

Comparing Regulatory Uncertainty with Other Policy Uncertainty Measures

Zhoudan Xie | February 2, 2022

Economic research shows that increased uncertainty can lead to [significant reductions](#) in hiring, investment, consumption, and output in the economy. Among many types of uncertainty, policy uncertainty has gained increased attention during recent years. In a recent [working paper](#), Tara Sinclair and I constructed a new time series measure of uncertainty around regulatory policy. The measure tracks changes in regulatory uncertainty in the U.S. since 1985 based on the degree of uncertainty expressed in relevant newspaper articles.

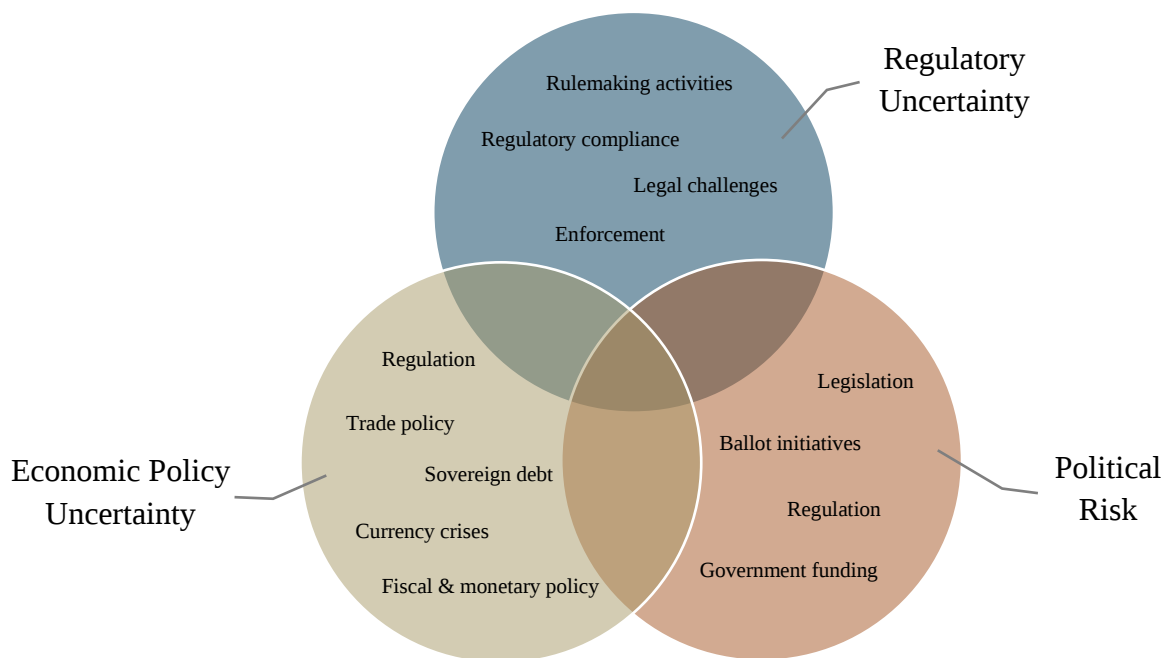
A text-based measurement approach has been used to capture other types of policy related uncertainty. [Baker et al. \(2016\)](#) developed a measure of [economic policy uncertainty \(EPU\)](#) based on the frequency of news articles that mention predefined sets of terms related to the economy, policy, and uncertainty. Using the same approach, they also built EPU indexes for policy categories, including categories on regulation and financial regulation specifically. Numerous studies have been published subsequently to develop similar uncertainty measures for [other countries](#) and specific policy areas such as [trade policy](#) and [monetary policy](#). Another closely related measure is the [firm-level political risk](#) measure developed by [Hassan et al. \(2019\)](#). They quantified political risk faced by individual U.S. firms using quarterly earnings conference calls. Risks associated with politics cover concerns about regulation, ballot initiatives, government funding, and other relevant issues. Although relying on different data and developed in different ways, these text-based measures are closely related to each other and likely to contain overlapping information about policy uncertainty. In general, I refer to these measures as policy uncertainty measures in this article.

