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Abstract

We develop a new monthly indicator of supply bottlenecks using newspaper articles. The supply bottlenecks index (SBI) provides a consistent narrative of supply issues related to wars, natural disasters, strikes and, most recently, the COVID-19 pandemic. Innovations in the SBI have important macroeconomic implications: an increase in the SBI functions as a cost-push shock, decreasing industrial production and employment, and pushing prices up, so that monetary policy faces important trade-offs.

Keywords: bottlenecks, supply disruptions, inflation, monthly index.

JEL classification: E00, F00.

Resumen

En este trabajo se desarrolla un nuevo indicador mensual de cuellos de botella en las cadenas de suministro utilizando artículos de prensa. El índice de cuellos de botella de oferta (SBI, por sus siglas en inglés) proporciona una narración coherente de los problemas de suministro relacionados con las guerras, las catástrofes naturales, las huelgas y, más recientemente, la pandemia ocasionada por el COVID-19. Las innovaciones en el SBI tienen importantes implicaciones macroeconómicas: un aumento del SBI actúa como un *shock* de costes, disminuyendo la producción industrial y el empleo, y presionando al alza los precios, lo que dificulta la actuación de la política monetaria.

Palabras clave: cuellos de botella, interrupciones de suministros, inflación, índice mensual.

Códigos JEL: E00, F00.

1. Introduction

Since the beginning of the Covid-19 pandemic, supply bottlenecks have been one of the key determinants of the global outlook. The global lockdown adopted to fight the health crisis produced severe supply chain disruptions, which hampered the trade of goods within and across borders. The subsequent reopening led to a strong rebound in the global demand for manufacturing goods, unmatched by supply, which worsened disruptions further. In addition, several sectors, such as the semiconductor industry, could not accommodate the increase in demand for electronic products. On top of that, maritime transport, especially in the case of containers, also suffered from supply bottlenecks, due to port congestion caused by local lockdowns. Finally, in 2022, when the disruptions produced by the COVID were subsiding, the invasion of Ukraine heightened those risks, in particular in the case of energy supplies and derived products, like fertilizers, and food.

Supply (or, alternatively, supply chain) disruptions, however, are not new. They occurred before the Covid-19 pandemic, although they were of a more local nature, and were usually caused by wars, strikes or natural disasters. An example of this is the Great Tohoku Earthquake of 2011 in Japan, which created supply chain problems that spilt over the whole Japanese economy (Carvalho et al, 2021). Another example is Hurricane Katrina, which affected port infrastructures, diverting all freight transport to alternative ports (Friedt, 2021).

From an economic point of view, the globalisation of supply disruptions can severely affect inflation, as supply problems transmit through the production chain creating upward price pressures. In the words of the ECB president, Christine Lagarde, when explaining the 50bp interest rate increase implemented in July 2022: "Persistent supply bottlenecks for industrial goods and recovering demand, especially in the services sector, are also contributing to the current high rates of inflation".[1] At the same time, supply disruptions can also strongly depress economic activity, since their impact can have long-lasting and sizeable effects on

[1] ECB press conference, 21st July 2022. Available at: https://www.ecb.europa.eu/press/pressconf/2022/html/ecb.is220721~51ef267c68.en.htmlhttps://www.ecb.europa.eu/press/pressconf/2022/html/ecb.is220721~51ef267c68.en.html

production processes. A survey of supply chain experts by the McKinsey Global Institute (2020), found that supply disruptions may reduce firms' annual profits by more than 40% over a period of 10 years. In this sense, these linkages have been thoroughly studied by the theoretical literature on the importance of input-output networks (Baqaee and Farhi (2022), Acemoglu and Tahbaz-Salehi (2020), Bonadio et al (2021)).

However, the empirical evidence on the macroeconomic impact of supply bottlenecks is very limited. We also contribute to closing this gap by developing a high-frequency measure of supply disruptions and studying its impact on inflation and output through a VAR. In particular, we construct a Supply Bottlenecks Index (SBI), based on newspaper data, for the United States (starting in 1990), United Kingdom, Germany, France, Italy, Spain and China.

We define supply disruption as a negative event related to supply provision or the functioning of supply chains. We follow the methodology developed by Baker, Bloom and Davis (2016), to construct text indices of economic policy uncertainty for different countries and other topics such as geopolitical risk (Caldara and Iacoviello, 2022) or trade policy uncertainty (Caldara et al., 2020). Our strategy relies on counting the relative frequency of the number of articles that contain some chosen words, belonging to two semantic groups. In English, the first group contains words related to the topic of supply chains, such as "supply chain, supply chains, supply, supplies". The second group of words includes terms reflecting a negative tone or the existence of problems or disruptions, like "bottleneck, bottlenecks, shortage, shortages, woe, woes, disruption, disruptions, problem, problems, scarcity, scarcities, lack, delay, delays, backlog, backlogs". For the article to be identified as reflecting supply concerns, a word from each one of the two groups must be present within a range of ten words. In the case of the euro area economies, we rely on natives to translate the words to national languages, while the Chinese index is based on news from international and domestic sources in English.

This paper improves the existing measures of bottlenecks available on several dimensions. First, our text-based procedure guarantees the selection of only supply-side events. We confirm this through two exercises. On the one hand, we check that the news generating the main spikes of the index are related to supply bottlenecks. Before the Covid pandemic, we find several spikes that correspond

closely to identified supply disruptions, such as strikes, Hurricane Katrina, or the Gulf War. After the Covid pandemic, although our index explodes, the spikes are related to the lack of global supplies such as semiconductors, raw materials, medical equipment and Covid vaccines. On the other hand, we use Word Embedding, an unsupervised machine learning technique, to show that our word selection only identifies supply chain pressures in the case of the New York Times for the US. On the contrary, the widely used monthly Purchasing Managers' Index (PMI) surveys on delivery times, backlogs or purchased stocks, react to both demand and supply issues, as shown by Benigno et al. (2022).

Second, the high-frequency nature of the indicator, which can be retrieved daily, allows for a real-time analysis of bottlenecks and helps to better identify shocks to macro variables[2]. Survey-based indicators tend to be more lagging, like the monthly PMIs or the quarterly survey on restrictions of production by the European Commission. Moreover, we show that our index for the US leads the monthly one developed by Benigno et al (2022).

Third, our index spans a longer sample and covers the whole economy. In the US case, the index is based on daily article searches from 11 nationwide newspapers since 1990, while the European indices start in the early or mid-2000s. Other supply bottlenecks indices based on text, such as Young et al (2021), using the quarterly S&P earnings calls as a source of information, are available for a more limited period.

In addition, we provide VAR evidence showing that the news-based index has a relevant impact on production, unemployment and prices, in the US and in a panel of six economies (US, UK, Germany, France, Italy and Spain). Our results suggest that a shock of one standard deviation in the index rises both unemployment and prices, and decreases industrial production.

The paper is organised as follows. In the first section, we start by defining and measuring supply disruptions. Section 2 shows a variety of checks that verify the plausibility of the SBI index and compare it with existing supply chain indicators. Section 3 presents VAR evidence on the macro impact of supply bottlenecks. Finally, section 4 concludes.

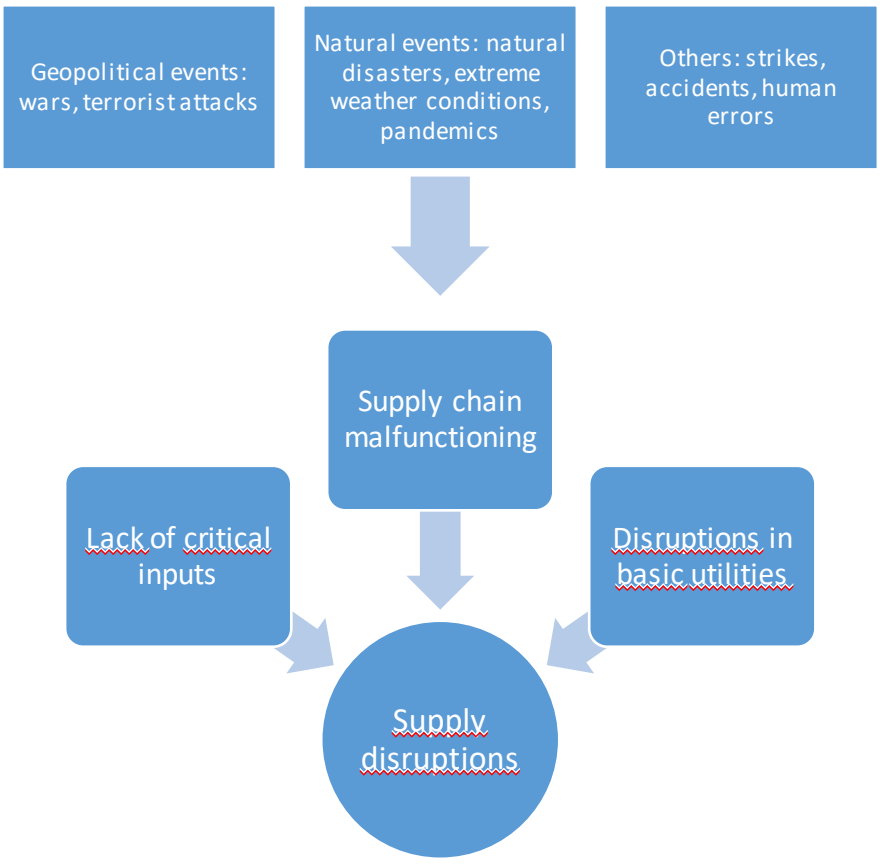
[2] Other high-frequency indicators, such as the Baltic Dry Index or the Harpex Index for maritime transport, only cover particular sectors and thus are more related to trade dynamics.

2 The supply bottlenecks index

2.1 Definition of supply disruptions

In line with the literature, we define a supply disruption as a negative event related to supply provision or the functioning of supply chains (see also Young et al (2021)). These events might be anticipatory (for example, the possibility of a supply shortage due to port congestion at the source of imports) or realized (such as energy shortages after a blackout). Figure 1 shows the main sources of supply disruptions we are considering. They include geopolitical events, such as wars and terrorist attacks; natural phenomena, like natural disasters, extreme weather conditions or pandemics; and a variety of other human-related events, such as strikes, accidents or human errors, which can give rise, for instance, to transportation issues or power outages. These events may lead to supply chain disruptions or lack of critical inputs when happening in foreign economies (such as the ones reported during the Covid crisis or the invasion of Ukraine), and to the destruction of capital and lack of provision of basic utilities in the directly-affected country.

Figure 1: Diagram of main sources of supply disruptions



2.2 Constructing a newspaper supply bottlenecks index

The methodology followed in this article to construct the supply bottlenecks index using newspaper articles from Factiva is the following. First, in line with Baker et al. (2016) or Young et al. (2021), we set two groups of words, one with the terms 'supply' and 'supply chain', that aim to capture the nature of the article, and then we search if within ten words[3], before or after each of the terms of the first group, appears a word of the second group, which is related to negative sentiment words such as "bottleneck", "shortage", etc. In particular, the words in English used for the United States and the United Kingdom to compute our supply bottlenecks index are:

1) supply chain, supply chains, supply, supplies

2) bottleneck, bottlenecks, shortage, shortages, woe, woes, disruption, disruptions, problem, problems, scarcity, scarcities, lack, delay, delays, backlog, backlogs.

Second, we follow the approach of Baker et al (2016) to construct the index from the selected articles (see Appendix A for a detailed description of the procedure). For each newspaper, we divide the number of articles that comply with our search by the total number of articles published. This ratio is then standardised by dividing it by the standard deviation of the subsample of that newspaper previous to 2022. The supply bottlenecks index (SBI) is calculated as the average value for all newspapers in each country. To make the indices comparable across countries the SBI of each country is divided by the mean of its subsample previous to 2022 and multiplied by 100[4]. Finally, to avoid the impact of outliers at each date only the newspapers with a significant number of articles for that month are included in the index.

Using this methodology, supply bottlenecks indices for seven different countries are constructed: United States, United Kingdom, Germany, France, Italy, China and Spain. The list of words chosen is translated into the languages of the non-

[3] We present robustness exercises around this window in Appendix D.
[4] This standardization is done to avoid the problem that raw counts vary substantially across newspapers and time.

English speaking countries by native speakers and adapted when necessary. For example, in the case of Germany, a new third group of words was added to account for the fact that the German language has words that by themselves mean "supply bottleneck" such as 'Versorgungsengpass'. Thus, in the German search, we count the article as 1 if we find the same search as for the other languages (groups 1 and 2) or any word of group 3.

In addition, we ensure that the newspaper articles refer to supply bottlenecks developments in a specific country by using a Factiva option that restricts the search to the articles related to that country.[5]

The list of newspapers and words used in the respective language to build each country index is described in Appendix A. For the case of the United States, these are the following: USA Today, the Miami Herald, the Chicago Tribune, the Washington Post, the Los Angeles Times, the Boston Globe, the San Francisco Chronicle, the Dallas Morning News, the Houston Chronicle, the Wall Street Journal and the New York Times; and the time period goes from the first of January of 1990 until today.[6]

2.3 Results and validation of the index

The evolution of the monthly SBI for the US is shown in Figure 2. The index increased dramatically in 2020, as a result of the Covid-19-related supply disruptions, and has remained at this higher level until today. In Figures 3 and 4 we show the evolution of the SBI over, respectively, the pre-Covid and post-Covid subsamples. Similar dynamics are observed for all the countries considered, but for brevity's sake we concentrate in the main text on the results relative to the US and leave the analysis for the other countries in Appendix B.

