequencies. The correlation coefficients are provided in the Appendix, Table A.3.

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[25]Since we have higher confidence in the completeness of the Factiva database than in the scrapped archive, we prefer to use the same database for both newspapers in one country to avoid a bias caused by different scopes of articles, such as whether sport-related news are included or not. Also, as mentioned in Section 3.1, we do not have the opportunity to access the Lexis Nexis database used by Baker et al. (2016) as a source of Le Monde articles.

[26]Table A.1 in the Appendix shows the differences in peaks for different EPU indices.

Figure 5: Comparison of Original, Replicated, and Adjusted EPU Indices
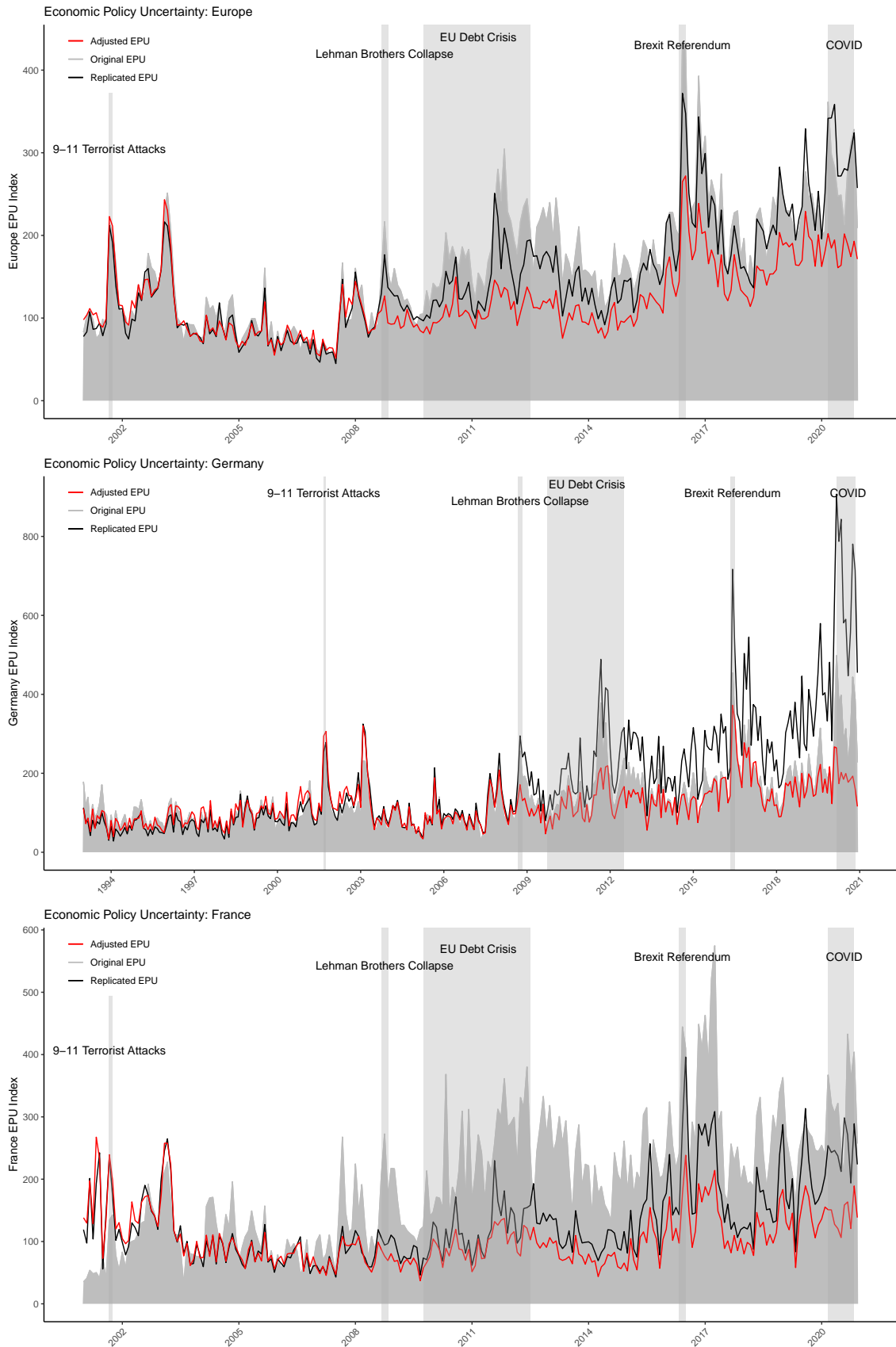
Economic Policy Uncertainty: Europe

Economic Policy Uncertainty: Germany

Economic Policy Uncertainty: France

Note: The grey area shows the original EPU published at https://www.policyuncertainty.com/. The black line presents the replicated EPU, i.e., based on the count of uncertainty-related words scaled by all articles. The red line - EPU adjusted - shows the EPU index based on the count of uncertainty-related articles scaled by economic-policy-related articles.

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Figure 5: Comparison of Original, Replicated, and Adjusted EPU Indices, Cont.

Note: The grey area shows the original EPU published at https://www.policyuncertainty.com/. The black line presents the replicated EPU, i.e., based on the count of uncertainty-related words scaled by all articles. The red line - EPU adjusted - shows the EPU index based on the count of uncertainty-related articles scaled by economic-policy-related articles.