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In this *Regulatory Insight*, I compare the new regulatory uncertainty measure from [our paper](#) (Sinclair and Xie 2021) with three preexisting policy uncertainty measures: Baker et al.’s (hereafter “BBD”) EPU index, their regulatory EPU index, and Hassan et al.’s (hereafter “HHLT”) political risk measure. I conduct the comparison using the latest data and focus on two dimensions. First, I compare methodological approaches to constructing these measures, examine their correlations, and discuss differences and similarities in historical patterns. The comparison suggests that the regulatory uncertainty index has a moderate correlation with BBD’s EPU index and slightly higher correlations with BBD’s regulatory EPU and HHLT’s political risk measure. In addition, the regulatory uncertainty index demonstrates different fluctuations from the other measures that coincide with different historical events. Second, I compare these measures in terms of their economic impacts. As demonstrated in our paper, Sinclair and I found that a regulatory uncertainty shock is only associated with transitory drops in future output and employment. Based on the same model and economic data for the same time period, I show that BBD’s EPU and regulatory EPU and HHLT’s political risk all have more persistent and larger effects on output and employment.

Figure 1: Hypothetical Relationships between Regulatory Uncertainty, Economic Policy Uncertainty, and Political Risk



Note: This figure illustrates hypothetical relationships between the policy uncertainty measures discussed in this article. The size or color of the circles does not contain particular meaning. The texts inside each circle indicate several examples of elements that each measure is intended to capture, which are based on the interpretation discussed in the corresponding paper (Baker et al. 2016; Hassan et al. 2019; Sinclair and Xie 2021).

Hypothetically, as illustrated in Figure 1, these policy uncertainty measures are likely to overlap with each other while covering distinct elements. The regulatory uncertainty index captures uncertainty about the overall regulatory environment, which could be driven by a broad range of regulation-related events such as the promulgation of a new regulation, a company's regulatory compliance or violation, a regulatory investigation, or a lawsuit challenging agency regulatory actions. EPU measures economic uncertainty induced by policy issues, including certain types of regulatory policy and other policy categories such as fiscal and monetary policy. The political risk measure, by its name, reflects risk and uncertainty emanating from the political system and thereby goes beyond policy-related topics. Measuring different types of policy uncertainty and studying their economic implications present unique opportunities, as each of them contains information that is not captured by the other measures.

Measuring Policy Uncertainty

Methodological Approaches

The regulatory uncertainty, EPU, regulatory EPU, and political risk measures all rely on text analysis to capture uncertainty expressed in relevant text. The seminal work by Baker et al. (2016) popularizes the approach of tracking the frequency of relevant news articles identified through a rule-based (or lexicon-based) approach. The approach predefines keywords associated with a topic and searches for the keywords in a corpus. Baker et al. defined three sets of keywords related to the economy, policy, and uncertainty, respectively, and identified news articles from major U.S. newspapers that contain keywords in all three sets. In particular, the policy terms include "Congress," "deficit," "Federal Reserve," "legislation," "regulation," and "White House." They scaled the volume of relevant articles by the total number of articles in the same newspaper and month and then normalize the time series to construct the monthly EPU index.

When constructing their categorical indexes, Baker et al. defined additional sets of keywords for policy categories. For the category of regulation, they identified a set of category-specific policy terms consisted of 73 words and phrases, such as "minimum wage," "environmental restrictions," and "banking supervision." Many of these terms are related to financial regulation, and others are associated with labor, trade, health, and environmental regulations. However, given the limited number of terms included, the regulation category covers only a selective set of regulatory subjects. As a subset of EPU, the regulatory EPU index is based on the frequency of news articles that contain the trio of terms about the economy, policy, and uncertainty as well as one or more category-specific terms.

Sinclair and I followed Baker et al. (2016) and used newspaper articles for constructing the regulatory uncertainty index, but our approach differs from theirs in three aspects. First, we

Table 1: Comparison of Methodological Approaches to Measuring Policy Uncertainty

Policy uncertainty measure	Data	How to identify policy-related text?	How to identify text expressing uncertainty?	How to quantify policy uncertainty in a document?	How to construct the time-series measure?
BBD EPU index	News articles from 10 major U.S. newspapers	Economic and policy terms defined based on human judgment	“uncertainty,” “uncertain” and their variants	Dummy variable =1 for an article with economic, policy, and uncertainty related content	Scaled and normalized relevant article counts
BBD regulatory EPU index	News articles from Newsbank	Economic, policy, and regulation-specific terms defined based on human judgment	“uncertainty,” “uncertain” and their variants	Dummy variable =1 for an article with economic, policy, uncertainty, and regulation related content	Scaled and normalized relevant article counts
Sinclair and Xie regulatory uncertainty index	News articles from 7 major U.S. newspapers	Regulatory noun chunks automatically identified from rule titles	Uncertainty words from the Loughran and McDonald dictionary	Proportion of uncertainty words in the section that mentions a regulatory noun chunk in an article	Article-level regressions with year-month and newspaper fixed effects
HHLT political risk measure	Firm earnings conference call transcripts	Political bigrams automatically identified from textbooks and news articles discussing political topics	Synonyms for “risk,” “risky,” “uncertain,” and “uncertainty” from the Oxford dictionary	Proportion of occurrences of political bigrams used in conjunction with an uncertainty synonym in a conference call	Average of political risk across firms at each time point