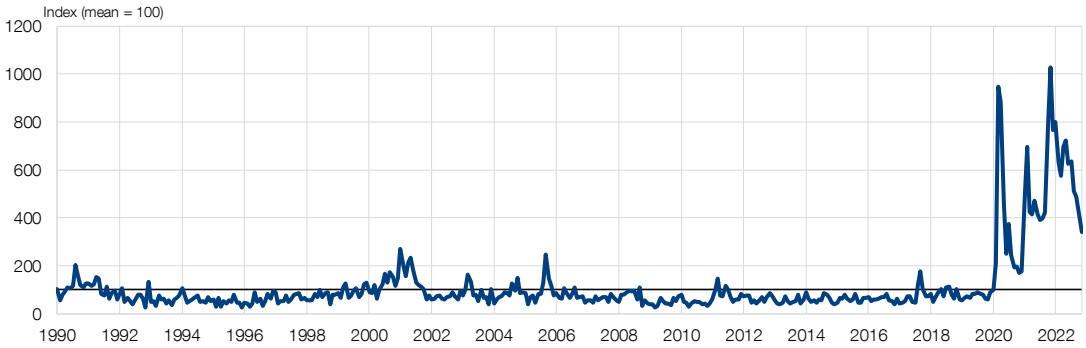
[5] Factiva allows to select only the region that an article is about.

[6] For instance, for United States there is only available data for all the sample for 4 newspapers: LA Times, the San Francisco Chronicle, the Houston Chronicle, The New York Times. The rest of newspapers join the index when their data becomes available in Factiva (in parenthesis the time they joined the index): The Washington Post (December 1997), the Chicago Tribune (January 2000), The Wall Street Journal (April 2001), the Miami Herald (June 2001), the Boston Globe (September 2001), the USA Today (February 2002) and the Dallas Morning News (May 2003).

2.3.1 Checking the historical events driving the index

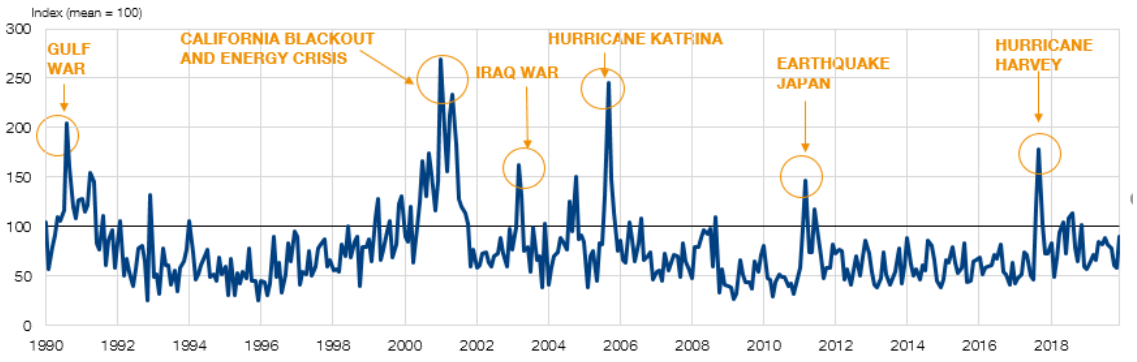
To understand the evolution of the index and ensure that it is correctly capturing supply disruptions, we report in the charts the main events behind the spikes. This is achieved by reading the articles that comply with our search criteria on each date. In particular, we consider as spikes all the observations that are one standard deviation above the mean, using sample-specific mean and standard deviation for the pre-Covid and the post-Covid sample. We highlight in yellow in the charts below the main events behind the local maxima of the US SBI index. A similar graphical analysis is performed in Appendix B for the other countries.[7]

Figure 2: United States Supply Bottlenecks Index (full sample)



Notes: US Supply Bottlenecks Index (SBI) from 1990 until November 2022. US SBI is normalized to 100 throughout the 1990–2021 period.

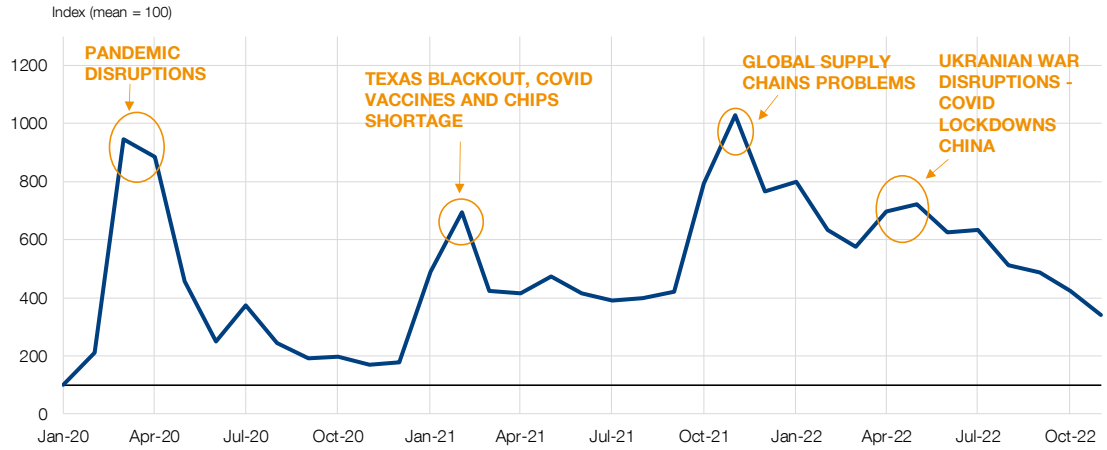
Figure 3: United States Supply Bottlenecks Index (before Covid)



Notes: US Supply Bottlenecks Index (SBI) from 1990 until the end of 2019. US SBI is normalized to 100 throughout the 1990–2021 period. We describe in yellow the main events behind the spikes of the US SBI.

[7] For the rest of countries in the post-Covid period, we include in the charts some additional peaks that would be left out following the restrictive one-standard-deviation criterion.

Figure 4: United States Supply Bottlenecks Index (after Covid)



Notes: US Supply Bottlenecks Index (SBI) from 2020 until November 2022. US SBI is normalized to 100 throughout the 1990–2021 period. We describe in yellow the main events behind the spikes of the US SBI.

Figure 3 shows that the main spikes in the pre-Covid period are related to three kinds of events: wars, natural disasters and energy crises. For instance, the US SBI captures the impact on supply chains of the Gulf and Iraq wars, Hurricanes Katrina and Harvey, the Japan Earthquake of 2011, and the energy crisis in California. Instead, after 2019 (see figure 4) spikes are related to the disruptions caused by the Covid-19 pandemic and the invasion of Ukraine, the global supply chain problems in health and energy products, semiconductors and raw materials, as well as logjams in maritime transport.

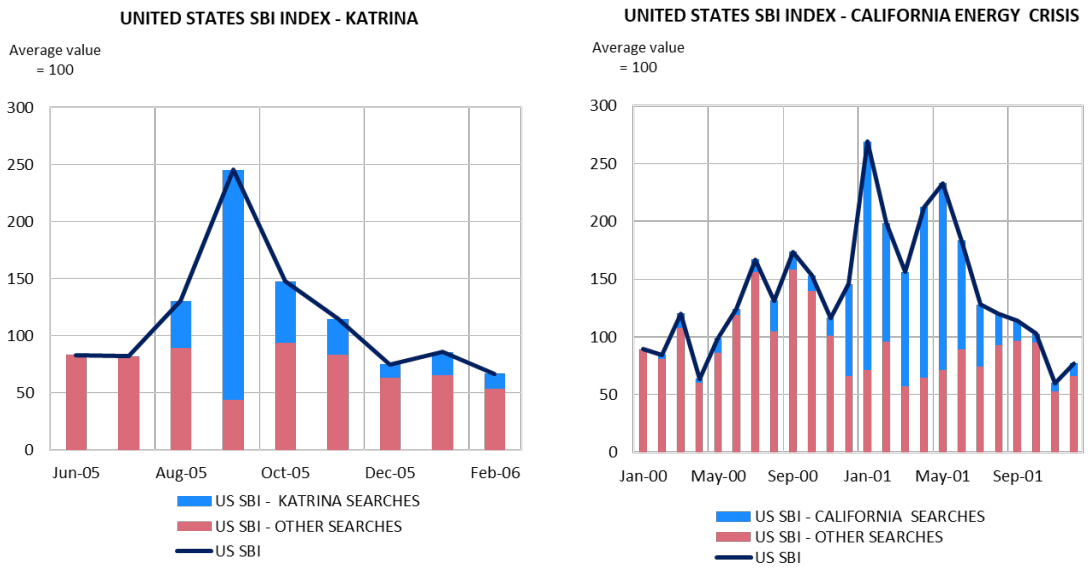
The table in Appendix E reports a more detailed description of the events behind SBI's spikes, for the US and for all the other countries. The results of this audit exercise let us conclude that SBI's spikes capture correctly both local and global events leading to supply bottlenecks.

2.3.2 Supply bottlenecks narratives

The text-based nature of our index also allows for a detailed narrative analysis of the contribution of specific events to aggregate bottlenecks. For example, hurricane Katrina hit the US in the summer of 2005, causing supply disruptions and fears of oil supply shortages due to damages at the Gulf Coast refineries. In Figure 5 (left-hand panel), we show that hurricane Katrina contributed significantly to the increase in the US SBI index over August and September of 2022. In particular, we count any article that includes our standard search plus the term "Katrina" in any place of the article. Similarly, in the right-hand panel

of Figure 5, we show that the increase in the US index observed at the beginning of 2001 was mainly due to the energy crisis in California. To wit, we relate to the energy crisis any article that includes our standard search plus a second search in any place of the article encompassing two additional groups of words, one related to the cities and the region of "California"[8], and a second one related to "electricity" and "fuels" [9], which have to appear within ten words before or after each of the terms of the first group.

Figure 5: Contributions of specific news around the date of important supply chain events



Notes: US Supply Bottlenecks Index (SBI) evolution around Hurricane Katrina (2005, left) and California energy crisis (2000-2001, right). The US SBI is normalized to 100 throughout the 1990–2021 period. In blue, the contribution of the specific news about these topics to the index, calculated as described in Appendix A.

2.3.3 Using machine learning techniques to validate the word selection

In order to further validate the news searches, we apply the Word Embedding techniques that were first introduced by Mikolov et al. (2013). According to Word Embedding, the text of an article is a continuous vector representation of words in a suitable low-dimensional Euclidean space, and, therefore, syntactic and semantic similarities between words can be captured by associating words with a similar meaning with vectors that are closer to each other. The main idea is to

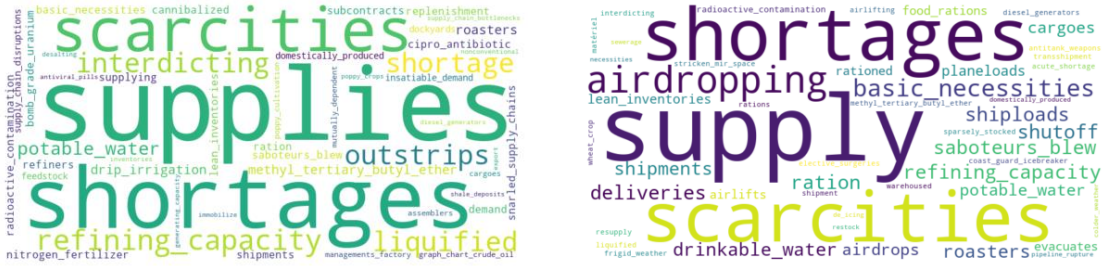
[8] Namely, "California", "San Jose", "San Francisco", "San Diego", "Los Angeles".
[9] "Electricity", "blackout", "blackouts", "power", "energy" and "fuel".

obtain a substantial amount of the meaning of a word from its context words, that is, from the words surrounding it (Moreno Pérez and Minozzo, 2022).

In particular, we use Word Embedding to validate the words that would be more useful to describe supply bottlenecks. In order to do this, we concentrate on the headlines, the snippets and the first paragraph of the articles of the New York Times from the first of January 1990 until the end of June 2022[10].

Figures 6 to 8 show word clouds with the 50 most similar words or combinations of words (tokens) to the vectors of words used to define the index: 'supply', 'supplies', 'supply chain', 'supply chains', 'supply chain bottlenecks', and 'supply chain disruptions'. The bigger the size of the words, the higher the similarity with the word of reference. For instance, Figure 6 shows that 'supply' (left-hand side) and 'supplies' (right-hand side) tend to appear more often close to words related to bottlenecks such as 'shortages' or 'scarcities' and to products that have suffered shortages since the Covid crisis and the Russian-Ukrainian war such as 'antiviral_pills' or 'nitrogen fertilizer'.

Figure 6: Word clouds of the 50 most similar words to the tokens 'supply' (left) and 'supplies' (right).



Notes: These word clouds show the 50 most similar tokens to the vectors of the tokens 'supply' (left-hand side) and 'supplies' (right-hand side) according to our results of Word Embedding. We excluded the words related to personal names, companies, countries and regional names.

According to Figure 7 the words 'supply chain' (left) and 'supply chains' (right) are related to sectors that have suffered supply chain disruptions in the US and Europe such as 'semiconductor_manufacturing_equipment', 'meat_processing_plants or 'chipmaking' and to trade policy terms such as 'aluminium_tariffs', or 'retaliatory_tariffs'.