Figure 6(*a*): French EPU Indices Based on Alternative Newspaper Selections
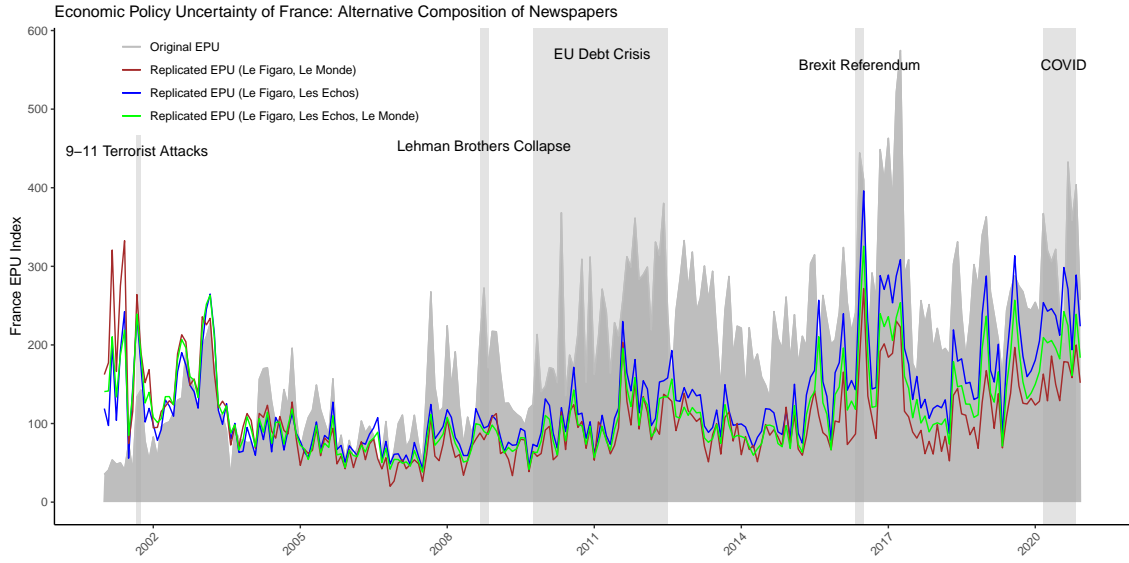
Economic Policy Uncertainty of France: Alternative Composition of Newspapers

Note: The grey area shows the original EPU published at https://www.policyuncertainty.com/ (both panels). Top panel: Blue = replicated EPU based on Factiva database, with Le Figaro and Les Echos. Green = replicated EPU, Le Figaro (Factiva), Le Monde (own archive scrapped via Google). Brown = all three newspapers. Bottom panel: Original EPU and replicated EPUs normalized with economic-policy articles. Red = Le Figaro and Les Echos; orange = Le Figaro and Le Monde; purple = all three newspapers.

Figure 6(*b*): French Adjusted EPU Indices Based on Alternative Newspaper Selections
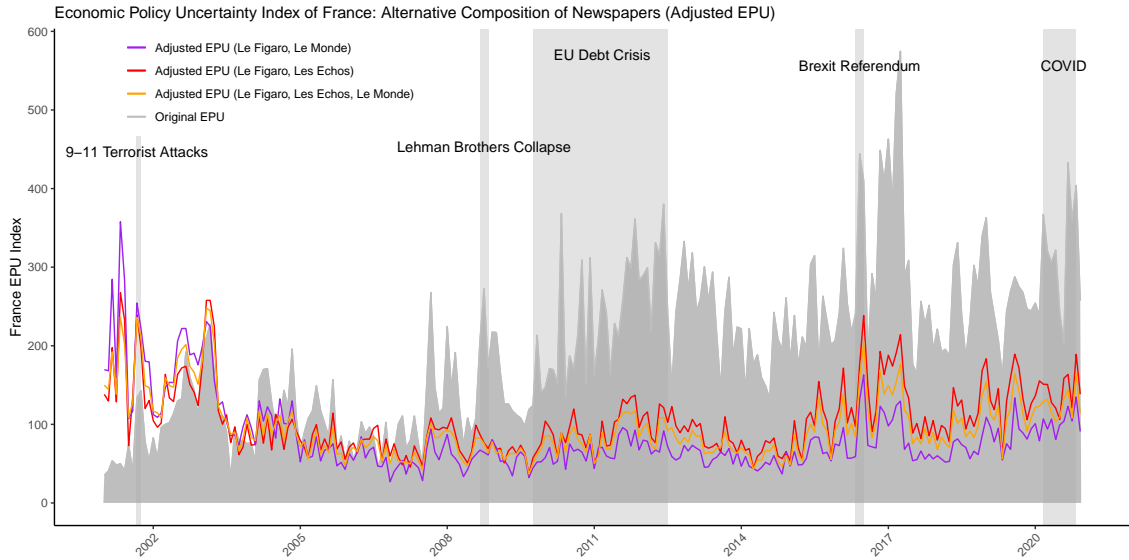
Economic Policy Uncertainty Index of France: Alternative Composition of Newspapers (Adjusted EPU)

Note: The grey area shows the original EPU published at https://www.policyuncertainty.com/ (both panels). Top panel: Blue = replicated EPU based on Factiva database, with Le Figaro and Les Echos. Green = replicated EPU, Le Figaro (Factiva), Le Monde (own archive scrapped via Google). Brown = all three newspapers. Bottom panel: Original EPU and replicated EPUs normalized with economic-policy articles. Red = Le Figaro and Les Echos; orange = Le Figaro and Le Monde; purple = all three newspapers.