defined policy terms related to regulation using computational text analysis of rule titles published by the federal government. We extracted “noun chunks” (i.e., subsets of noun phrases) from all unique titles of rules published by federal agencies since 1995¹ and searched for the noun chunks through the potentially relevant news sections that mention keywords starting with “regulat*” or “deregulat*.” Second, Sinclair and I quantified the degree of uncertainty using a lexicon-based “sentiment analysis” approach—a natural language processing (NLP) method—instead of basing the measure on whether an article contains any uncertainty terms. The sentiment analysis method is usually used to assess the positivity and negativity in a document but can also be applied to extract other subjective information, such as emotional states, subjectivity, confidence, and uncertainty. We used a dictionary of uncertainty terms originally developed by [Loughran and McDonald \(2011\)](#) to assess uncertainty in regulation-related sections of news articles. We then computed the uncertainty score for an article as the proportion of uncertainty words in the regulation-related section of the article. Third, we used regressions to construct the time-series index following [Shapiro et al. \(2020\)](#) instead of relying on the volume of relevant articles. The regression includes article-level uncertainty scores on the left-hand side and year-month fixed effects and newspaper fixed effects on the right-hand side. The estimated coefficients on the year-month fixed effects indicate the monthly regulatory uncertainty index.

Different from newspaper-based approaches, Hassan et al. (2019) used quarterly earnings conference-call transcripts to construct a measure of political risk faced by firms. They also used computational text analysis to identify “bigrams” (i.e., two-word combinations) that are frequently used in political texts from a “training library” which covers political textbooks and articles from political sections of newspapers.² They then counted the number of instances in which those bigrams are used in a conference call within 10 words of synonyms for “risk” or “uncertainty.” This measure of the share of content on conference calls that focuses on political risk enables various firm-level analyses, but an aggregate time-series measure can be constructed by taking the average of political risk across firms at each time point.

As discussed above and summarized in Table 1, the four policy uncertainty measures from the three studies share some similarities in terms of their methodological approaches. They all rely on a rule-based approach. That is, a customized or preexisting dictionary related to certain topics (e.g., policy, regulation, politics, or uncertainty) is used to identify the relevant content from a corpus (e.g., newspaper articles or earnings calls). The difference lies in how a dictionary is defined. Comparatively, the dictionary used by Baker et al. (2016), which is defined primarily based on human judgment, covers a relatively small scope of policy terms compared to the regulatory noun chunks in our paper or political bigrams in Hassan et al. (2019). This also

¹ For example, the noun chunks extracted from the rule title “Test Procedures for the Analysis of Trace Metals under the Clean Water Act” include “test procedure,” “analysis,” “trace metal,” and “clean water act.” In our analysis, we only used noun chunks with two or more tokens, so “analysis” in this example was excluded.

² For example, bigrams identified from political text include “the constitution,” “public opinion,” and “the FAA.”

suggests that more advanced NLP techniques, such as deep learning, have not been sufficiently used in this area and, if applied, could further improve the measurement of policy uncertainty in future research.

Variations in Policy Uncertainty

Because of the different data and methodological approaches used, the policy uncertainty measures from the three studies exhibit some variations. To compare these measures, I examine the monthly indexes of regulatory uncertainty, BBD EPU, and BBD regulatory EPU from January 1985 and December 2021. HHLT's political risk measure is only available on a quarterly frequency from the first quarter of 2002 (2002:Q1) to the third quarter of 2021 (2021:Q3). To compare them with the political risk measure, the regulatory uncertainty index is re-estimated on a quarterly basis, and the EPU and regulatory EPU measures are converted to their quarterly means.

As shown in Table 2, the HHLT political risk measure is highly correlated with BBD's EPU and regulatory EPU measures, with correlations around 0.82. The regulatory uncertainty measure has a lower correlation (0.34) with the BBD EPU index. The correlation is slightly higher between the regulatory uncertainty index and the regulatory EPU index (0.43), suggesting more overlapping information on regulation between these two measures. The regulatory uncertainty index also has a moderate correlation (0.43) with the political risk measure.