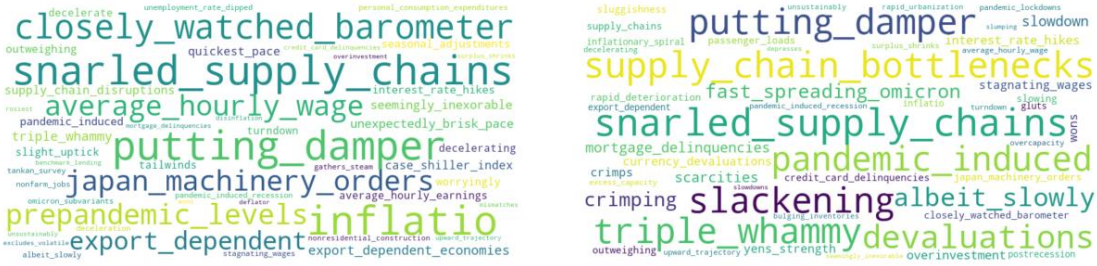
[10] We compute the bigrams of the words with a frequency higher than 100 and the trigrams with a frequency higher than 150. We perform these computations using Word2Vec of the Gensim Python library.

Figure 7: Word clouds of the 50 most similar words to the tokens 'supply chain' (left) and 'supply chains' (right).

Notes: These word clouds show the 50 most similar tokens to the vectors of the tokens 'supply chain' (left-hand side) and 'supply chain' (right-hand side) according to our results of Word Embedding. We excluded the words related to personal names, companies, countries and regional names.

Figure 8 shows that the words 'supply chain bottlenecks' and 'supply chain disruptions' tend to appear close to several 'words' with negative meanings such as 'slowdown', 'slackening' or 'decelerating'. Moreover, these words were often employed in the context of the pandemic, since they were often associated with Covid-related clauses, such as 'fast_spreading_omicron' or 'pandemic_induces', as well as to words related to the resulting economic crisis and higher prices, such as 'inflationary_spiral'.

Figure 8: Word clouds of the 50 most similar words to the tokens 'supply chain bottlenecks' (left) and 'supply chain disruptions' (right).



Notes: These word clouds show the 50 most similar tokens to the vectors of the tokens 'supply chain bottlenecks' (left-hand side) and 'supply chain disruptions' (right-hand side) according to our results of Word Embedding. We excluded the words related to personal names, companies, countries and regional names.

2.3.4 Relation with other measures

Our index seems to be a better measure of supply-side disruptions than the other measures available in at least three dimensions: it ensures the selection of only supply-side events; its high-frequency nature allows for a timelier analysis; and it covers the whole economy.

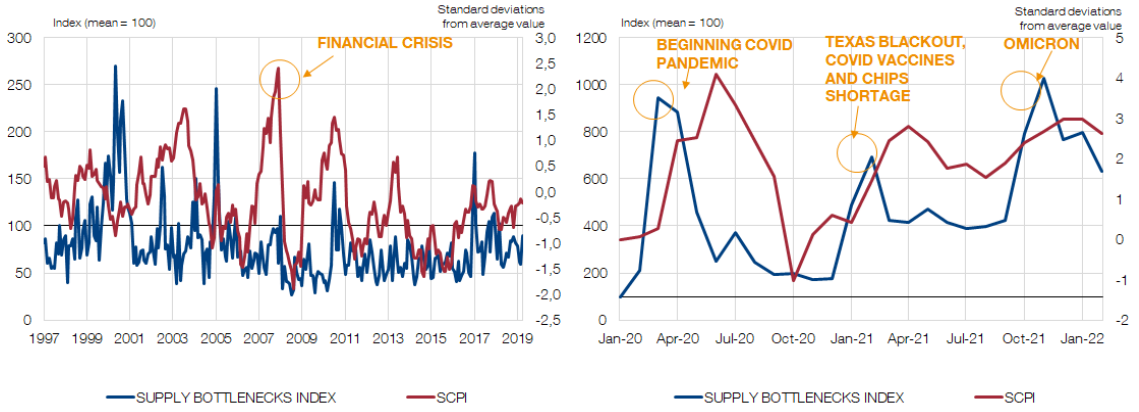
First, our text-based procedure guarantees the selection of only supply-side events. As shown in the previous section, the spikes of the index are related to supply-side bottlenecks. Before the Covid pandemic, we find several spikes that correspond closely to identified supply disruptions, such as strikes, Hurricane Katrina, or the Gulf War. After the Covid pandemic, although our index explodes, the spikes are related to the lack of global supplies such as semiconductors, raw materials, medical equipment and Covid vaccines. This is confirmed first in the previous section by using a narrative approach which confirms that most of the increase in the index around two specific events, the California energy crisis of 2001 and Hurricane Katrina in 2005, is in fact due to these events. In addition, using Word Embedding techniques (see previous section) we find that the words closer to our word criteria are related to supply chain pressures.

On the contrary, the widely used monthly PMI surveys on delivery times, backlogs or purchased stocks, seem to react to both demand and supply issues, as shown by Benigno et al. (2022). In turn, the measure proposed by these authors to try to correct these shortcomings of the monthly PMIs indicators of supply constraints by cleansing them of demand shocks, still falls short of our measure. In particular, when we compare our index for the US to the Supply Chain Pressures Index (SCPI) proposed by Benigno et al. (2022), we find a moderate correlation between both indices for the pre-Covid period (see left-hand side of Figure 9). The highest spike in the SCPI index is related to the financial crisis – a period for which there is little evidence of supply bottlenecks—, while the highest spike of our SBI is produced by the 2001 California blackout and energy crisis, followed by the impact of the 2005 hurricanes Rita and Katrina. Both indices capture the increase in supply disruptions after the Japan earthquake in 2011, but the SCPI shows little movement around hurricane Katrina. During the pandemic period, on the contrary, the two indices are more correlated (see right-hand side of Figure 9).

Similar results are found when comparing the US SBI with other more general measures of uncertainty, like the index of Economic Policy Uncertainty developed by Baker et al. (2016). In Figure 10 we show that war events tend to increase both indices, while natural disasters only increase the SBI. Table 1 in appendix C reports the correlation of the monthly SBI and EPU with several economic variables in the pre-Covid period (results for the whole sample are similar, although in general the cross-correlation of economic variables increases).

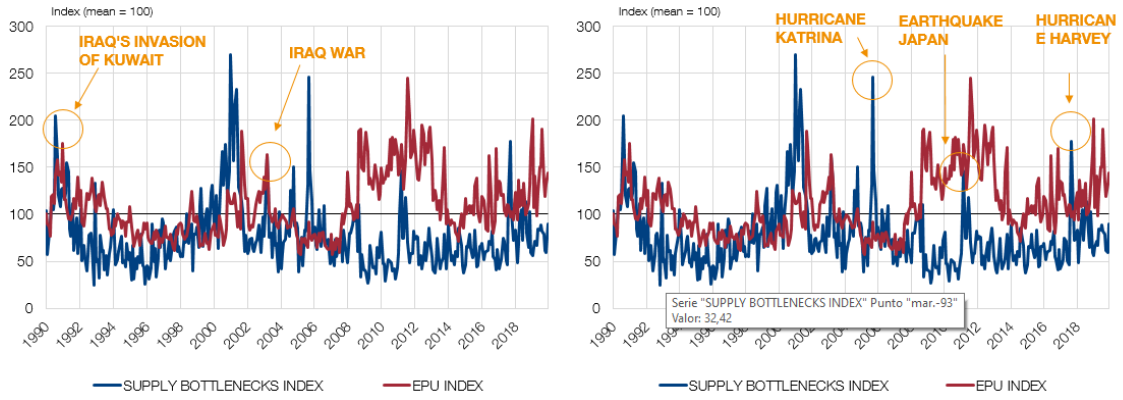
Interestingly, unlike the EPU, the SBI is not correlated with oil price or consumer sentiment developments.

Figure 9: Comparison of US SBI with NY Fed's US SCPI - before Covid (left) and after Covid (right).



Notes: US Supply Bottlenecks Index (SBI) and NY Fed's US SCPI (Benigno et al., 2022) from 1997 until March 2022. The SBI is normalized to 100 throughout the 2001–2021 period.

Figure 10: Comparison of US SBI with US EPU - wars (left-hand side) and natural disasters (right-hand side).

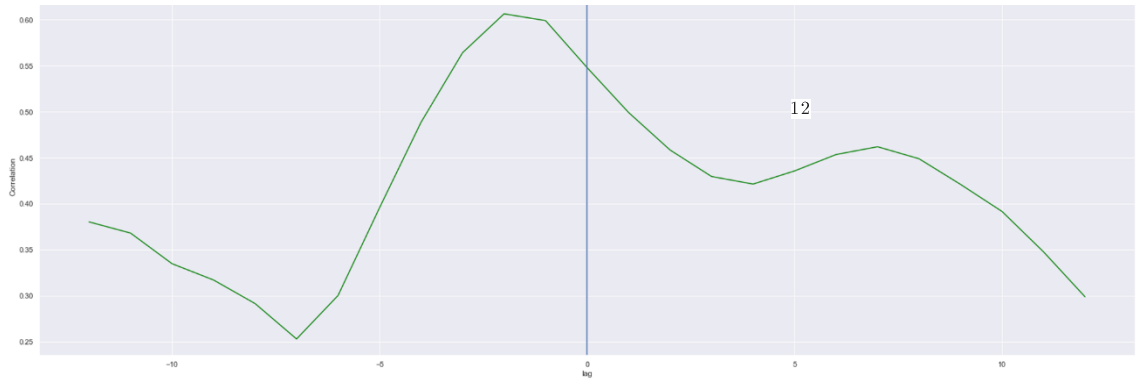


Notes: Comparison of US SBI with US EPU - wars (left-hand side) and natural disasters (right-hand side) from 1990 until 2019. The US SBI is normalized to 100 throughout the 1990–2021 period.

Second, the high-frequency nature of the indicator, which can be retrieved daily, allows for real-time analysis of bottlenecks and helps to better identify shocks to macro variables[11]. Survey-based indicators tend to be more lagging, like the monthly PMIs or the quarterly survey on restrictions of production by the

[11] Other high-frequency indicators, such as the Baltic Dry Index or the Harpex Index for maritime transport, only cover specific sectors, being especially related to trade dynamics.

Figure 11: Dynamic correlations of US SBI with US Supply Chain Pressure index (1997-2022)



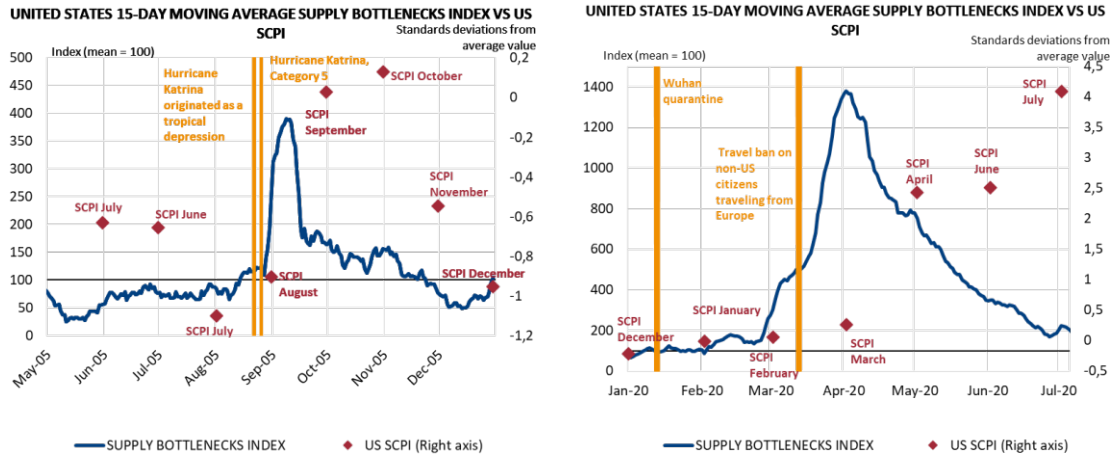
Notes: Dynamic correlations from of US SBI with US Supply Chain Pressure index 1997 until March 2022. The US SBI is normalized to 100 throughout the 1990–2021 period.

European Commission. In this sense, our index for the US tends to lead the monthly one developed by Benigno et al (2022). The dynamic maximum (monthly) correlation between the two indices (see Figure 11) is achieved with two lags of the news-based SBI index. Furthermore, a Granger-causality test finds that the SBI causes (in the sense of Granger) the SCPI.[13] We observe this in two particular events such as in Katrina and in the Covid crisis. For instance, as shown in Figure 12 (left panel), after Hurricane Katrina reached Category 5 at the end of August 2022, the US SBI increased during the first half of September, a month before the US SCPI data for September would have been available. This is even clearer during the Covid Crisis (see right panel of Figure 12), when the SBI index started to increase in early February, reaching historical maxima during March, capturing the diverse problems in supply due to the Covid crisis, whereas the SCPI did not show any signs of bottlenecks until the beginning of May, when the data of April was available.

Third, our index spans a longer sample and covers the whole economy. In the US case, the index is based on daily article searches from 11 nationwide newspapers since 1990, while the European indices start in the early or mid-2000s. Other supply bottlenecks indices commonly used only cover specific sectors, like the Harper and Baltic maritime trade indices (which are based on the prices of maritime trade across different locations), or lack a sufficiently big sample to

[12] A similar result was found when estimating the correlation between a similarly constructed SCPI and the SBI in the rest of the countries in our sample. Results are available upon request.