4 Applications

4.1 EPU and economic activity in Europe

To investigate the qualitative and quantitative impact of our alternative normalization of the EPU, we estimate a panel VAR model in EU countries with the EPU index, unemployment rate and industrial production in manufacturing. The selection of variables is inspired by the specification in Baker et al. (2016), who conducted a similar exercise for a wider range of countries.

The panel VAR model was estimated on monthly data beginning in January 2001 and ending in December 2019, prior to the COVID-19 pandemic. We adopted a parsimonious mean-group OLS estimator.[27] The resulting impulse responses are shown in Figure 7. Importantly, the magnitudes of the responses to the EPU shock are much smaller for the replicated EPU with the normalization of uncertainty articles by economic policy articles than for the original EPU. The differences are statistically significant at 90% for the unemployment rate at all horizons. Thus, scaling the index has a direct effect on the estimated impact of uncertainty on economic activity. Although larger differences between original and adjusted EPU appear only in three countries and in the later part of the sample.

Figure 7: Impact of an uncertainty shock on unemployment and industrial production for different EPU indices
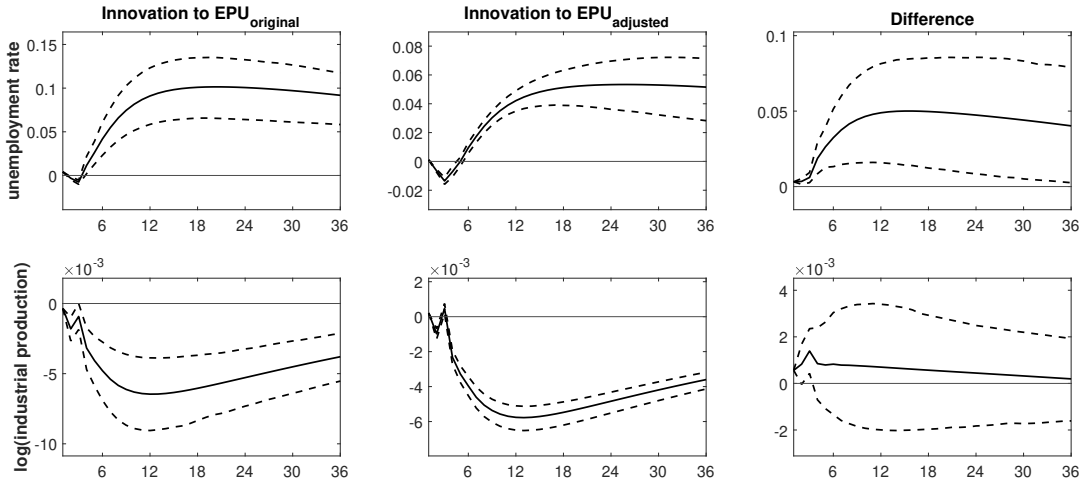
Note: Panel VAR model, Germany, France, Spain, Italy, and the United Kingdom, monthly data 2001M01 - 2019M12. To recover orthogonal shocks, we use a Cholesky decomposition with the following ordering: Economic policy uncertainty index (levels), unemployment rate, and log of industrial production. Our model specification includes three lags. 90% credible intervals obtained from 1,000 bootstrap simulations. Responses correspond to an increase in the EPU index by 90 points. Column 'Difference' shows the distribution of the difference between impulse responses under the original and replicated index of uncertainty. A positive value means that the variable in question responds stronger to an innovation in uncertainty when the original EPU index is considered.

4.2 Brexit-related uncertainty

One of the most prominent European EPU peaks corresponds to the Brexit referendum of June 23, 2016. Uncertainty around future trade relations with the United Kingdom was expected to have a detrimental impact on the British economy. Bloom (2016) predicted a negative impact of uncertainty already before the referendum. Based on the findings in Baker et al. (2016),

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[27]The model was estimated using the BEAR toolbox (Dieppe et al., 2016).

Table 2: Brexit-related uncertainty, the United Kingdom

	EPU original	*EPU replicated*	*EPU adjusted*
January 2016	249.4	153.0	146.0
February 2016	312.6	208.7	177.7
March 2016	479.3	229.4	177.4
April 2016	434.6	194.1	159.8
May 2016	428.5	296.6	226.1
June 2016	799.9	384.2	321.9
July 2016	1141.8	480.8	409.4
August 2016	458.7	336.9	273.2
September 2016	379.0	266.3	225.7
October 2016	545.1	344.0	285.5
November 2016	816.2	494.4	337.3
December 2016	468.0	321.7	252.0

Note: The United Kingdom European Union membership referendum took place on 23 June 2016. The EPU original is taken from https://www.policyuncertainty.com/. The EPU replicated is based on the count of uncertainty-related words scaled by all articles. The EPU adjusted is the EPU index with the alternative normalization, i.e., the counts of uncertainty-related articles scaled by economic-policy-related articles.