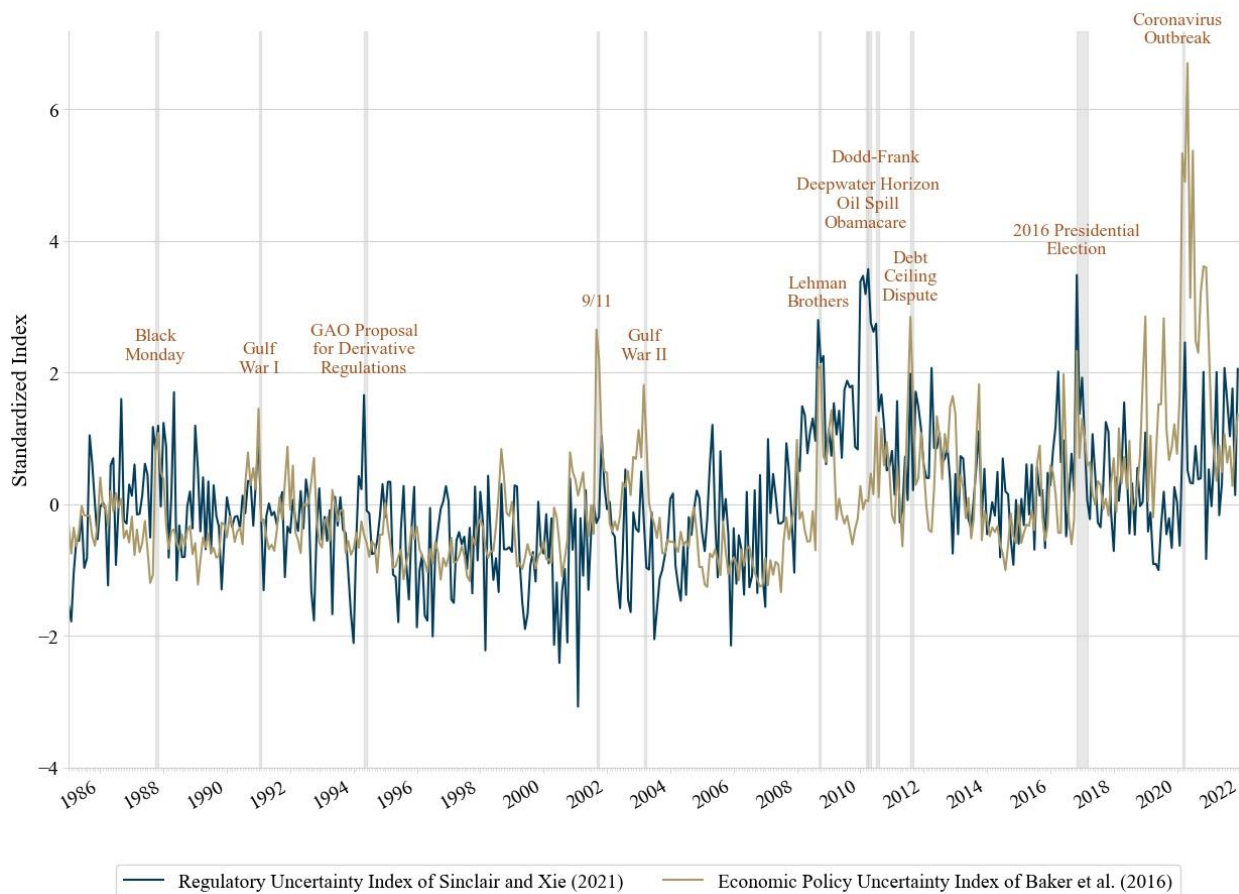
Table 2: Correlations between the Policy Uncertainty Measures

	Sinclair and Xie Regulatory Uncertainty	BBD EPU	BBD Regulatory EPU	HHLT Political Risk
Sinclair and Xie Regulatory Uncertainty	1			
BBD EPU	0.3420 (p=0.000)	1		
BBD Regulatory EPU	0.4339 (p=0.000)	0.6473 (p=0.000)	1	
HHLT Political Risk	0.4316 (p=0.004)	0.8183 (p=0.000)	0.8245 (p=0.000)	1

Figures 2 and 3 plot the regulatory uncertainty index with the EPU index and regulatory EPU index, respectively, from January 1985 to December 2021. Each measure is standardized to mean equal to 0 and variance equal to 1, for comparison purposes. Although the regulatory uncertainty and EPU measures have a relatively low correlation, the two indexes demonstrate several spikes around the same time periods, such as those around Black Monday in 1987, the Lehman Brothers

bankruptcy in 2008, the 2016 presidential election, and the coronavirus outbreak in 2020. Nevertheless, the two indexes also capture some different historical events. For example, EPU surged around the first and second Gulf wars, the 9/11 attacks, and the debt ceiling dispute in 2011, while regulatory uncertainty was relatively undisturbed around those time periods. Instead, a large increase in regulatory uncertainty occurred during January-April 2010, coinciding with the enactment of Obamacare and the Deepwater Horizon oil spill.