Figure 12: United States 15 days moving average supply bottlenecks index vs US Supply Chain Pressure Index



Notes: Evolution of the US SBI (blue line, left axis) and US Supply Chain Pressure index from Benigno et al (2022) (red dots, right axis), around Hurricane Katrina and the first wave of Covid-19. The US SBI is normalized to 100 throughout the 1990–2021 period. The US Supply Chain Pressure index is measured in standard deviations from the average value.

provide inference, such as the Small Business Pulse Survey in the US, or cover a more limited period, like the text-based index in Young et al. (2021), which uses quarterly S&P earnings calls as a source of information.

3 Macro impact of supply-side disruptions

To study the macro impact of the supply-side disruptions identified by the SBI, we follow Baker et al. (2016) and construct a monthly VAR identified using a Cholesky decomposition in which we include the following 7 variables, in the stated order: the bottleneck index, the Economic Policy Uncertainty index, the stock price index (S&P 500), the official interest rate (Fed funds), log employment, log industrial production and log Consumer Price Index, plus a constant. We include 2 lags in all specifications, following the Schwarz criterion.

The supply chain bottlenecks are clearly not purely exogenous variables (or shocks), since, for example, they are more binding when demand intensifies. To control with the VAR methodology for this potential feedback between activity and supply chain bottlenecks, we use the fact that bottlenecks are unlikely to react contemporaneously to activity. In fact, firms usually use inventories to accommodate demand shocks, and they increase their inventories when the supply chain risk is higher (Carreras Valle, 2021). This means that the Cholesky identification proposed, placing the SBI index first and the activity variables last,

should be adequate. That is, we assume that shocks to the domestic variables may only be reflected with a lag in the bottlenecks index (as contemporaneous shocks will be absorbed by inventories), while supply chain disruptions may affect contemporaneously activity and prices.

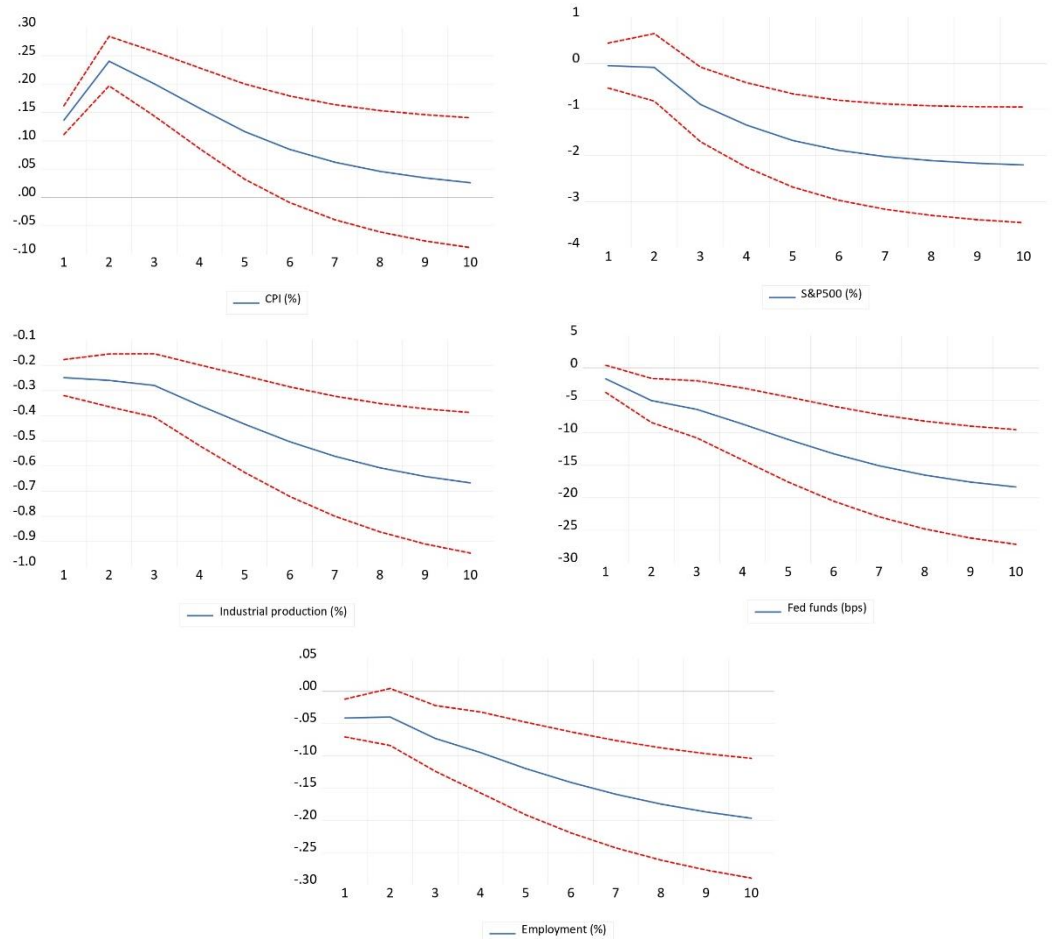
In our benchmark specification, we restrict the sample to the period January 1999 to January 2020. This strategy avoids the use of the latest period, which is not comparable with the previous period as a result of the great negative effect of the Covid pandemic.

The results are presented in Figure 13. In particular, a shock of one standard deviation to the SBI (resulting in an increase of 60 points in the index over the whole sample) induces a significant decrease in employment of around 0.2 pp after 10 months, and a decrease in industrial production of 0.7 pp after 10 months. The effects on financial variables are more moderate, with a non-significant decrease in stock prices on impact and a decrease of around 2% after 10 months, together with a small (and non-significant during the first quarter) decrease in the Fed funds rate. As for prices, the VAR evidence confirms the SBI shock is a pure supply shock: prices rise significantly on impact, with CPI increasing by 0.25 pp in the first two months after the shock.

In Figure 14, we compare these results with those of a standard measure of economic policy uncertainty, the EPU by Baker et al. (2016). The size of the shocks is the same as before (a one standard deviation of the index, corresponding to an increase of 60 points in the index). The effects on industrial production and employment are also quite comparable. However, the EPU has a stronger impact on financial variables, which is consistent with the high relevance of uncertainty for stock prices. Interestingly, while the CPI is not affected by the EPU shock, it increases in the case of the SBI shock. As the SBI shock is a persistent supply shock, monetary policy faces a trade-off between prices and activity, which is reflected in the more cautious response of the Fed funds rate in the case of the SBI shock.

In Figure 15, we present several robustness exercises around our benchmark specification (blue line) for the response of industrial production. First, we include the Michigan consumer sentiment (orange line), ordered after the EPU index. It is well known that the response of economic variables to EPU is less strong when including forward-looking consumer variables. In the case of the SBI, the results

Figure 13: Impulse responses to an SBI shock in the US (1990-2020)



Notes: Monthly VAR from January 1990 to January 2020 identified using a Cholesky decomposition in which we include 7 variables, in the stated order: the SBI, the Economic Policy Uncertainty index, the stock price index (S&P 500), the official interest rate (Fed funds), log employment, log industrial production and log Consumer Price Index. We include 2 lags in all specifications, following the Schwarz criterion. The shock is an increase of 60 points in the SBI. The red lines denote 1 standard deviation confidence bands.

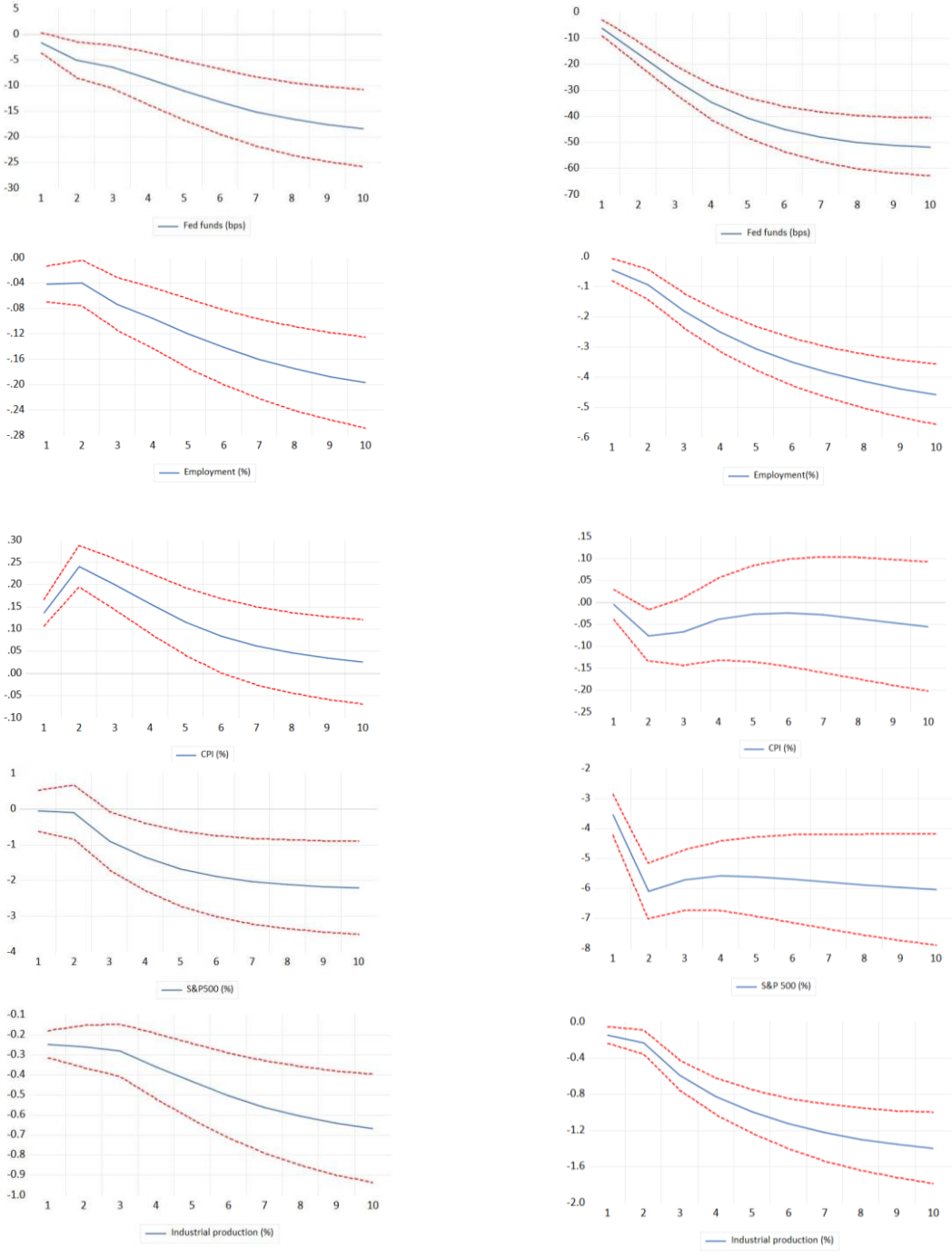
remain unchanged. Second, we change the ordering of variables, by putting the EPU first (green line). The significance of the results is not affected. Finally, we include the oil price as an exogenous variable (red line). As before, it captures some of the effects of the benchmark VAR, but it does not affect the significance of the results.

The next exercise is a comparison with a similar benchmark VAR computed using the SCPI as a bottlenecks indicator. As shown in Figure 16, the effects on the CPI are similar on impact (left-hand side), although more persistent in the case of the SCPI. However, the impact on industrial production (right-hand side) is completely different. Counterfactually, the shock to SCPI increases (non-

significantly) industrial production, while the SBI shock decreases it. We conclude that the SBI is more related to the supply side of bottlenecks.

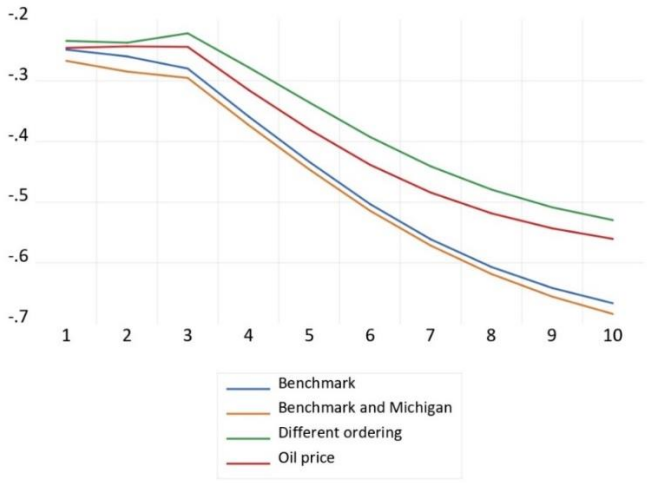
Figure 14: Impulse responses to an SBI shock (on the left column) and the EPU index (on the right column) in the US (1990-2020)

SBI EPU



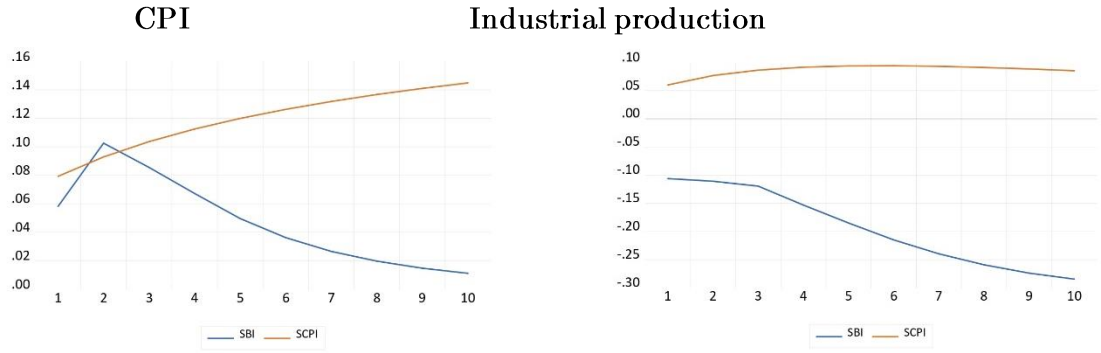
Notes: Monthly VAR from January 1990 to January 2020 identified using a Cholesky decomposition in which we include 7 variables, in the stated order: the SBI, the Economic Policy Uncertainty index, the stock price index (S&P 500), the official interest rate (Fed funds), log employment, log industrial production and log Consumer Price Index. We include 2 lags in all specifications, following the Schwarz criterion. The shock is an increase of 60 points in the SBI (left) and 60 points in the EPU (right). The red lines denote 1 standard deviation confidence bands.