Bloom ([2016]) asserts that a stop in investment and hiring until clarification of the UK's status would amplify economic uncertainty and its negative impact on the economy.[28] International Monetary Fund ([2016]) and HM Treasury ([2016]) also highlight that the effect of the Brexit referendum was transmitted to the British economy through uncertainty.[29]

In Table 2, we present the evolution of the British EPU around the Brexit referendum. Our replicated and adjusted EPU indices reveal a markedly lower increase in uncertainty. Although the original EPU in July is 4.5 times higher than the January level, our replicated indices are about three times higher than their January levels. Therefore, the increase in uncertainty is corroborated by our replication, but its magnitude is lower. Our results have quantitative implications for the predictions of the short-term impact of the Brexit referendum. According to Bloom's assessment of the Baker et al. ([2016]) US model, every 90-point upward innovation in the EPU implies a 0.5% decrease in employment. Therefore, an increase in the EPU of 890 points between January and July 2016 decreases employment by 5%. On the other hand, replicated and adjusted EPU imply a moderate decrease in employment of 1.4 to 1.8%. Thus, a relatively arbitrary change in the composition of newspapers, along with a change in the database used for scrapping the newspaper articles, lead to a significantly lower predicted impact of the Brexit referendum on employment. A similar exercise for industrial production leads to the prediction of a 12% decline in industrial production with the original EPU. In comparison, the replicated

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[28]"In that analysis, we estimated that a 90-point upward innovation in the US EPU Index led to short-term declines of 1.2% in US industrial production, about 0.6% in its gross investment, and about 0.5% in its level of employment. Since the Brexit-related increase in the UK EPU index appears to be even greater, we believe that Brexit-related uncertainty has a material negative effect on UK economic performance" (Bloom, [2016]).

[29]Note that in those publications, the uncertainty was represented by a common factor of several uncertainty series. Therefore, the impact of measurement problems on the EPU was less compared to the analysis by Bloom ([2016]). The HM Treasury constructed the uncertainty factor by averaging the following normalized measures: the EPU; FTSE 100 implied volatility; sterling implied volatility; CBI Industrial Trends uncertainty measure; European Commission consumer uncertainty measure, and GfK unemployment expectations. All series were normalized by subtracting their means and divided by the respective standard deviations over 2000-2015. The IMF used the average standard deviation of the current and future years of the consensus forecast, the EPU, the survey-based indicator of the uncertainty effect on industrial demand, the GfK unemployment expectations, and the volatility of the stock market and the exchange rate.

EPU again suggests a more moderate 4% decline.[30]

4.3 COVID-related uncertainty

The uncertainty indices spiked again with the start of the COVID-19 pandemic. Altig et al. (2020) compare the evolution of a wide range of indicators that map uncertainty in the United States. The authors found that while all indices imply huge uncertainty jumps in reaction to the pandemic, their amplitudes and time paths differ greatly. We document similar variations solely among the original, replicated, and adjusted EPU indices in the case of European countries. Table 3 presents the European EPU indices and shows that the original and replicated EPU peaked at values greater than 80% above the January 2020 levels, while the adjusted EPU peak was higher only by 25%.

Again, a substantially larger variation appears in the country-level data. We observe the largest increases in the EPU indices in Germany, where the original EPU almost quadrupled and the adjusted index doubled. Large discrepancies between the original and adjusted EPU indices appear in all other countries, but the sizes of the differences between the peaks and the values in January 2020 are smaller. Still, the EPU index scaled by all articles leads to roughly twice as large an uncertainty increase than the adjusted EPU normalized by economic policy articles in all countries. In addition, the timings of the peaks are different in France, Spain, and the United Kingdom.

To conclude, we confirm that the COVID pandemic caused unprecedented jumps in the uncertainty index of Europe, but the timing of the peaks and the implied changes in uncertainty differ across EPU indices markedly.

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[30]Note that following the result of the Brexit referendum, employment remained increasing. Industrial production accelerated after the Bank of England cut the policy rate, launched quantitative easing, and allowed the pound to depreciate.

Table 3: Economic Policy Uncertainty during the COVID-19

	Peak value	Increase to the peak since January (%)	Peak date
Europe			
EPU original	361.4	81.4	March
EPU replicated	358.5	83.0	May
EPU adjusted	202.1	24.5	March
Germany			
EPU original	498.1	278.7	March
EPU replicated	907.0	221.2	March
EPU adjusted	267.0	117.1	March
France			
EPU original	432.7	70.2	September
EPU replicated	298.5	65.2	August
EPU adjusted	189.2	38.9	November
Italy			
EPU original	279.4	118.5	November
EPU replicated	209.1	49.0	November
EPU adjusted	212.9	46.8	November
Spain			
EPU original	246.8	158.9	March
EPU replicated	289.7	91.0	December
EPU adjusted	240.4	68.0	August
United Kingdom*			
EPU original	386.6	62.4	March
EPU replicated	322.0	36.7	May
EPU adjusted	289.0	29.2	May

Note: Our sample ends in December 2020. The EPU original is taken from https://www.policyuncertainty.com/. The EPU replicated is based on the count of uncertainty-related words scaled by all articles. The EPU adjusted is the EPU index with the alternative normalization, i.e., the counts of uncertainty-related articles scaled by economic-policy-related articles.
* In the case of the United Kingdom, the COVID-related peak is compared with the EPU levels in February. In January, the EPU indices were determined by the final phase of negotiation of the Withdrawal Agreement Bill that was finally passed through the House of Commons on 22 January and the United Kingdom officially left the EU on 31 January 2020. Original EPU peaks in January 2020, before the COVID epidemic spread in Europe.

5 Conclusion

In this paper, we explore the properties of the EPU indices of the major European economies (Germany, France, Italy, Spain, and the United Kingdom) and their sensitivity to minor modifications of estimation procedures.

First, we discuss long-term increasing trends in the EPU indices in the United Kingdom, Germany, France, and the aggregate European EPU index and lack thereof in Italy and Spain, despite the turmoil during the EU debt crisis and subsequent political instabilities in both countries. Moreover, the trends in the EPU are inconsistent with the financial instability measured by implied volatilities and with the World Uncertainty Index. These uncertainty indices tend to be mean-reverting and do not contain any clear upward-sloping trends observed in the EPU.

