Business Uncertainty during the Covid-19 Pandemic: Assessment Based on the Pandemic Fear Index and Economic Surveys

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Abstract:

Purpose: *The article presents an assessment of the situation of business enterprises during the COVID-19 pandemic.*

Design/Methodology/Approach: *The analysis uses the Pandemic Fear Index (PFI) and more detailed analyses based on Business Tendency Surveys (BTS). The proposed PFI considers critical factors in a pandemic, such as reported cases of illness and death and government actions that restrict business operations.*

Findings: *The study indicates a clear differentiation of the situation among businesses depending on the nature of the business activity. The changes in the PFI index turned out to be like the changes observed in the BTS in individual sectors of the economy. An exceptionally high correlation was found between the indicator and the results of the "pandemic module" of the BTS.*

Practical Implications: *The analysis uses data from the Polish economy, but the proposed methodology of identifying and assessing the impact of a pandemic on the economy may be used in other countries, depending on data availability. A broader application of the presented approaches considering pandemic shock may be one of the directions for further research in the future.*

Originality/Value: *The PFI, specially designed for the pandemic period, is a proxy for assessing business uncertainty during a pandemic. The advantage of the indicator is the ability to observe the daily changes of its value along with any incoming information. The added value of applying the proposed methods is the possibility of a detailed analysis of the occurrence of subsequent pandemic waves and the emerging discrepancies in the shaping of uncertainties that appear during the pandemic in individual sectors of the economy.*

Keywords: *COVID-19, Pandemic Fear Index, uncertainty.*

JEL codes: *D80, D83, C43.*

Paper type: *Research article / Case study.*

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1. Introduction

Shock events that disrupt economic activity can, in extreme situations, lead to a recession. The uncertainty that then arises on business entities relates to the assessment and the consequence of the shock. Short-term analyses are prone to error, mainly from the limited information available when the shock occurs. The COVID-19 pandemic is just such an event. The first COVID-19 case was diagnosed in China on December 10, 2019, and the first death was recorded one month later, on January 9, 2020. Since then, the number of global registered cases and deaths has significantly increased. The World Health Organization (WHO), on March 11, 2020, declared COVID-19 as a global health pandemic (WHO, 2020). In a pandemic situation, it is crucial to have an up-to-date analysis of the current situation. This allows the monetary and fiscal authorities and businesses to make the right decisions and reduces short-term macroeconomic forecasts errors. Due to the rapid economic changes during a pandemic, the monthly macroeconomic data published by statistical offices do not have to reflect the current situation accurately.

This article aims to analyze the relationship between the COVID-19 pandemic shock and the economy using non-macroeconomic data. The analysis of the nature of the shock (its strength and intensity) will be carried out using two methods. First, a specially designed pandemic uncertainty indicator will be used for this purpose. It will consider the dual nature of the pandemic, that is, the epidemiological situation (statistics on virus infections and deaths) and government decisions restricting economic activity (different degrees of lockdown restrictiveness). Second, the results of the standard and "pandemic module" of BTS prepared for a more detailed analysis of the effects of the pandemic will be used. The results of both methods will be compared and discussed in the detailed assessment of the pandemic situation in individual sectors of the economy. The paper is structured as follows: section 1 is the introduction to the issue of COVID-19, section 2 presents research on the impact of COVID-19 on the economy, section 3 is a description of the method and data, section 4 shows the main results of the study, and section 5 covers the conclusions.

2. Literature Review

Due to its unprecedented scale, the COVID-19 pandemic has been a critical focus for economists. While its development was still in progress, analytical work was undertaken, mainly aimed at assessing the effects of the pandemic (IMF, 2020; Djankov and Panizza, 2020) and the reaction of firms to the COVID-19 pandemic (Beck *et al.,* 2020). It was clear that the uncertainty resulting from the pandemic (the scale of infection and death) and the various forms of lockdown introduced by the government would reduce production, impact services, and disrupt consumption, thus reducing economic activity. In the analyses, attention was paid to dynamic management, a tradeoff between health and economic costs. This problem was raised, among others, by Gourrinchas (2020) and Eichenbauma *et al.* (2020). In the socially

optimal solution, "the severity of the containment measures by the government roughly parallels the dynamics of the infection rate itself" (World Bank, 2020).