Figure 2: Regulatory Uncertainty Index and EPU Index (Monthly)



These variations can be attributed to the two measures capturing different types of policy issues. The EPU index is intended to capture uncertainty around general policies that may affect the economy, while the regulatory uncertainty index is focused on the overall regulatory environment which covers a wide range of regulatory issues. It is not surprising that regulatory uncertainty did not surge around the historical events that are less relevant to regulation, such as the Gulf wars, but rather captures more regulatory developments on healthcare and the environment.

Similar patterns are observed when comparing the regulatory uncertainty index and the regulatory EPU index (Figure 3). Regulatory EPU shows particularly large spikes around the Lehman Brothers bankruptcy and the passage of the Dodd-Frank Act, reflecting its emphasis on financial regulation.

Figure 3: Regulatory Uncertainty Index and Regulatory EPU Index (Monthly)

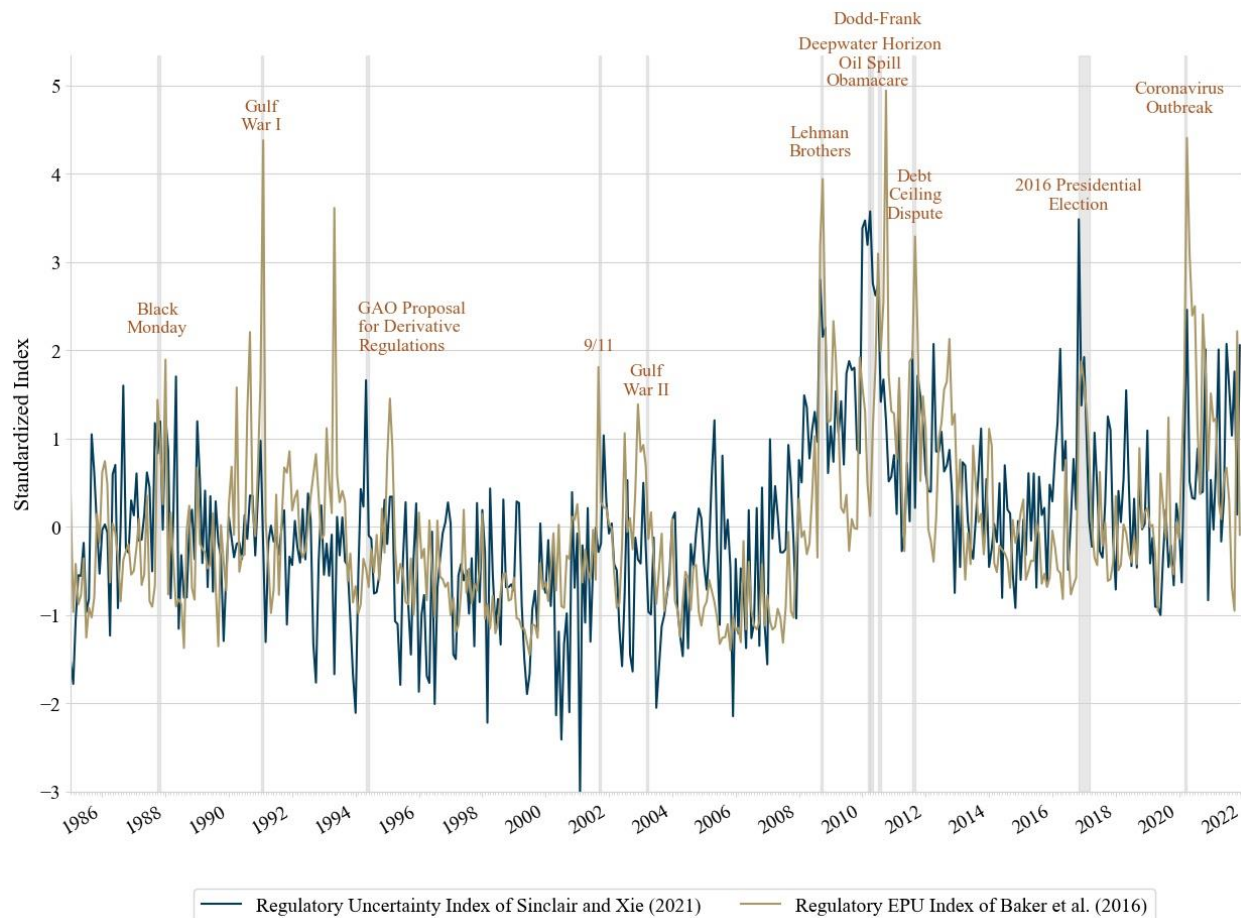
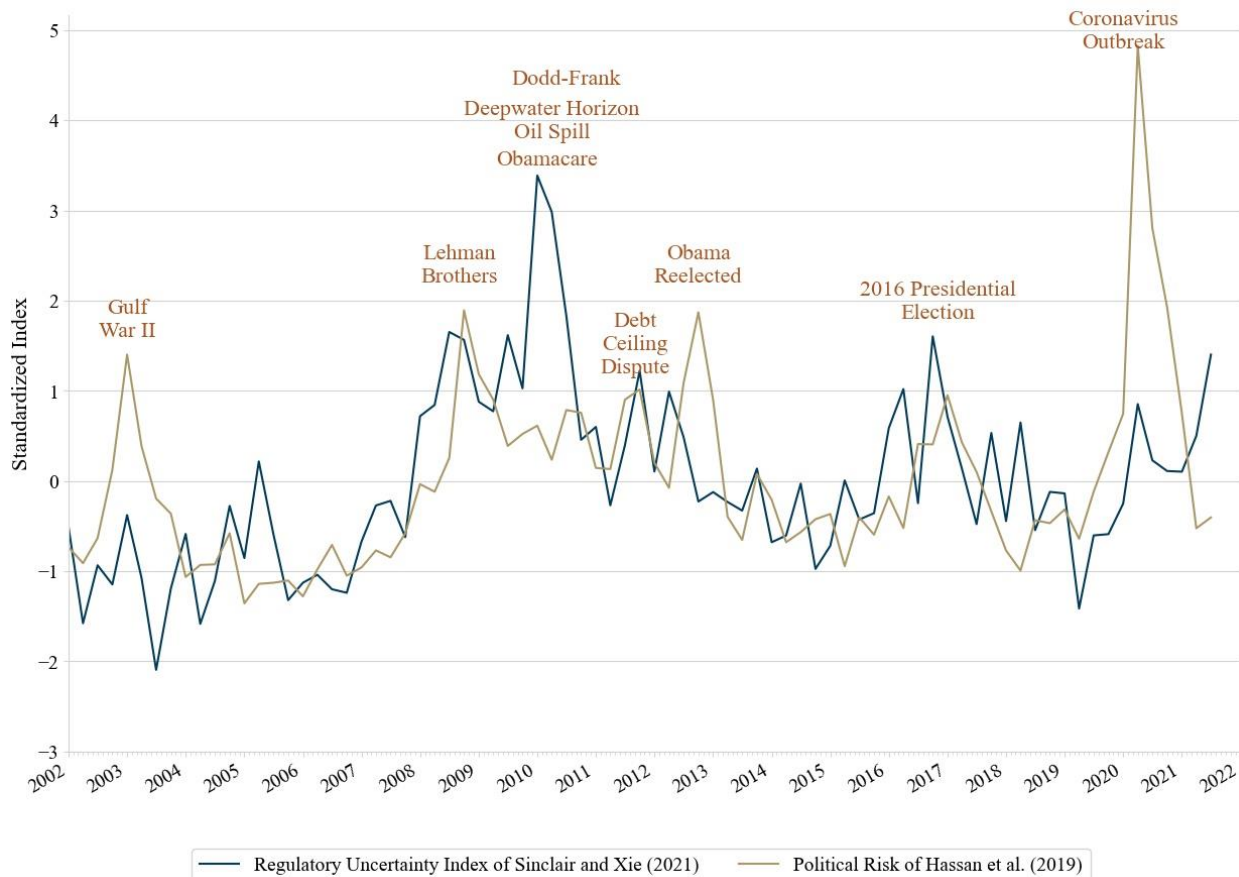