Next, we replicated the text mining and construction of the EPU indices to reveal the nature of the trends and their sensitivity to minor changes in their construction. We have found that our replicated EPU indices differed from the original indices, despite using the closest possible text mining specification. The differences appear mainly in the long-run behavior of the indices of Germany, France, and to some extent of the United Kingdom as well. These differences arise not only from the utilization of alternative databases and/or newspapers (France, United Kingdom) but also appear in countries where our text-mining exercise matches the one by Baker et al. (2016), authors of the original EPU.

Finally, we have shown that some dynamics of the original EPU indices are driven by nontrivial movements in the count of all articles used for normalization of the raw count of uncertainty articles rather than by the frequency of economic policy uncertainty articles that are supposed to provide signals about genuine uncertainty. To eliminate the impact of changing newspaper composition on EPU, we normalize the counts of uncertainty articles by the counts of articles related to economic policy, instead of all articles. We have found that this normalization leads to less pronounced trends in the EPU, more consistent results using different newspapers and/or databases, and possibly increasing the reproducibility and reliability of the EPU index, as seen in our experiments with French and German newspapers.

Our findings have several implications for empirical research on the effects of uncertainty shocks. Most importantly, the EPU index could overestimate uncertainty in European countries during recent uncertainty episodes by 20 - 50%. Furthermore, our panel VAR experiment revealed that the negative response of unemployment to shocks in adjusted EPU is qualitatively similar but quantitatively smaller. These differences between alternative normalizations lead to a quantitatively different assessment of the importance of uncertainty shocks, which is particularly relevant for policymakers aiming to offset their negative effects through policy interventions. Our results also imply that policymakers must consider the limited reliability of uncertainty indicators in tracking uncertainty. Finally, alternative scaling factors for uncertainty articles counts should be considered when developing new uncertainty indicators based on the methodology of the EPU index.

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Appendix for "Uncertain Trends in Economic Policy Uncertainty"

Appendix A: Additional Tables

Table A1: Stationarity tests

I. Index by Baker, Bloom, and Davis (2016)

	ADF		ADF-GLS		KPSS	
	tau	p-value	tau	p-value	t-stat	p-value
Europe	-2.403	0.141	-0.577	0.527	2.724	<0.01
Germany	-5.409	0.000	-0.859	0.392	2.058	<0.01
France	-2.453	0.127	-0.502	0.559	3.141	<0.01
Italy	-3.704	0.004	-1.023	0.314	0.494	0.045
Spain	-3.609	0.006	-1.999	0.045	0.435	0.062
UK	-0.803	0.818	0.192	0.795	3.141	<0.01

II. Replicated EPU indices

	ADF		ADF-GLS		KPSS	
	tau	p-value	tau	p-value	t-stat	p-value
Europe	-2.051	0.265	-0.667	0.487	2.719	<.01
Germany	-2.024	0.277	0.048	0.753	3.029	<.01
France	-2.624	0.088	-2.308	0.020	1.476	<.01
Italy	-4.279	0.001	-1.899	0.058	1.488	<.01
Spain	-3.414	0.011	-0.639	0.501	1.805	<.01
UK	-1.404	0.582	-0.718	0.461	2.701	<.01

Note: Augmented Dickey-Fuller test with lag length based on AIC, test down from 12 lags. ADF-GLS test, demeaned and detrended data, lag length based on AIC, test down from 12 lags. ADF and ADF-GLS null hypothesis: unit root. KPSS test, automatic window size, null hypothesis: stationarity. Sample: 2001:1 - 2019:10.

Table A2: Summary Statistics

Variable	Since	N	Mean	Std. Dev.	Min	Pctl. 25	Pctl. 75	Max	AR(1)
Original EPU Index									
Europe	1990-01	372	139	67	45	89	179	433	0.8277
Germany	1993-01	336	132	73	28	81	167	498	0.7095
Italy	1997-01	288	112	41	32	81	135	279	0.6049
UK	1997-01	288	194	156	25	75	274	1142	0.8712
France	1990-01	372	155	98	11	81	218	575	0.8190
Spain	2001-01	240	117	58	23	75	146	407	0.6051
Replicated EPU Index									
Europe	2001-01	240	147	68	45	96	183	372	0.8632
Germany	1993-01	336	180	145	28	81	251	907	0.8469
Italy	1997-01	288	119	43	33	87	143	285	0.5863
UK	1990-01	372	130	77	38	73	153	494	0.8810
France	2001-01	240	131	64	43	83	159	396	0.7249
Spain	2001-01	240	139	68	22	88	181	388	0.6828
Adjusted EPU Index									
Europe	2001-01	240	121	43	51	91	143	272	0.8386
Germany	1993-01	336	120	53	33	83	148	372	0.6665
Italy	1997-01	288	110	34	35	85	128	223	0.5461
UK	1990-01	372	125	60	51	86	145	409	0.8623
France	2001-01	240	105	43	37	73	126	267	0.6866
Spain	2001-01	240	117	55	30	78	147	326	0.6787

Table A3: Uncertainty indicators: Correlation coefficients

	EPU_{Orig}	EPU_{Rep}	EPU_{Adj}	WUI	VSTOXX		
				Europe			
EPU_{Orig}	1	0.938	0.851	0.696	0.154		
EPU_{Rep}		1	0.917	0.665	0.16		
EPU_{Adj}			1	0.627	0.189		
WUI				1	-0.105		
VSTOXX					1		