The analysis of the impact on the economy of actions aimed at slowing the spread of the pandemic focuses on assessing gains and losses for various groups of the population and individual sectors of the economy. For example, Glover *et al.* (2020) indicate that older people gain the most, while younger workers in closed sectors have the most to lose. Buera *et al.* (2020) analyze how pandemic containment measures affect economic activity depending on the performance of financial sectors. Basic information relating to pandemic shock includes the number of reported COVID-19 cases and deaths. One of the methods to facilitate such analysis, the Global Fear Index (GFI), is proposed by Salisu and Akanni (2020) and Salisu *et al.* (2020). The GFI is a composite index of two factors, the Reported Cases Index (RCI) and the Reported Death Index (RDI), with equal weights assigned to both indexes. The GFI ignores government actions that directly affect the functioning of economic entities during a pandemic, and thus also their uncertainty. The GFI is a proxy for assessing uncertainty in the economy (an increase in the index value means an increase in uncertainty).

3. Research Methodology

Analysis of the status of companies during the pandemic will be carried out using two methods. First, we construct a Pandemic Fear Index (PFI) for the COVID-19 period. Second, the results of the standard and "pandemic module" of the Business Tendency Surveys (BTS) will be used.

3.1 Construction of the Pandemic Fear Index

Due to the nature of the pandemic period, the primary sources of uncertainty are information on the course of the pandemic (the number of infections and deaths) and government restrictions on running a business (full, partial, or no lockdown). In the latter case, both the degree of restrictiveness and the duration of the lockdown are essential. This information has been included in the proposed extended version of the fear index. The proposed Pandemic Fear Index (PFI) seeks to measure monthly changes in uncertainty on the spread and severity of COVID-19. The PFI, a transformed version of the GFI, also includes data on government activities that limit the possibilities of doing business in individual sectors of the economy. The PFI allows the differences in uncertainty caused by a pandemic shock to be assessed in more detail. It is also possible to assess possible differences more precisely in the intensity of uncertainty of business owners in various sectors of the economy. The proposed PFI is a composite index of three factors: the Reported Cases Index (RCI), the Reported Death Index (RDI), and the Lockdown Index (LI). The Reported Cases Index (RCI) is computed as:

$$RCI_t = \left(\frac{\sum_i c_{i,t}}{\sum_i (c_{i,t} + \overline{c}_{i,t14})} \right) \times 100 \tag{1}$$

where:
$c_{i,t}$ the number of reported COVID-19 cases at time t
$\overline{c}_{i,t14}$ – the average number of reported COVID-19 cases in the last 14 days
$t = 1, 2, ..., T$

The Reported Death Index (RDI) is computed as:

$$RDI_t = \left(\frac{\sum_i d_{i,t}}{\sum_i (d_{i,t} + \overline{d}_{i,t14})} \right) \times 100 \tag{2}$$

where:
$d_{i,t}$ – the number of reported COVID-19 deaths, at time t,
$\overline{d}_{i,t14}$ – the average number of reported COVID-19 deaths in the last 14 days,
$t = 1, 2, ..., T$

The RCI and RDI components refer to the average change over the last 14 days. This is justified by the incubation period of the virus and the decision makers' reference to the changes that took place in the past two weeks.

The Lockdown Index (LI) is computed as:
$$LI_t = \left(\frac{\sum_i l_{i,t}}{\sum_i (l_{i,t} + l_{i,t-1})} \right) \times 100 \tag{3}$$

where:
$l_{i,t}$ – degree of government restrictions, i = 0, 0.5 or 1

The LI considers three degrees of restrictiveness of government lockdown caused by a pandemic, respectively: full lockdown ($l_{i,t} = 1$); partial lockdown ($l_{i,t} = 0.5$); and no restrictions in running a business ($l_{i,t} = 0$). Determining the degree of lockdown (full, partial or no lockdown) with the use of the LI makes it possible to consider factors that are important from the point of view of companies that are affect by their uncertainty (pandemic fear).