Figure 4 shows the quarterly regulatory uncertainty index and quarterly averages of firm-level political risk measures from 2002:Q1 to 2021:Q3. Given the high correlation between the political risk measure and the EPU, the political risk time series demonstrates similar spikes to the EPU index, such as those around the First Gulf War, Lehman Brothers bankruptcy, and the debt ceiling dispute. As with the EPU index, political risk increased substantially around the coronavirus outbreak, reaching a historical high point. While regulatory uncertainty also increased in the same period, the magnitude is much smaller than the political risk or EPU spikes. One possible explanation is that COVID-19 imposed a substantial degree of uncertainty on firm operations and economic activities but had limited implications for regulation. There was uncertainty around regulatory interventions to control the virus such as travel restrictions and

regulatory approvals of drugs and medical devices, which explains the increase in the regulatory uncertainty index, but such uncertainty may only be a small part of [COVID-induced uncertainties](#). In addition, the large spike in political risk around the reelection of Obama also demonstrates the measure's relatively large emphasis on politics compared to the other measures.

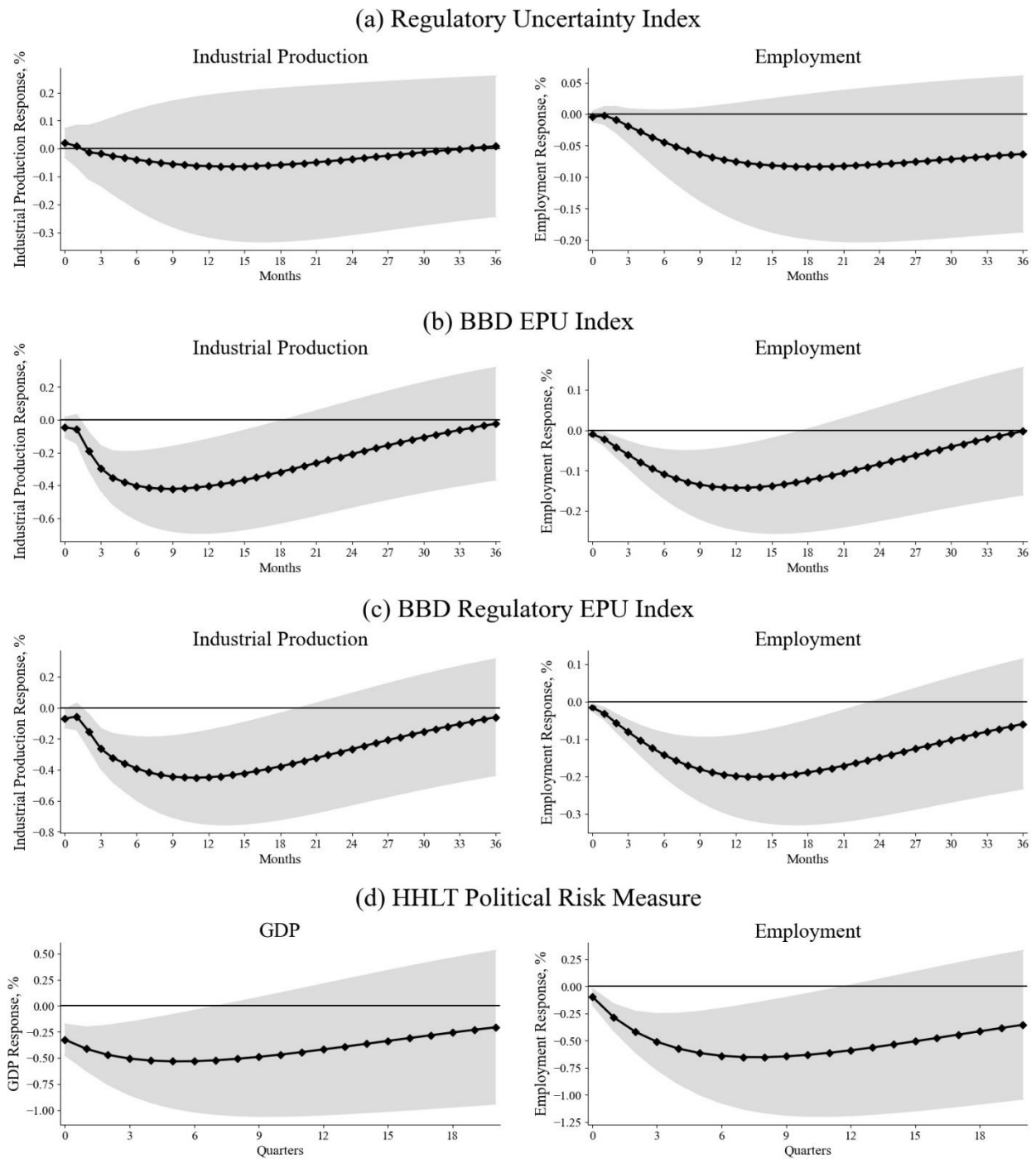
Figure 4: Regulatory Uncertainty Index and Political Risk Measure (Quarterly)