	EPU_{Orig}	EPU_{Rep}	EPU_{Adj}	WUI	Forecast	Macro	VDAXX
				Germany			
EPU_{Orig}	1	0.946	0.850	0.374	0.325	-0.003	0.281
EPU_{Rep}		1	0.794	0.471	0.394	-0.110	0.226
EPU_{Adj}			1	0.321	0.117	0.033	0.302
WUI				1	0.318	-0.131	-0.053
Forecast					1	0.239	0.224
Macro						1	0.446
VDAX							1

	EPU_{Orig}	EPU_{Rep}	EPU_{Adj}	WUI	Forecast	Macro	VCAC
				France			
EPU_{Orig}	1	0.665	0.387	0.312	0.252	-0.035	0.035
EPU_{Rep}		1	0.864	0.199	0.005	0.128	0.175
EPU_{Adj}			1	0.220	0.001	0.178	0.277
WUI				1	0.238	-0.085	0.217
Forecast					1	0.168	0.231
Macro						1	0.618
VCAC							1

	EPU_{Orig}	EPU_{Rep}	EPU_{Adj}	WUI	Forecast	Macro
				Italy		
EPU_{Orig}	1	0.777	0.730	0.263	-0.004	0.021
EPU_{Rep}		1	0.865	0.339	-0.128	-0.009
EPU_{Adj}			1	0.275	0.046	0.067
WUI				1	-0.223	-0.274
Forecast					1	0.371
Macro						1

	EPU_{Orig}	EPU_{Rep}	EPU_{Adj}	WUI	Forecast	Macro
				Spain		
EPU_{Orig}	1	0.801	0.800	0.498	0.022	0.162
EPU_{Rep}		1	0.875	0.507	0.179	0.356
EPU_{Adj}			1	0.500	0.109	0.192
WUI				1	-0.024	0.200
Forecast					1	0.335
Macro						1

	EPU_{Orig}	EPU_{Rep}	EPU_{Adj}	WUI	VFTSE
			United Kingdom		
EPU_{Orig}	1	0.907	0.867	0.748	-0.124
EPU_{Rep}		1	0.951	0.695	-0.136
EPU_{Adj}			1	0.766	-0.112
WUI				1	-0.057
VFTSE					1

Note: Correlations between original EPU by Baker et al. (2016), replicated EPU, adjusted EPU scaled by economic policy articles and other uncertainty indicators. Those include (i) the respective World uncertainty indices (Ahir et al. (2018)), (ii) the implied volatilities of the stock market, (iii) the uncertainty indices derived from the forecast dispersion and (iv) macroeconomic uncertainty. The last two indicators were calculated by Meinen and Röhe (2017)). Because the WUI is available on a quarterly basis, its correlations are based on quarterly data.

Appendix B: Replication of EPU - Search queries

Germany

Q1 (Wirtschaft OR wirtschaftlich) AND (steuer OR wirtschaftspolitik OR regulierung OR regulierungs OR ausgaben OR bundesbank OR EZB OR zentralbank OR haushalt OR defizit OR haushaltsdefizit) AND (unsicher OR Unsicherheit)

Q2 (Wirtschaft OR wirtschaftlich) AND (steuer OR wirtschaftspolitik OR regulierung OR regulierungs OR ausgaben OR bundesbank OR EZB OR zentralbank OR haushalt OR defizit OR haushaltsdefizit)

Q3 (empty)

Sources: Own archives of Frankfurter Allgemeine Zeitung and Handelsblatt available at https://fazarchiv.faz.net/?dosearch=new and https://archiv.handelsblatt.com/

France

Q1 (economie OR economique OR economiques) AND (taxe OR taxes OR impot OR impots OR politique OR politiques OR regulation OR regulations OR reglementation OR loi OR "lois reglementations" OR depense OR depenses OR deficit OR deficits OR "banque centrale" OR "BCE" OR "Reserve Federale" OR budget OR budgetaire) AND (incertitude OR incertain OR incertitudes OR incertains)

Q2 (economie OR economique OR economiques) AND (taxe OR taxes OR impot OR impots OR politique OR politiques OR regulation OR regulations OR reglementation OR loi OR "lois reglementations" OR depense OR depenses OR deficit OR deficits OR "banque centrale" OR "BCE" OR "Reserve Federale" OR budget OR budgetaire)

Q3 aujourd'hui

Source: Factiva. Searched for Le Figaro (France, French Language) and Les Echos (France, French Language)

Search specifications:
Language: French
Exclude: Republished news; Recurring pricing and market data; Obituaries, sports, calendars, etc.
Starting date: January 2001
Note - Original sources: Figaro - Factiva, Le Monde - Lexis Nexis

Italy

Q1 (economia OR economico OR economica OR economici OR economiche) AND (tassa OR tasse OR politica OR regolamento OR regolamenti OR spesa OR spese OR spesa OR deficit OR "Banca Centrale" OR "Banca d'Italia" OR budget OR bilancio) AND (incerto OR incerta OR incerti OR incerte OR incertezza)

Q2 (economia OR economico OR economica OR economici OR economiche) AND (tassa OR tasse OR politica OR regolamento OR regolamenti OR spesa OR spese OR spesa OR deficit OR "Banca Centrale" OR "Banca d'Italia" OR budget OR bilancio)

Q3 oggi

Source: Factiva. Newspapers: Corriere della Sera (Italy, Italian Language) and La Stampa (Italy, Italian Language)

Search specifications:
 Language: Italian
 Exclude: Starting date: January 1997
 Republished news; Recurring pricing and market data; Obituaries, sports, calendars...