Figure 15: Impulse responses of the industrial production to a SBI shock (robustness).



Notes: Monthly VAR from January 1990 to January 2020 identified using a Cholesky decomposition. The Figure shows the response of industrial production to the SBI shock in the benchmark specification (see notes to Figure 13). The orange line includes 8 variables in the stated order: SBI, the Economic Policy Uncertainty index, the Michigan Consumer Sentiment, the stock price index (S&P 500), the official interest rate (Fed funds), log employment, log industrial production and log Consumer Price Index. The green line includes seven variables in this order: the Economic Policy Uncertainty index, the SBI, the stock price index (S&P 500), the official interest rate (Fed funds), log employment, log industrial production and log Consumer Price Index. Finally, the red line includes seven endogenous variables as the benchmark plus an exogenous one (the oil price. We include 2 lags in all specifications, following the Schwarz criterion. The shock is normalized in all specifications to show an increase of 60 points in the SBI.

Figure 16: Impulse responses of CPI (left) and industrial production (right) to a 1 sd SBI or SCPI shock in the US (1990-2020)

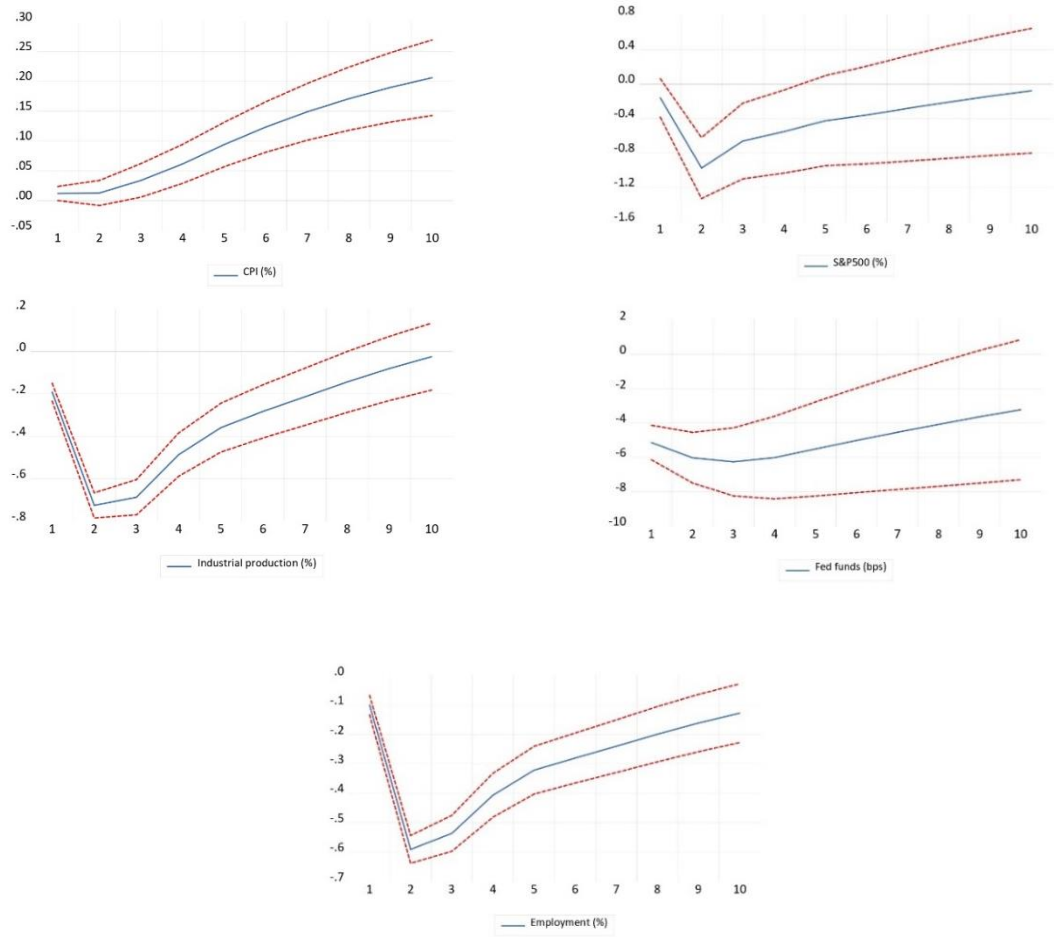


Notes: Monthly VAR from January 1990 to January 2020 identified using a Cholesky decomposition in which we include 7 variables, in the stated order: the SBI (blue) or the SCPI (orange), the Economic Policy Uncertainty index, the stock price index (S&P 500), the official interest rate (Fed funds), log employment,

For robustness, we also report in Figure 17 the impulse responses of a VAR estimated using data for the whole sample available, from January 1990 until

May 2022.[13] Although qualitatively the results are not changed, some differences in the dynamics appear. First, the response of CPI is much more persistent than before. Second, the response of industrial production and employment is more immediate than in the previous exercises, with an immediate fall. This could be caused by the pandemic itself, as it created a very important and sudden bottlenecks shock.

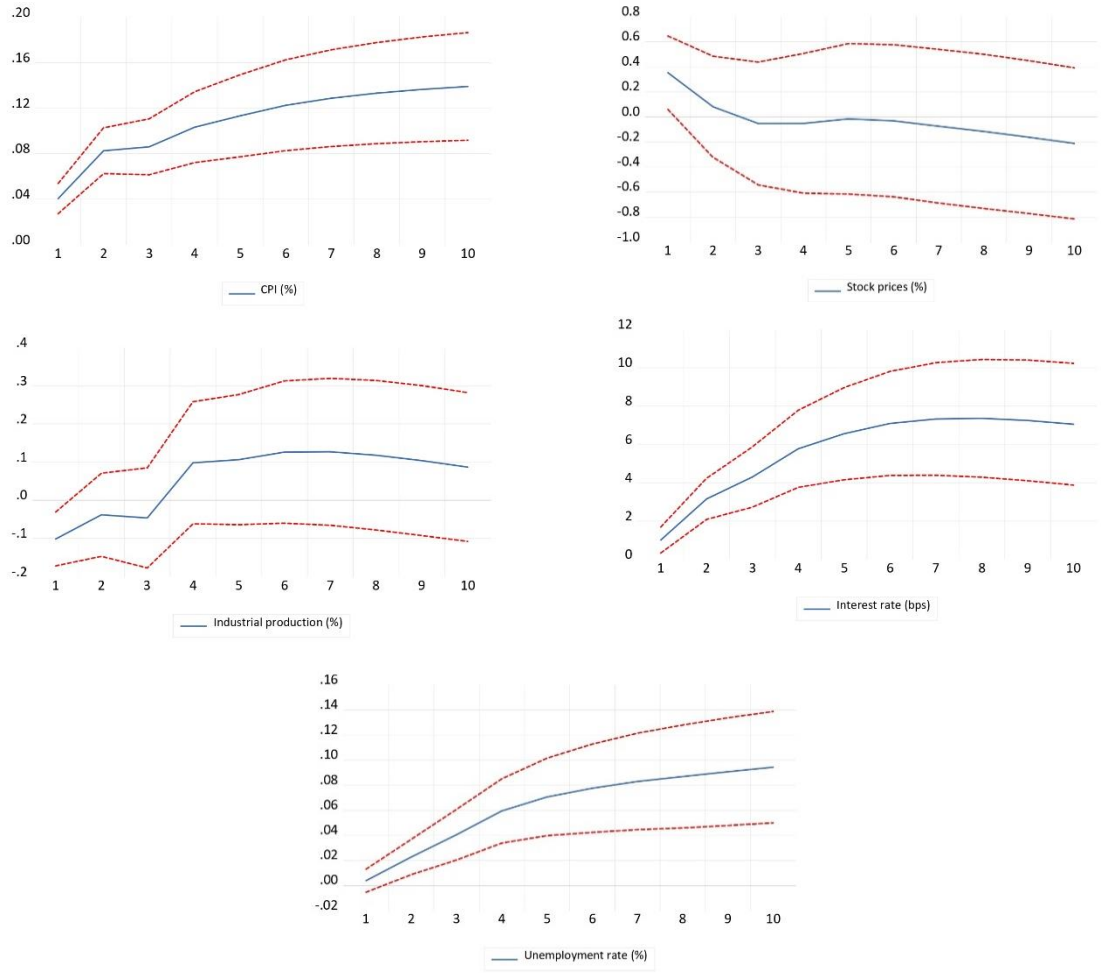
Figure 17: Impulse responses to a 1 sd SBI innovation in the US (Jan 1990-May 2022)



Notes: Monthly VAR from January 1990 to May 2022 identified using a Cholesky decomposition in which we include 7 variables, in the stated order: the SBI (blue) or the SCPI (orange), the Economic Policy Uncertainty index, the stock price index (S&P 500), the official interest rate (Fed funds), log employment, log industrial production and log Consumer Price Index. We include 2 lags following the Schwarz criterion. The red lines denote 1 standard deviation confidence bands. The shock is normalized in all specifications to show an increase of 60 points in the SBI.

[13] The large and persistent spike in the SBI after the pandemic can be thought of as a measure of the prominent importance of these shocks or as a structural change, and therefore it warrants some caution when interpreting the results using the whole sample.

Figure 18: Impulse responses to a 1 sd SBI in the US, UK, Germany, France, Italy and Spain (pre-Covid sample)



Notes: Monthly panel VAR from January 2007 to January 2020 identified using a Cholesky decomposition. The countries included are the US, the UK, Germany, France, Italy and Spain. We include 7 variables: the SBI, the EPU index of each country, a stock price index, the official interest rate, the unemployment rate, log industrial production and log CPI. We include 2 lags following the Schwarz criterion. The red lines denote 1 standard deviation confidence bands. The shock is an increase of 60 points in the SBI.

Finally, we estimate a panel VAR for 6 countries (US, UK, Spain, Italy, France and Germany). The sample ranges from January 2007 to January 2020, given the restrictions on newspaper availability across countries. The shock is also a one standard deviation, equal to a 60 points increase in the index. The panel VAR includes equivalent variables to the ones used before, but we use the unemployment rate, which is available at monthly frequency for all countries. In any case, as shown in Figure 18, the results for unemployment, industrial production and the CPI are qualitatively similar to the ones presented before, although noisier, as it is expected due to the shorter and more heterogeneous sample.

4. Conclusions

We construct an index of supply bottlenecks using newspaper articles. An audit exercise based on a comparison with other possible sources of information, a human-based analysis of the main spikes, and the use of machine learning techniques over a sample of articles, let us conclude that the index captures the main events previously identified in the literature as leading to supply disruptions –including wars, natural disasters, strikes, and the notable supply chain bottlenecks during the Covid-19 pandemic. The index is calculated for the US, the UK, the main economies in the euro area, and China.

The econometric analysis shows that supply bottlenecks have important effects on the economy, leading to a decrease in industrial production and employment, and an increase in prices. Overall, the evidence presented in this paper supports the view that supply bottlenecks should be carefully monitored and addressed by policymakers.

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Appendix A: Definition of the index, newspapers used and data sample

Definition of the SBI index:

1) Define NR_t^i as the number of articles containing the words selected in each newspaper $i = 1, 2, \ldots p$ and time period t.

2) Let $X_t^i = \frac{NR_t^i}{N_t^i}$ be the relative frequency re-scaled by the total number of articles in the same newspaper and period t (N_t^i), to account for the fact that the overall volume of articles varies across newspapers and time, and let T_1 and T_2 denote the time intervals used in the standardization and normalization calculations.

3) Compute the variance and mean of variable X_t^i, in the interval T_1 for each newspaper i

$$\sigma_{T_1}^{X^i} = \sqrt{\sum_{T_1} \left(\frac{NR_t^i}{N_t^i} - \mu_{T_1}^{X^i}\right)^2 / T_1}\ , \ \mu_{T_1}^{X^i} = \sum_{T_1} \frac{NR_t^i}{N_t^i} / T_1.$$

4) Standardize X_t^i by dividing through by the standard deviation for all t. This operation yields, for each newspaper, a series $Y_t^i = \frac{X_t^i}{\sigma_{T_1}^{X^i}}$ with unit standard deviation in the interval T_1.

5) Compute the mean over the p newspapers of Y_t^i in each period t to obtain the series $Z_t = \sum_p Y_t^i / p$.