Economic Effects of Policy Uncertainty

Does the relationship between policy uncertainty and economic outcomes vary by the measure of policy uncertainty? I examine this question by investigating how aggregate output and employment respond to a shock to policy uncertainty. To generate comparable estimates, I use the same VAR model and economic data to estimate the impulse responses to a one-standard-deviation shock to each of the policy uncertainty measures. The VAR model follows Baker et al. (2016). The shock is orthogonalized by using the Cholesky decomposition with the following ordering of variables: a policy uncertainty measure, the log of S&P 500 index, the federal funds

Figure 5: Impulse Responses Using Different Policy Uncertainty Measures



rate, log employment, and log industrial production (monthly) or log real GDP (quarterly).³ The VAR includes three lags of all variables in the monthly model and one lag in the quarterly model. I show impulse response functions up to 36 months after the shock. Since COVID-19 introduced an extraordinary degree of policy uncertainty, I exclude the COVID period from the baseline estimation. Therefore the monthly VAR is fit to data from January 1985 to December 2019, and the quarterly VAR is fit to data from 2002:Q1 to 2019:Q4. Including the 2020-2021 data changes some of the impulse response patterns but does not change the major conclusions of this article.

Figure 5 shows the impulse responses of output and employment to a one-time policy uncertainty shock, using different measures of policy uncertainty. As Sinclair and I showed in our paper (using data from January 1985 to August 2020), a regulatory uncertainty shock only leads to transitory drops in future industrial production and employment. Using data through 2019, the effects of a regulatory uncertainty shock become insignificant at the 10 percent level (Panel (a) of Figure 5). In contrast, an EPU or regulatory EPU shock is associated with statistically significant and large drops in output and employment (Panels (b) and (c)). The responses are persistent, remaining significant for approximately 18 months after the shock. This is consistent with the results from Baker et al. (2016). Using quarterly data, the responses of GDP and employment to a political risk shock are also statistically significant and large in size (Panel (d)). These comparisons imply that regulatory uncertainty may not have a significant impact on the aggregate economy. While not examined in this article, Sinclair and I demonstrated in our paper that sentiment about regulation may play a more important economic role than uncertainty about regulation.

Conclusion

In this article, I compare the new regulatory uncertainty index developed in a recent paper with three preexisting measures that capture policy uncertainty: Baker et al. (2016)'s EPU index, their categorical EPU index on regulation, and Hassan et al. (2019)'s political risk measure. These four measures all use rule-based text analysis approaches to assess uncertainty around government policies and political issues over time but differ in how they define policy-related text and how to quantify uncertainty. The resulting measures show variations in historical patterns that coincide with different historical events. Compared to the other three measures, the regulatory uncertainty index captures more regulatory developments on healthcare and the environment.

³ The monthly VAR uses monthly data on employment from the U.S. Bureau of Labor Statistics, effective federal funds rate and industrial production from the Board of Governors of the Federal Reserve System, and monthly averages of the S&P 500 index are from Dow Jones. The quarterly VAR employs quarterly data on real gross domestic product from the U.S. Bureau of Economic Analysis and quarterly averages of effective federal funds rate and S&P 500.

I also examine whether the relationship between policy uncertainty and aggregate economic outcomes varies by the measure of policy uncertainty. Based on the same model and economic data, I show that a shock to EPU, regulatory EPU, or political risk leads to large and persistent drops in future output and employment, while a shock to the regulatory uncertainty index has no statistically significant effects.

The differences between the regulatory uncertainty measure and the other policy-related uncertainty measures are expected. Ultimately, these four measures are not intended to capture the same type of uncertainty. While the regulatory uncertainty index is intended to measure uncertainty about the overall regulatory environment, the EPU and political risk measures clearly reflect uncertainty around broader policy and political issues. Even though the regulatory EPU index is intended to measure policy uncertainty specific to regulation, it covers only a selected set of regulatory issues given how the regulation-specific text is identified. The analysis in this article shows that the new regulatory uncertainty index, while sharing some overlapping information with other policy uncertainty measures, contains unique information about regulation and different economic implications.