The Pandemic Fear Index (PFI) is computed with a weight of 0.25 assigned to both the RCI and the RDI, and a weight of 0.5 assigned to the LI. The PFI is computed as:

$$PFI_t = [0.25(RCI_t + RDI_t) + 0.5LI_t] \tag{4}$$

The PFI is given on a scale between 0 and 100 (where a higher value means a higher level of fear due to the pandemic). The PFI, depending on data availability, can be calculated for individual sectors of the economy. For our analysis, we chose six sectors: manufacturing, construction, retail trade, the transportation and storage sector, the accommodation and food service sector, and the information and communication sector. As a result, we had the opportunity to assess uncertainty in different parts of

the economy. The PFI allows us to assess the effects of a pandemic on an ongoing basis, and it can also be used for short-term macroeconomic forecasts.

3.2 Business Tendency Survey Data

The Business Tendency Surveys (BTS) results are the second benchmark for a quick assessment of the effects of a pandemic and short-term macroeconomic forecast. The occurrence of a shock in the economy in a pandemic influenced the economic survey results. Survey results are preceded by "hard" macroeconomic data (for example, industrial production sales, retail sales) published by statistical offices and are one of the most up-to-date sources of information about the state of the economy. Based on the results of the BTS, indicators relating to the general economic situation or a given sector are constructed. In this article, we use a set of data from the Polish Central Statistical Office (GUS). Data from the standard BTS include four seasonally adjusted simple indicators for six sectors:

- general business climate indicator,
- current general economic situation of the business,
- expected general economic situation of the business,
- expected production or sales.

In addition, the analysis used the results of a "pandemic module" attached as an annex to the standard monthly BTS (GUS, 2020). At the beginning of the pandemic, this type of research was initiated by the GUS in April 2020. These surveys constitute an extension of the monthly BTS in individual sectors of the economy. The additional questions are both qualitative and quantitative. They concern the assessment of the impact of a pandemic on many dimensions of entities' operations. In the period from April 2020 to May 2021, a total of 10 questions appeared, some of which were asked every month and some in rotation (alternating with other questions) every few months.

The respondents were asked, among other questions, about: the period of survival of the company in the current situation, the status of employees, investment plans, inventories, demand and supply, and the use of aid and facilities under the government's Anti-Crisis Shield. The research results are a source of quick and in-depth information on the impact of the COVID-19 pandemic on companies in Poland. For our analysis, we chose two questions, the answers of which indicate the level of uncertainty among the surveyed business owners in six sectors of the economy:

- What will be the negative effects of the COVID-19 pandemic and its consequences for your business in the current month?
- If the current actions and restrictions taken to combat the coronavirus by the state authorities in Poland in operation at the time of completing the survey would last for a long time, for how many months would your company be able to survive?

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The results of the standard BTS cover the period from January 2011 to May 2021, while the results of the additional "pandemic module" cover the period from April 2020 to May 2021.

In summary, as part of the business uncertainty analysis during a pandemic, the following will be used: the PFI indicator, four types of simple indicators from BTS, and two indicators from the pandemic module of BTS. All types of data relating to six sectors of the economy.

4. Results and Discussion

Excessive fear can have a significant impact on the behavior of businesses, including investment sentiment and decisions, as well as economic activity. To analyze the situation of businesses during a pandemic, it is necessary to identify the shock of the pandemic correctly. The PFI index makes it possible to consider the nature of the pandemic period and its changing intensity over time. The construction of the PFI index enables a more detailed analysis of the intensification of uncertainty in various sectors of the economy. This is because statistics related to the number of people who contracted COVID-19 and those who died are considered, and government decisions regarding restrictions on business activity (lockdown) are also considered. Businesses' perceptions of the situation changed as the pandemic unfolded and as the government-imposed restrictions. The development of the PFI index in individual sectors of the economy confirms the intuitive assumptions of an apparent diversification of business owners' perceptions of uncertainty generated during a pandemic. The uncertainty related to the pandemic was evident in the accommodation and food service activities sector and the retail trade sector (Table 1).

Changes in the PFI index indicate three waves of the pandemic: March to June 2020, October to December 2020, and January to April 2021. Between April and June, the General Business Climate Indicator (GBCI) improved significantly in all sectors of the economy. However, in four of the six analyzed sectors, the current general economic situation assessments were only slightly better than after the first month of the pandemic, while the expected general economic situation of the businesses and expected production or sales improved significantly.