Spain

Q1 (económica OR economía) AND (impuesto OR tarifa OR regulacion OR politica OR gastar OR gasta OR gasto OR presupuesto OR deficit OR "banco central") AND (incierto OR incertidumbre)

Q2 (económica OR economica) AND (impuesto OR tarifa OR regulacion OR politica OR gastar OR gasta OR gasto OR presupuesto OR deficit OR "banco central")

Q3 hoy

Source: Factiva. Newspapers: El Mundo (Spain, Spanish Language) El País - Nacional (Spain, Spanish Language)

Search specifications:
 Language: Spanish
 Exclude: Republished news; Recurring pricing and market data; Obituaries, sports, calendars, etc.
 Starting date: January 2001 (limited by El País)

United Kingdom

Q1 (economic OR economy OR business OR industry OR commerce OR commercial) AND (spending OR policy OR deficit OR budget OR tax OR regulation OR "Bank of England" OR war OR tariff) AND (uncertain OR uncertainty)

Q2 (economic OR economy OR business OR industry OR commerce OR commercial) AND (spending OR policy OR deficit OR budget OR tax OR regulation OR "Bank of England" OR war OR tariff)

Q3 today

Source: Factiva. Newspapers: The Times (UK), The Guardian (UK)

Search specifications:
 Language: English
 Exclude: Republished news; Recurring pricing and market data; Obituaries, sports, calendars, etc.
 Starting date: January 1990 (limited by The Guardian)

Original EPU was retrieved from https://www.policyuncertainty.com/europe_monthly.html, April 13, 2021 Factiva searches were performed in March 2021.

Appendix C: Additional results for Germany

This appendix tests the robustness of the differences between the original EPU index by Baker et al. (2016) and our replicated EPU. We have considered the following alterations to the baseline text mining exercise.

 First, we manually retrieved the underlying EPU data at a quarterly frequency from the Frankfurter Allgemeine Zeitung archive, and the results matched our monthly data.

 Second, we rerun the text mining in March 2023, two years after our data collection, with and without additional restrictions.

- Handelsblatt online archive: Only Handelsblatt print was used (previously, all resources (*Alle Quellen*) were used).

- Frankfurter Allgemeine Zeitung: Instead of *Alle Quellen*, all resources, only "Frankfurter Allgemeine Zeitung".

Differences from these experiments are depicted in Figures C1 and C2.

Most strikingly, even with the restriction, the counts of uncertainty and economic policy articles in the Frankfurter Allgemeine Zeitung are *higher* than in our original text mining exercise in 2021, although their short-run pattern remains very similar. The count of all articles obtained from our search differs relatively little. On the other hand, we do not see such large discrepancies in the case of Handelsblatt, where the data from the 2023 data collection matched those collected in 2021 (Figure C1). This result shows that the collection of data from the FAZ online archive does not produce consistent results over time.