6) Compute $M = \sum_{T_2} Z_t / T_2$, the mean value of Z_t in the interval T_2.

7) Multiply Z_t by $(100/M)$ for all t to obtain the normalized SBI time-series index $SBI_t = Z_t \frac{100}{M}$.

Therefore, putting all together we have

$$SBI_t = \frac{\sum_p \frac{X_t^i}{\sigma_{T_1}^{X^i}} / p}{\sum_{T_2} \left(\sum_p \frac{X_t^i}{\sigma_{T_1}^{X^i}} / p \right) / T_2} 100.$$

We can calculate the contributions of a subset of news on the index, for example, those related to a particular event like Katrina, in the following manner. Count the number of news amongst those including the selected words which also contain a word describing that event ($NR_t^{S,i}$) and defined the re-scaled frequency of this set of news as $X_t^{S,i} = \frac{NR_t^{S,i}}{N_t^i}$. In the current example we would add the word "Katrina". Then the contribution of this event to the SBI index ($SBI^S{}_t$) would be as follows

$$SBI^S{}_t = \frac{\Sigma_p\left(\frac{X_t^{S,i}}{\sigma_{T_1}^{X^i}}\right)/p}{\Sigma_{T_2}\left(\Sigma_p \frac{X_t^i}{\sigma_{T_1}^{X^i}}/p\right)/T_2} 100..$$

Newspapers and sample:

The time period covered for the United States goes from 1 January 1990 until May 2022. The newspaper used are the following (in parenthesis the time they join the index if they did it later than January 1990 due to lack of data): the LA Times, the San Francisco Chronicle, the Houston Chronicle, the New York Times, the Washington Post (December 1997), the Chicago Tribune (January 2000), the Wall Street Journal (April 2001), the Miami Herald (June 2001), the Boston Globe (September 2001), USA Today (February 2002) and the Dallas Morning News (May 2003).

The newspapers used for UK are the following: The Times, The Independent, The Guardian, The Telegraph, The Daily Mirror, The Daily Express, The Daily Mail, The Evening Standard, The Sun, The Sunday Times. The time sample starts the 1st of January 2001.

In the case of France, we adapt the words into the French language. In particular, we use the following words for each group:

1. chaine d'approvisionnement, chaines d'approvisionnement, chaine logistique, chaines logistiques, approvisionnement, approvisionnements.

2. goulot d'étranglement, goulots d'étranglement, pénurie, pénuries, perturbation, perturbations, problème, problèmes, rareté, raretés, absence de, absences de, manque de, retard, retards, délai, délais.

The sample starts on 1 January 2006. The newspapers used are the following (in parenthesis the time they join the index if they did it later than January 2006 due to lack of data): Le Figaro, Le Monde, Les Echos, Le Progrès, Agence France Presse, Sud Ouest, Ouest France and Midi libre (September 2006).

For Italy, we adapted the search words into Italian:

1) Catena di approvvigionamento, catene di approvvigionamento, supply chain, supply chains, catena di fornitura, catena di forniture, fornitura, forniture, catena logistica, catene logistiche.

2) Collo di bottiglia, rallentamento, rallentamenti, congestione, scarsità, carenza, carenze, assenza, assenze, interruzione, perturbazione, interruzioni, perturbazioni, problema, problemi, difficoltá, penuria, mancanza, mancanze, ritardo, ritardi, arretrato, arretrati, inevaso, inevasi.

The sample starts on 1 January 2007. The Italian newspapers used are the following: ANSA, Agenzia Giornalistica Italia, Corriere della Sera, La Stampa, Il Sole 24 ore, La Repubblica, Il Giornale, La Nazione, Il Resto del Carlino, Il Giorno.

For Spain, we adapted the search words into Spanish:

1) cadena de suministro, cadena de suministros, cadenas de suministro, cadenas de suministros, suministro, suministros.

2) cuello de botella, cuellos de botella, escasez, escaseces, interrupción, perturbación, paralización, interrupciones, perturbaciones, paralizaciones, problema, dificultad, problemas, dificultades, carencia, carencias, falta de, atraso, retraso, atrasos, retrasos.

The sample starts on 1 January 2007. The Spanish newspapers used are the following (in parenthesis the time they join the index if they did it later than

January 2007 due to lack of data): ABC, El Mundo, El País, El Economista (May 2008), Expansión and Cinco Días.

For Germany, we adapted the search words into German. However, we created a new group of words due to the characteristics of the German language that have words that by itself mean "supply bottleneck" such as 'Versorgungsengpass'. Thus, in the German search, we count the article as 1 if we find the same search as for the other languages (group 1 and 2 simultaneously) or any word belonging to group 3.

1) Lieferkette, Lieferketten, Lieferung, Beschaffung, Lieferungen, Beschaffungen.

2) Engpass, Kapazitätsengpass, Mangel, Knappheit, Mängel, Knappheiten, Störung, Betriebsstörung, Störungen, Betriebsstörungen, Problem, Probleme, Verknappung, Verknappungen, Fehlen von, Verzug, Verzögerung, Verspätung, Verzögerungen, Verspätungen, Rückstand, Nachholbedarf, Rückstau, Arbeitsrückstand, Rückstände, Arbeitsrückstände, Schwierigkeit, Schwierigkeiten.

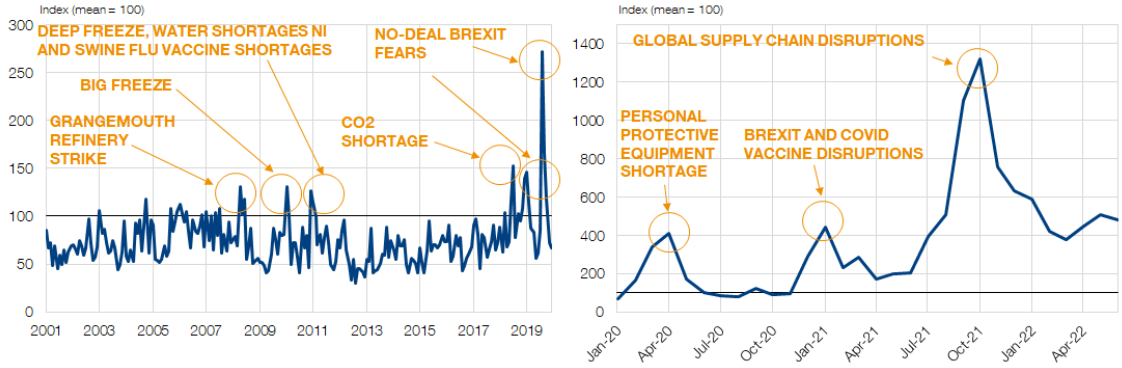
3) Lieferengpass, Lieferengpässe, Versorgungsengpass, Versorgungsengpässe, Beschaffungsprobleme, Lieferrückstand.

The sample starts on 1 January 2007. The German newspapers used are the following (in parenthesis the time they join the index if they did it later than January 2007 due to lack of data): Die Welt, Frankfurter Allgemeine Zeitung (March 2013), Handelsblatt (March 2013), Die Welt, Der Tagesspiegel, Die Tageszeitung, Bild (April 2013), Rheinische Post, Frankfurter Rundschau, Stuttgarter Zeitung, Berliner Morgenpost.

For China, the sample starts on 1 January 2010. The newspapers used are the following: the Wall Street Journal, China Daily, the South China Morning Post, Reuters News, and Dow Jones Institutional News. We restrict our search to include only news related to China.

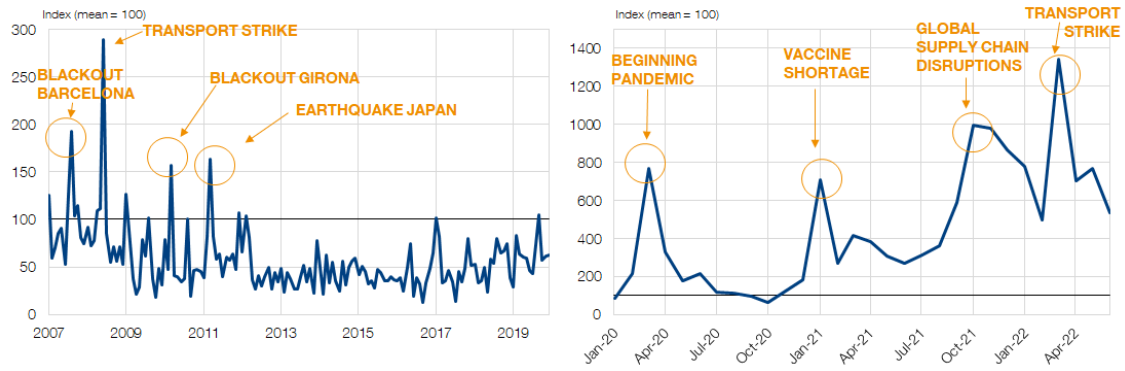
Appendix B: Explanations of spikes in the SBI (rest of countries)

Figure B.1: United Kingdom Supply Bottlenecks Index



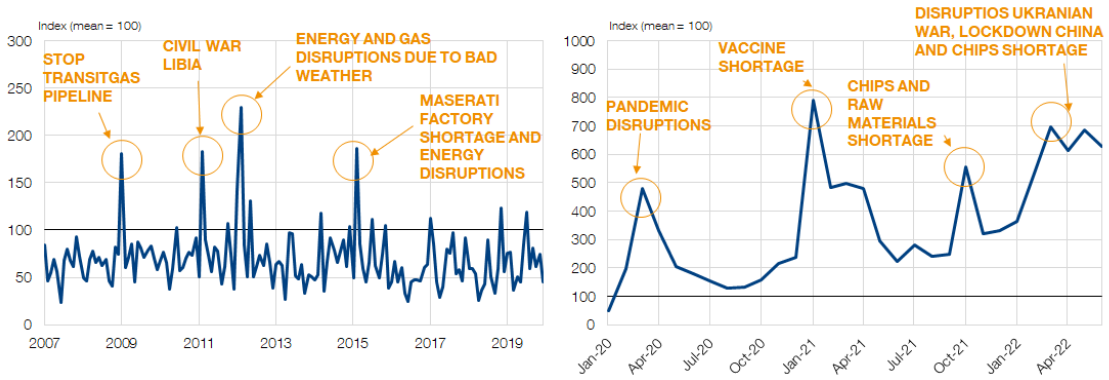
Notes: UK Supply Bottlenecks Index (SBI) from 2001 until June 2022. UK SBI is normalized to 100 throughout the 2001–2021 period. We describe in yellow the main events behind the spikes of the UK SBI.

Figure B.2: Spain Supply Bottlenecks Index



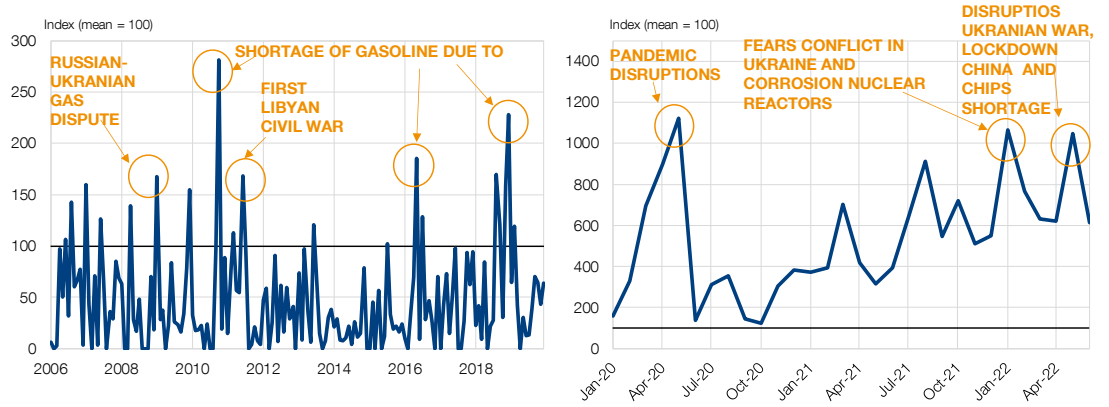
Notes: Spain Supply Bottlenecks Index (SBI) from 2007 until June 2022. The Spain SBI is normalized to 100 throughout the 2007–2021 period. We describe in yellow the main events behind the spikes of the Spain SBI.

Figure B.3: Italy Supply Bottlenecks Index



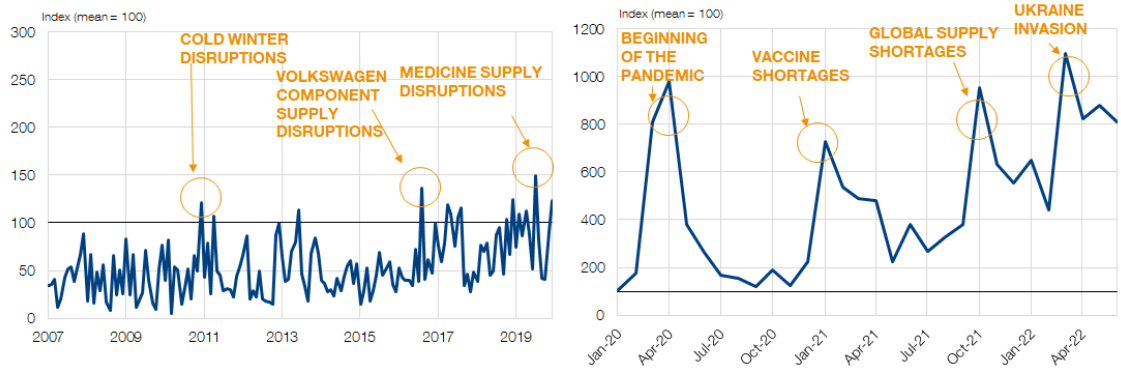
Notes: Italy Supply Bottlenecks Index (SBI) from 2007 until June 2022. Italy SBI is normalized to 100 throughout the 2007–2021 period. We describe in yellow the main events behind the spikes of the Italy SBI.