The standard BTS of the economic situation also indicates the differential impact on businesses during the pandemic. The results of the April survey indicate a sharp deterioration of corporate sentiment. The GBCI fell by 36.3 points in the "information and communication" sector and by 66.7 points in the "accommodation and food service activities" sector on a month-to-month basis. The biggest problems were indicated by hotel and restaurant owners, which can also be observed in their assessment of the current and expected general economic situation and expected sales. The indicators based on the surveys show that the most significant deterioration in the situation assessment occurred in the first month of the pandemic in the "accommodation and food service activities" sector (Figures 1-4). The most

significant uncertainty and the most pessimistic assessments continued in this sector throughout the pandemic. This is consistent with the conclusions of the analysis of the PFI index for individual sectors of the economy. The variation in assessments of uncertainty between individual sectors deepened during the pandemic. In the first month of the pandemic, the GBCI standard deviation for individual sectors of the economy was twice as high as in the periods in which there was no shock. The sectoral gap decreased as each pandemic wave faded out and grew as the next wave emerged.

However, the results of the additional "pandemic module" (annex to the standard BTS) indicate that differences in the perception of the adverse effects of the pandemic (severe and threatening the stability of the company) in the second and third phases of the pandemic increased. This resulted from the deteriorating situation in the "accommodation and food service" and "retail trade" sectors. The most challenging situation during the pandemic was in the accommodation and food service sector (Figure 5 and 6). Most businesses from this sector declared an expected survival time not longer than three months.

Table 1. *PFI in various sectors of the economy, case for Poland.*

Pandemic wave	Month	Manufacturing	Construction	Retail trade	Transportation and storage	Accommodation and food service activities	Information and communication
First wave	03-2020	85,9	85,9	85,9	85,9	85,9	60,9
	04-2020	52,7	52,7	77,7	77,7	77,7	52,7
	05-2020	23,3	48,3	48,3	73,3	48,3	48,3
	06-2020	23,5	23,5	23,5	48,5	48,5	23,5
	07-2020	24,7	24,7	24,7	24,7	24,7	24,7
	08-2020	25,0	25,0	25,0	25,0	25,0	25,0
	09-2020	25,7	25,7	25,7	25,7	25,7	25,7
Second wave	10-2020	30,1	30,1	55,1	55,1	55,1	30,1
	11-2020	26,0	26,0	76,0	51,0	76,0	26,0
	12-2020	22,0	22,0	47,0	47,0	72,0	22,0
Third wave	01-2021	23,0	23,0	73,0	48,0	73,0	23,0
	02-2021	24,1	24,1	74,1	49,1	74,1	24,1
	03-2021	25,7	25,7	75,7	50,7	75,7	25,7
	04-2021	22,0	22,0	72,0	47,0	72,0	22,0
	05-2021	18,6	18,6	43,6	18,6	43,6	18,6

Sources: *Author's calculations.*

These results are in line with the information we can obtain based on the PFI index. The PFI index and the results of the BTS indicate that the most significant uncertainty among business owners occurred during the first three months of the pandemic, April to June 2020. Another problematic month was November 2020 (the peak of the second wave of the pandemic). The differences that appear between the changes in the value of the PFI index and the results of surveys come down to the duration of subsequent waves of the pandemic and the differences in the assessment of uncertainty between individual sectors during the pandemic. It should also be noted that the changes in the value of the PFI index (decreases or increases compared to the previous month) largely coincided with the changes indicated in the BTS in individual sectors of the economy. Noteworthy is the high correlation between the PFI index and the responses from the

additional module to the question regarding the adverse effects of the COVID-19
pandemic and its consequences for business (for example, 82% in the accommodation
and food service sector, 84% in Information and communication sector and 91% in
construction sector).
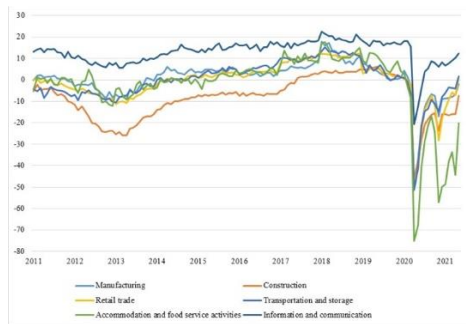
Figure 1. *General business climate indicator*