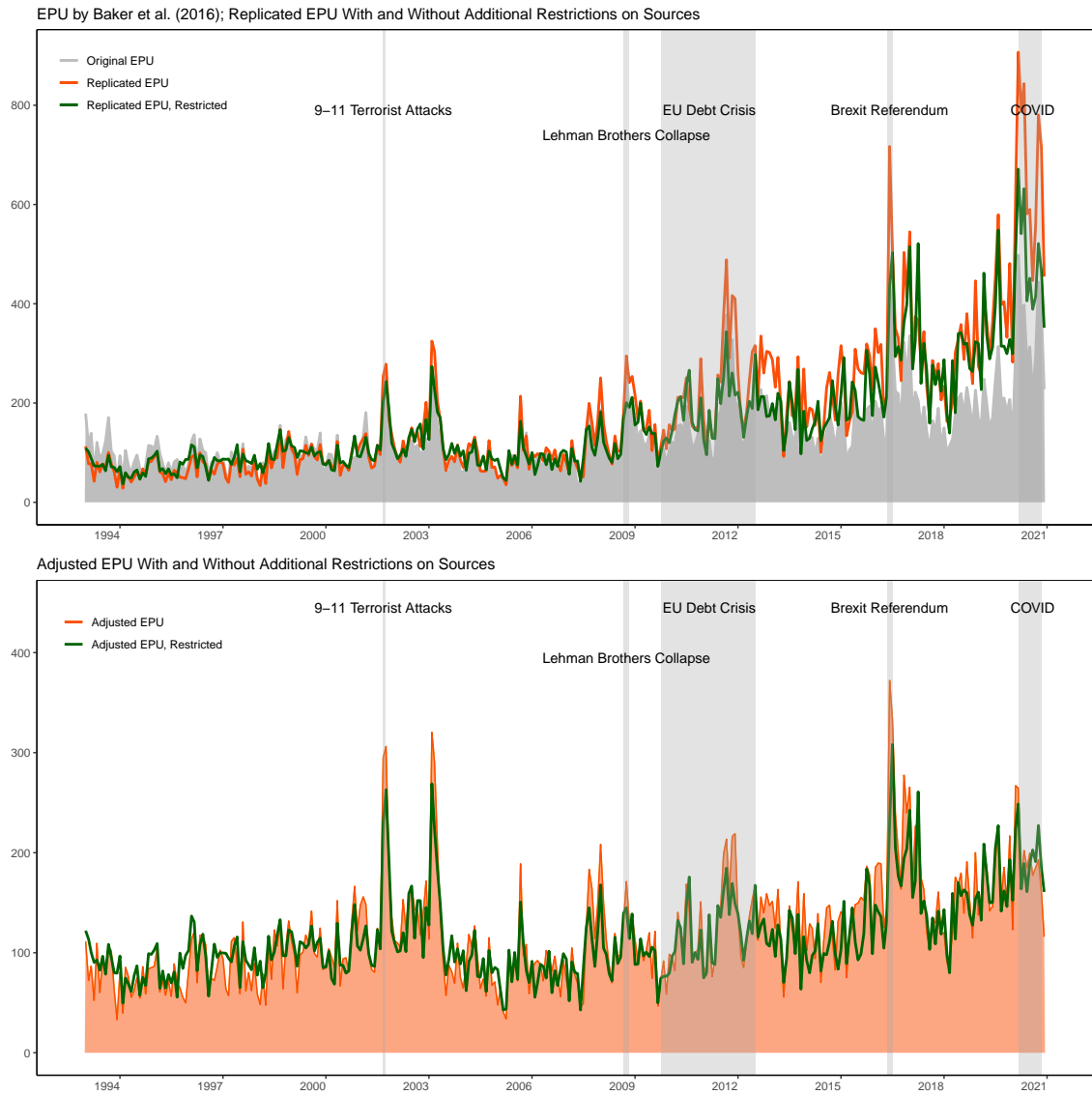Figure C1: Raw counts for Germany Retrieved in 2021 and 2023, With and Without Restrictions
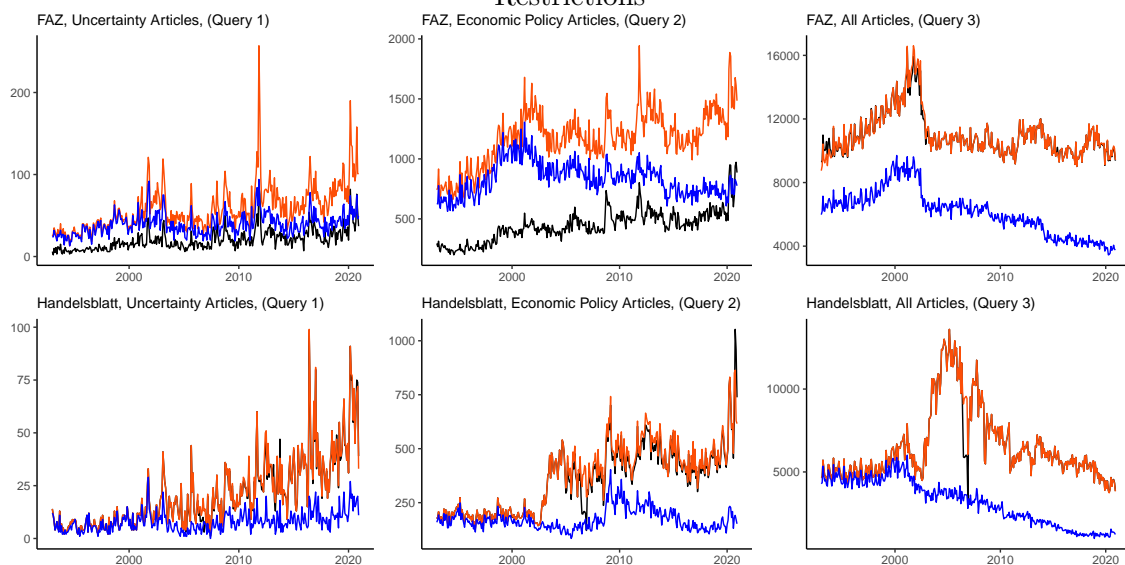
Note: Search in 2021 (baseline) - black, Search in 2023 - red, Search in 2023 with restrictions (Handelsblatt on printed articles, Frankfurter Allgemeine Zeitung - articles appearing only in FAZ and not in other resources included in the archive) - blue. Query 1: economic + policy + uncertainty articles. Query 2: economic + policy articles. Query 3: All articles.

Despite these differences in FAZ counts, the replicated EPU index did not change with the data collected in 2023 due to the normalization of the overall index to the pre-2009 means and standard deviations. The restriction on the printed edition of Handelsblatt and only on articles published in Frankfurter Allgemeine Zeitung leads to an index that resembles the original EPU by Baker et al. (2016) more than our replication without those additional restrictions (Figure C2). However, the replicated index has remained higher in recent years than the index by Baker et al. (2016). On the other hand, the dynamics of the adjusted EPU index normalized with economic policy articles is relatively robust to additional restrictions on resources (Figure C2, lower panel).

Overall, this experiment confirms that the adjusted EPU is more robust to various changes in search specifications than the baseline EPU.

Figure C2: Germany - EPU Indices, Sensitivity Analysis

EPU by Baker et al. (2016); Replicated EPU With and Without Additional Restrictions on Sources

Adjusted EPU With and Without Additional Restrictions on Sources

Note: Comparison of the EPU by Baker et al. (2016) (gray) with the replicated EPU (orange) and replicated EPU with additional restrictions (Handelsblatt on printed articles, Frankfurter Allgemeine Zeitung - articles appearing only in FAZ and not in other resources included in the archive; (green)). The bottom plot shows the comparison of the adjusted EPU (orange) with adjusted EPU with these restrictions (green).