Figure B.4: France Supply Bottlenecks Index



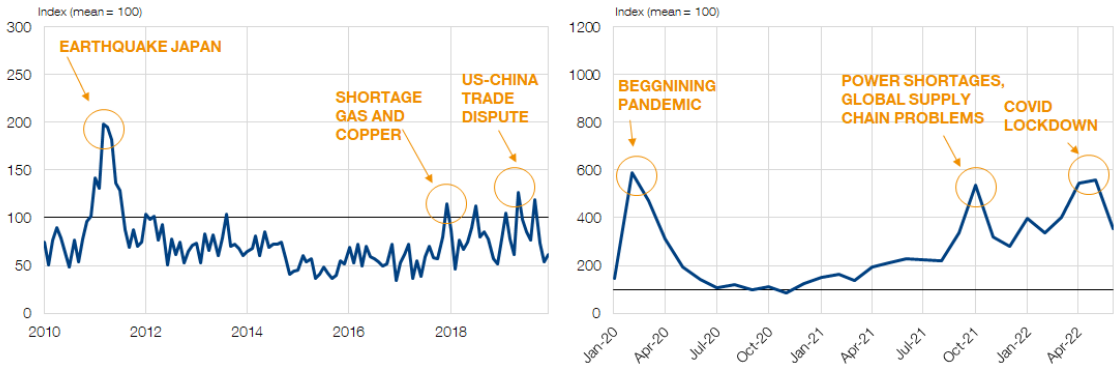
Notes: France Supply Bottlenecks Index (SBI) from 2006 until June 2022. France SBI is normalized to 100 throughout the 2006–2021 period. We describe in yellow the main behind the spikes of the France SBI.

Figure B.5: Germany Supply Bottlenecks Index



Notes: Germany Supply Bottlenecks Index (SBI) from 2007 until June 2022. Germany SBI is normalized to 100 throughout the 2007–2021 period. We describe in yellow the main events behind the spikes of the Germany SBI.

Figure B.6: China Supply Bottlenecks Index



Notes: China Supply Bottlenecks Index (SBI) from January 2010 until June 2022. China SBI is normalized to 100 throughout the 2010–2021 period. We describe in yellow the main behind the spikes of the China SBI.

Appendix C: correlation with EPU and sentiment measures

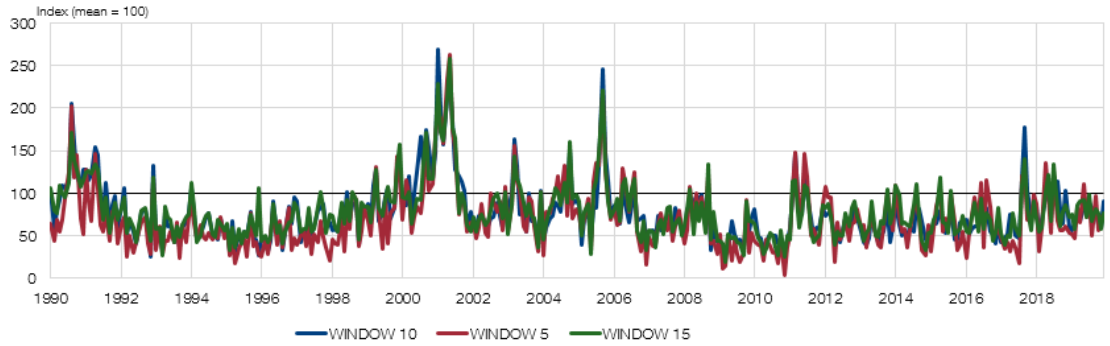
Table C.1: Correlations of SBI with EPU and Michigan consumer sentiment measures (1990-2019)

Variable	SBI	EPU	CONSUMER SENTIMENT
SBI	1.000	-0.039	0.116
EPU	-0.039	1.000	-0.589
FI	-0.010	0.096	0.230
IPI	-0.027	0.099	0.091
IR	0.308	-0.482	0.376
OIL	-0.098	0.402	-0.454
CPI	-0.163	0.330	-0.123
SENTIMENT	0.116	-0.589	1.000
PPI	-0.180	0.392	-0.210
EMPLOYMENT	-0.060	0.176	0.064
VIX	0.035	0.374	-0.339

Notes: Correlation of US SBI with the EPU, the Michigan Consumer Sentiment, the S&P 500 (FI), Industrial Production (IPI), the Fed Funds Rate (IR), the Brent oil price, the CPI, Producer Prices Index, employment and the VIX. With the exception of the EPU and the SBI, the rest of variables are retrieved from FRED St. Louis statistical database.

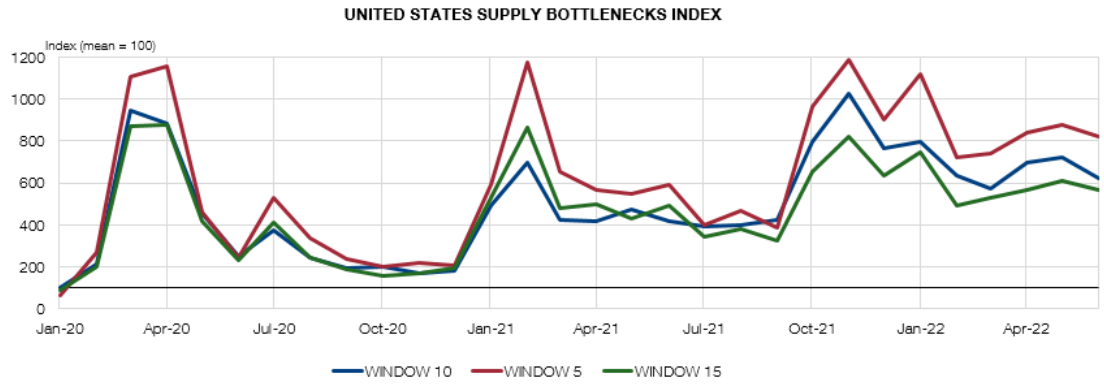
Appendix D: different windows for news search

Figure D.1: US monthly SBI with different search windows before Covid-19



Notes: US Supply Bottlenecks Index (SBI) from 1990 until the end of 2019. The SBI is normalized to 100 throughout the 1990–2021 period. We create two groups of words, one with the terms 'supply' and 'supply chain', that aim to capture the nature of the article, and another related to negative sentiment, such as "bottleneck", "shortage". Then we search, within a predefined window, for a coincidence of one word of the first group with another of the second group. Window 5, 10 and 15 indicate for each SBI US index the maximum number of words between the two groups of words in our search.

Figure D.2: US monthly SBI with different search windows after Covid-19



Notes: US Supply Bottlenecks Index (SBI) from 2020 until the end of June 2022. The SBI is normalized to 100 throughout the 1990–2021 period. We create two groups of words, one with the terms 'supply' and 'supply chain', that aim to capture the nature of the article, and another related to negative sentiment, such as "bottleneck", "shortage". Then we search, within a predefined window, for a coincidence of one word of the first group with another of the second group. Window 5, 10 and 15 indicate for each SBI US index the maximum number of words between the two groups of words in our search.

Appendix E: audit of the main events

This appendix lists the events behind the spikes of each national SBI index to ensure that they capture correctly supply disruptions. For each country, we classify as spikes

all the observations that are one standard deviation above the mean, using sample-specific mean and standard deviation for the pre-Covid and the post-Covid sample. To deduce the main events behind the spikes of each national SBI, we read all the articles that comply with our SBI searches.

US

PRE-COVID:

Jul. 1990 (SBI=116): rhodium shortage, risk of water shortages in California

Aug. 1990 (SBI=205): risk of oil supply shortages due to Gulf war

Sept. 1990 (SBI=161): risk of oil supply shortages due to Gulf war

Oct. 1990 (SBI=120): risk of oil and propane supply shortages due to Gulf war

Dec. 1990 (SBI=127): risk of oil supply shortages due to Gulf war

Jan. 1991 (SBI=128): risk of oil supply shortages due to Gulf war

Feb. 1991 (SBI=115): risk of water shortages in California, shortages in military supplies, vulnerability to oil supply shortages

Mar. 1991 (SBI=122): risk of water shortages in California, vulnerability to oil supply shortages

Apr. 1991 (SBI=154): risk of water shortages in California

May 1991 (SBI=145): risk of water shortages in California

Aug. 1991 (SBI=111): risk of oil supply shortages from Soviet Union, copper supply shortages, risk of water shortages in California

Dec. 1992 (SBI=132): risk of shortages in steel and lumber production, risk of supply shortages of palladium from Russia and South Africa

Apr. 1999 (SBI=127): gasoline supply shortages, risk of supply shortages of palladium from Russia

Nov. 1999 (SBI=123): risk of Y2K-related disruptions, supply disruptions for electronics makers due to Taiwan earthquake

Dec. 1999 (SBI=131): risk of Y2K-related disruptions

Mar. 2000 (SBI=120): risk of oil, gas and gasoline supply shortages, risk of water shortages in California

Jun. 2000 (SBI=124): debate on oil and gasoline supply shortages (related to gasoline price spikes)

Jul. 2000 (SBI=167): debate on oil and gasoline supply shortages, risk of electricity shortages in California

Aug. 2000 (SBI=131): risk of heating oil shortage for the coming winter, risk of electricity shortages in California, tire shortages due to Bridgestone/Firestone Inc. tire recall, blood shortage

Sept. 2000 (SBI=174): risk of energy crisis (oil and electricity), flu vaccine shortage

Oct. 2000 (SBI=153): risk of energy crisis (oil and electricity), flu vaccine shortage, supply shortages to electronics firms

Nov. 2000 (SBI=116): risk of energy crisis (oil and electricity), flu vaccine shortage

Dec. 2000 (SBI=146): risk of energy crisis (electricity), supply shortages to electronics firms

Jan. 2001 (SBI=269): blackouts and energy crisis in California

Feb. 2001 (SBI=198): California energy crisis, tetanus vaccine shortage

Mar. 2001 (SBI=156): risk of energy crisis in several States and at the national level (oil, gas and electricity), electricity energy crisis in California

Apr. 2001 (SBI=212): risk of energy crisis in several States and at the national level (oil, gas and electricity), electricity energy crisis in California

May 2001 (SBI=233): risk of energy crisis in several States and at the national level (oil, gas and electricity), electricity energy crisis in California

Jun. 2001 (SBI=183): risk of energy crisis in several States and at the national level (oil, gas and electricity), electricity energy crisis in California, blood shortages related to mad cow disease

Jul. 2001 (SBI=128): risk of energy crisis in several States and at the national level (oil, gas and electricity), electricity energy crisis in California, blood shortages

Aug. 2001 (SBI=120): risk of energy crisis in several States and at the national level (mostly gasoline and electricity), blood shortages

Sept. 2001 (SBI=114): risk of energy crisis in several States and at the national level (mostly gas and gasoline)

Mar. 2003 (SBI=163): disruptions in oil supply due to Iraq war and to political unrest in Nigeria and Venezuela, supply shortages to US troops in Iraq

Apr. 2003 (SBI=131): risk of oil shortages due to Iraq, supply shortages to US troops in Iraq

Aug. 2004 (SBI=126): risk of oil shortages due to disruptions from Russia's top oil producer (Yukos), Iraq and election in Venezuela, flu vaccine shortage

Oct. 2004 (SBI=150): risk of oil shortages due to disruptions from Russia's top oil producer (Yukos), Iraq and election in Venezuela, flu vaccine shortage, delays in Los Angeles and Long Beach ports

Aug. 2005 (SBI=130): Hurricane Katrina supply disruptions (fears oil supply disruptions due to damage at Gulf Coast refineries)

Sept. 2005 (SBI=245): Hurricane Rita and Hurricane Katrina supply disruptions (fears oil supply disruptions due to damage at Gulf Coast refineries)

Oct. 2005 (SBI=147): Hurricane Wilma supply disruptions, discussion supply disruptions of Hurricane Rita and Hurricane Katrina, flu vaccine shortage

Nov. 2005 (SBI=115): past hurricanes disruptions (especially construction materials), flu vaccine shortage

Mar. 2011 (SBI=146): Tōhoku earthquake and tsunami supply chain disruptions (auto makers, batteries, etc.), fears of oil disruptions due to military intervention and conflict in Libya

Jun. 2011 (SBI=118): disruptions oil in Libya, supply disruptions related to Tōhoku earthquake

Aug. 2017 (SBI=118): fears of oil disruptions and supply disruption caused by Hurricane Harvey

Sept. 2017 (SBI=178): supply disruption in Puerto Rico after Hurricane Maria and supply disruptions caused by Hurricanes Irma and Harvey

Aug. 2018 (SBI=114): fears supply disruptions due to trade-war tensions with China

POST-COVID:

Mar. 2020 (SBI=946): pandemic disruptions

Apr. 2020 (SBI=885): pandemic disruptions

Oct. 2021 (SBI=794): pandemic-related disruptions and congestion in Long Beach and Los Angeles ports

Nov. 2021 (SBI=1028): pandemic-related disruptions and congestion in Long Beach and Los Angeles ports