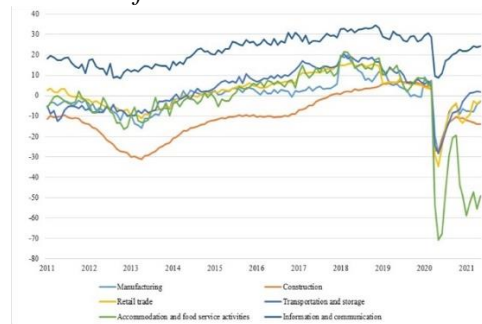**Figure 2.** *Current general economic situation of the business*
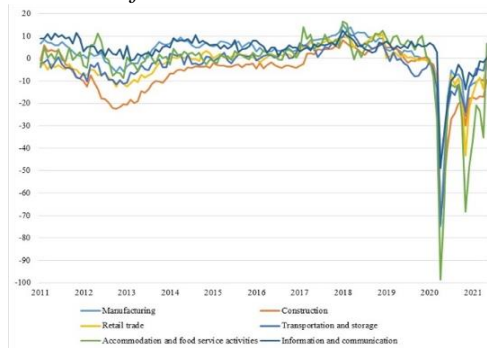

Figure 3. *Expected general economic situation of the business*

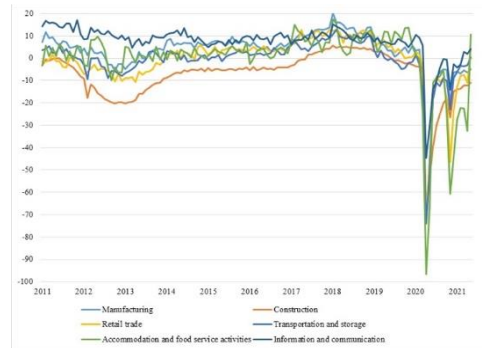**Figure 4.** *Expected production or sales*

Figure 5. *Negative effects of the pandemic (serious and threatening the stability of the company)*
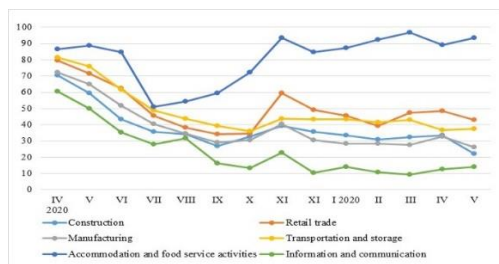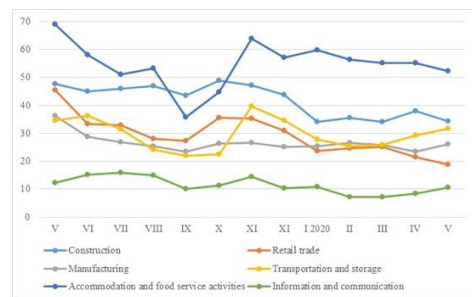

Figure 6. *Companies declaring an expected time of no more than 3 months.*

Source: *GUS.*

5. Conclusions

This article aims to present the situation of businesses during the pandemic. In studies on the negative impact of the COVID-19 pandemic on economic activity, there is no standard measure to be used. The proposed Pandemic Fear Index (PFI) considers critical factors in a pandemic, such as reported cases of illness and death and government actions that restrict business operations. The advantage of the PFI index is the possibility of updating the index daily, which, compared to alternative assessment methods, allows for a timelier assessment of the dynamically changing situation during a pandemic. Additionally, the PFI index makes it possible to identify differences in the assessment of uncertainty in various sectors of the economy. This is the main contribution of the study.

The conclusions from this study indicate a clear differentiation of the situation among businesses depending on the nature of the business activity. The scale of the observed differences changed during the successive waves of the pandemic. It should be emphasized that the changes in the PFI confirm the directional changes observed in the standard and "pandemic module" of the BTS. The proposed PFI indicator and indicators based on economic situation studies can be used in macroeconomic forecasts as essential components that take into account the effects of shocks in the economy. The presented methods of identifying and assessing the impact of a pandemic on the economy may be used in the future by decision-makers.

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