Dec. 2021 (SBI=767): pandemic-related disruptions (omicron)

Jan. 2022 (SBI=798): pandemic-related disruptions (omicron), chip shortages, risk of oil and gas disruptions related to RUS-UKR war

UK

PRE-COVID:

Jan. 2003 (SBI=106): school staff supply shortages

Oct. 2004 (SBI=117): risk of oil supply shortages, flu vaccine shortages

Sep. 2005 (SBI=108): gasoline and organic milk supply shortages

Dec. 2005 (SBI=105): petrol supply shortages due to a fire in the oil terminal Hemel Hempstead

Jan. 2006 (SBI=112): risk of gas shortages

Feb. 2006 (SBI=103): oxygen supply shortages

Apr. 2006 (SBI=105): energy supply shortages

Nov. 2006 (SBI=101): winter flu vaccine shortages

Jan. 2007 (SBI=105): disruption to power supplies due to storms in London and the South-East

May. 2007 (SBI=103): housing sector supply shortages

Jul. 2007 (SBI=108): food supply shortages due to floods from heavy rains

Apr. 2008 (SBI=130): Grangemouth refinery strike

May. 2008 (SBI=101): beef supply shortages; oil supply disruptions

Jun. 2008 (SBI=118): scarce oil supply, fuel supply problems

Jan. 2010 (SBI=131): Big Freeze related disruptions

Dec. 2010 (SBI=126): Big Freeze related disruptions, swine flu vaccine shortages

Jan. 2011 (SBI=114): water supply disruptions, swine flu vaccine shortages

Jun. 2018 (SBI=115): CO2 shortages, risk of supply disruptions associated to possible no-deal Brexit

Jul. 2018 (SBI=152): risk of supply disruptions associated to possible no-deal Brexit

Sep. 2018 (SBI=102): risk of supply disruptions associated to possible no-deal Brexit

Nov. 2018 (SBI=108): winter flu vaccine shortages; risk of supply disruptions associated to possible no-deal Brexit

Dec. 2018 (SBI=140): risk of supply disruptions associated to possible no-deal Brexit

Jan 2019 (SBI=146): risk of supply disruptions associated to possible no-deal Brexit

Feb. 2019 (SBI=114): risk of supply disruptions associated to possible no-deal Brexit

Aug. 2019 (SBI=272): drugs supply shortages, risk of supply disruptions associated to a possible no-deal Brexit

Sept. 2019 (SBI=166): drugs supply shortages, risk of supply disruptions associated to a possible no-deal Brexit

Oct. 2019 (SBI=117): drugs supply shortages, risk of supply disruptions associated to a possible no-deal Brexit

POST-COVID:

Sept. 2021 (SBI=1104): delays and supply shortages related to Covid and Brexit

Oct. 2021 (SBI=1323): delays and supply shortages related to Covid and Brexit

Nov. 2021 (SBI=755): delays and supply shortages related to Covid and Brexit

SPAIN

PRE-COVID:

Jan. 2007 (SBI=126): interruptions in electricity supply due to adverse weather conditions

Jul. 2007 (SBI=125): interruptions in electricity supply in Barcelona

Aug. 2007 (SBI=192): interruptions in electricity supply in Barcelona and Valencia

Sep. 2007 (SBI=103): storm-related disruptions in Southern regions; risk of oil supply disruptions associated to price spikes

Oct. 2007 (SBI=114): disruptions in electricity supply (particularly power outages in Barcelona, Leon and Sevilla)

Apr. 2008 (SBI=109): risk of water shortages due to extreme heat

May. 2008 (SBI=111): risk of water shortages due to extreme heat; risk of oil supply disruptions associated to price spikes

Jun. 2008 (SBI=289): transport strike

Jan. 2009 (SBI=127): storm-related disruptions in northern regions

Aug. 2009 (SBI=101): water and electricity shortages in southern regions (particularly in Sevilla and Cadiz)

Mar. 2010 (SBI=157): interruptions in electricity supply in Girona due to adverse weather conditions

Aug. 2010 (SBI=101): interruptions in electricity supply in coastal areas

Mar. 2011 (SBI=163): supply interruptions related to the Fukushima earthquake

Dec. 2011 (SBI=107): gas supply disruptions from the Algeria-Spain pipeline

Feb. 2012 (SBI=104): shortage of selected medicaments

Jan. 2017 (SBI=101): bacterial meningitis vaccine shortages; cold weather supply disruptions

Sep. 2019 (SBI=105): power outage in Canary Islands; risk of supply disruptions associated to possible no-deal Brexit

POST-COVID:

Oct. 2021 (SBI=993): chip shortages, risks to gas supply from Algeria

Nov. 2021 (SBI=978): pandemic-related disruptions

Mar. 2022 (SBI=1344): transport strike

ITALY

PRE-COVID:

Jan. 2009 (SBI=180): interruption of gas supply from Russia

Jun. 2010 (SBI=103): gas supply disruptions due to disagreement between Belarus and Russia

Feb. 2011 (SBI=183): risk of gas interruption from Libya, due to civil war

Oct. 2011 (SBI=107): hospitals supply shortages; supply disruptions due to earthquake in Liguria

Jan. 2012 (SBI=142): electricity and gas disruptions due to bad weather

Feb. 2012 (SBI=229): electricity and gas disruptions due to bad weather

May 2012 (SBI=130): refunds for bad weather in January

Mar. 2014 (SBI=118): risk of gas supply disruptions due to the Ukrainian crisis

Dec. 2014 (SBI=104): cold weather disruptions in gas supply

Feb. 2015 (SBI=186): Maserati factory supply shortages; electricity supply disruptions

Jul. 2015 (SB1=111): water supply disruptions

Nov. 2015 (SBI=105): water supply shortages; Alfa Romeo factory supply disruptions

Jan. 2017 (SBI=112): cold weather supply disruptions

Nov. 2018 (SBI=123): energy and water supply disruptions due to bad weather

Jul. 2018 (SBI=118): shortage of selected medicaments

POST-COVID:

Jan. 2021 (SBI=789): vaccine shortages

Oct. 2021 (SBI=555): chips and raw material shortage

Mar. 2022 (SBI=696): chip shortages, risk of oil and gas disruptions related to RUS-UKR war

Apr. 2022 (SBI=614): chip shortages, risk of oil and gas disruptions related to RUS-UKR war

May 2022 (SBI=686): risk of oil and gas stop from Russia

Jun. 2022 (SBI=628): risk of oil and gas stop from Russia

FRANCE

PRE-COVID:

Apr. 2006 (SBI=97): water supply shortages due to low levels of underground water reserves

Jun. 2006 (SBI=107): steel supply shortages

Aug. 2006 (SBI=143): water supply shortages

Jan. 2007 (SBI=160): roads blocked by snowed caused supply disruptions in the factories of Peugeot-Citroën, gas disruptions due to 2007 Russia–Belarus energy dispute

Jun. 2007 (SBI=127): fish market supply disruptions

Apr. 2008 (SBI=139): organic food supply shortages; strike in Coca-Cola factory

Jan. 2009 (SBI=168): interruption of gas supply from Russia

Dec. 2009 (SBI=155): oil supply disruptions due to a pipeline rupture; energy supply disruptions due to multiple worker strikes

Sep. 2010 (SB1=98): oil supply shortages due to strikes affecting the oil terminal of Fos-Lavera

Oct. 2010 (SBI=281): oil shortages due to pension reform strike

Jun. 2011 (SBI=169): oil supply disruptions from Libya, due to civil war

Mar. 2013 (SBI=97): extreme cold weather supply disruptions; supply shortage of medicines

Jun. 2013 (SBI=121): crops supply shortages due to hailstorms and heavy rains

Jul. 2015 (SBI=102): crops supply shortages due to extreme heat

May. 2016 (SBI=186): oil shortages due to new labor law strike

Jul. 2016 (SBI=128): fuel shortages due to strikes; bad weather supply disruptions

Jun. 2017 (SBI=98): truck drivers' multi-day strike

Aug. 2018 (SBI=170): different supply problems

Sep. 2018 (SBI=121): bitumen supply shortages

Nov. 2018 (SBI=159): oil shortages due to Gilets Jaunes strike

Dec. 2018 (SBI=227): oil shortages due to Gilets Jaunes strike

Feb. 2019 (SBI=119): supply shortage of medicines

POST-COVID:

Apr. 2020 (SBI=899): pandemic disruptions

May. 2020 (SBI=1122): pandemic disruptions

Aug. 2021 (SBI=911): pandemic-related disruptions (semiconductors and raw materials)

Jan. 2022 (SBI=1063): chip shortages, risk of oil and gas disruptions related to RUS-UKR war, problems to nuclear power stations over corrosion

May. 2022 (SBI=1047): supply shortages, risk of oil and gas disruptions related to RUS-UKR war, problems to nuclear power stations over corrosion

Jul. 2022 (SBI=988): supply shortages, risk of oil and gas disruptions related to RUS-UKR war

GERMANY

PRE-COVID:

Dec. 2007 (SBI=89): Mercedes Benz and Sharp TV key components supply disruptions

Dec. 2010 (SBI=121): cold weather supply disruptions

Apr. 2011 (SBI=107): electricity companies supply disruptions due to shutdowns in gas and coal power plants

Nov. 2012 (SBI=87): delay in delivery of new regional transportation trains intended for winter

Dec. 2012 (SBI=100): supply shortages of medicines; domestic train manufacturers supply disruptions

Jun. 2013 (SBI=113): long-distance trains supply shortages

Nov. 2013 (SBI=84): medicines supply disruptions

Aug. 2016 (SBI=136): Volkswagen key component supply disruptions

Dec. 2016 (SBI=99): medicines supply disruptions

Apr. 2017 (SBI=119): medicines supply disruptions (particularly anesthetic deliveries)

May. 2017 (SBI=109): BMW components supply disruptions

Jul. 2017 (SBI=105): Bayern painkillers supply shortages

Aug. 2017 (SBI=116): disruptions in egg supply; closure of Rhine Valley railway route

Jul. 2018 (SBI=88): risk of water shortages due to extreme heat

Aug. 2018 (SBI=95): risks for German car manufacturers due to US and Mexico free trade agreement; shortage of truck drivers

Oct. 2018 (SBI=104): fuel delivery shortages by maritime routes due to low water levels; Frankfurt Airbus plant production disruptions

Dec. 2018 (SBI=124): Flu vaccines supply disruptions

Feb. 2019 (SBI=109): construction materials supply disruptions (particularly sand)

Mar. 2019 (SBI=86): medicines supply disruptions (particularly oxytocin)

Apr. 2019 (SBI=113): power generation supply disruptions due to energy transition; risk of supply disruptions associated to possible no-deal Brexit

May. 2019 (SBI=87): Loewe supply disruptions; closure of Russian oil pipeline

Jul. 2019 (SBI=149): medicines supply disruptions

Nov. 2019 (SBI=91): multi-day strike in Amazon, Leipzig; medicines supply disruptions (particularly antidepressants and epilepsy related)

Dec. 2019 (SBI=123): medicines supply disruptions

POST-COVID:

Mar. 2020 (SBI=809): pandemic disruptions

Apr. 2020 (SBI=980): pandemic disruptions

Oct. 2021 (SBI=952): pandemic-related disruptions (particularly chip shortages)

Mar. 2022 (SBI=1096): chip shortages, risk of oil and gas disruptions related to RUS-UKR war

Apr. 2022 (SBI=824): chip shortages, risk of oil and gas disruptions related to RUS-UKR war

May. 2022 (SBI=878): chip shortages, risk of oil and gas disruptions related to RUS-UKR war

Jun. 2022 (SBI=812): chip shortages, risk of oil and gas disruptions related to RUS-UKR war

CHINA

PRE-COVID:

Jan. 2011 (SBI=142): cold weather disruptions in transportation and energy supply; steelmakers supply shortages due to floodwaters disrupting vital coal supplies from Australia

Feb. 2011 (SBI=130): farm products supply shortages (particularly vegetables and grain); refined oil products supply shortages

Mar. 2011 (SBI=198): supply interruptions related to the Fukushima earthquake

Apr. 2011 (SBI=195): supply interruptions related to the Fukushima earthquake (particularly carmakers); power outages supply disruptions in aluminum and lead-acid batter industries

May. 2011 (SBI=182): power generation supply disruptions due to a shift in investment to new energies; supply disruptions related to a drought along the Yangtze River

Jun. 2011 (SBI=137): energy supply shortages

Jul. 2011 (SBI=128): energy and copper supply shortages

Jan. 2012 (SBI=104): fuel supply shortages

Dec. 2017 (SBI=115): gas supply shortages

Jul. 2018 (SBI=113): tariff war with the U.S. resulting in supply shortages of soybeans, sport-utility vehicles and chemicals

Feb. 2019 (SBI=104): risk of supply disruptions associated to a possible no-tariff relief with the U.S.; iron ore supply shortages

May. 2019 (SBI=127): copper supply shortages; housing supply shortages in Hong Kong

Sep. 2019 (SBI=119): nickel ore supply disruptions; pork supply shortage caused by African swine fever

POST-COVID:

Feb. 2020 (SBI=590): pandemic disruptions

Mar. 2020 (SBI=469): pandemic disruptions

Oct. 2021 (SBI=536): energy supply disruptions related to shortage of coal supply; labor force shortages related to pandemic restrictions

Apr. 2022 (SBI=545): manufacturers supply shortages related to pandemic disruptions

May. 2022 (SBI=560): labor force shortages related to pandemic restrictions

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