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Liudmila Kitrar, Tamara Lipkind

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Liudmila Kitrar[1], Tamara Lipkind[2]

DEVELOPMENT OF COMPOSITE INDICATORS OF CYCLICAL RESPONSE IN BUSINESS SURVEYS CONSIDERING THE SPECIFICS OF THE 'COVID-19 ECONOMY'[3]

The article proposes a new set of composite indicators-predictors in business tendency surveys, which allow identifying early information signals of a cyclical nature in the economic behavior of business agents. The main criterion for the efficiency of such indicators is their sensitivity to a cyclical pattern and changes in the dynamics of statistical referents. Statistically significant lead in time series or earlier publication allows them to be combined into a group of early response indicators. The composite Business Activity Indicator (BAI) in the basic sectors of the Russian economy reflects the 'common' profile in the dynamics of short-term fluctuations of the key parameters of the economic environment. It consists of the 'balances of opinions' of respondents on questions, which are unified for all sectoral surveys, and connected with reference quantitative statistics with significant cross-correlation coefficients and a lead at least one quarter. This is its main difference from the well-known indices of economic sentiment and entrepreneurial confidence. The components of the BAI are the new composite indices of real demand, current output, real employment, total profits and general economic situation. The Economic Vulnerability Indicator demonstrates a counterdirectional profile and various symmetry of its dynamics relative to the short-term movement of the BAI. Proactive monitoring of emerging vulnerabilities in the business environment is necessary to warn their large-scale accumulation, prevent the risks of economic downturns and ensure the highest possible macroeconomic stability. This integrated approach determines the novelty of the proposed measures of short-term cyclical fluctuations in economic development.

Keywords: business cycles, business surveys, business activity indicator, composite indicators of cyclical response, economic vulnerability indicator, real demand indicator, current output indicator, real employment indicator.

JEL: C14, C38, C82, E32.

[1] National Research University Higher School of Economics, Russian Federation. Institute for Statistical Studies and Economics of Knowledge, Centre for Business Tendency Studies. Deputy Director, lkitrar@hse.ru, ORCID: 0000 0002 6383 9562.

[2] National Research University Higher School of Economics, Russian Federation. Institute for Statistical Studies and Economics of Knowledge, Centre for Business Tendency Studies, leading expert, tlipkind@hse.ru, ORCID: 0000 0003 2632 9026.

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Introduction: economic background of research

The economic crises of the last decade in the world and in Russia have become a stimulus for new research related to the identification of early response indicators and data. An important issue is the study of the behavioral reaction of economic agents to the emerging and expected short-term cyclical fluctuations in sectoral development.

The key problem under study is the 'cognitive perception' by economic agents of crisis events in the business environment, including exogenous ones, and the consequences of current decisions in macroeconomic policy. It is assumed that the sequence of legislative measures is formed largely based on forward-looking economic information, including those received from the business community.

In this context, the expansion of composite early response indices based on the results of regular surveys on the opinions and expectations of economic agents is mainly aimed at prompt indication and confirmation of cyclical reversals of economic dynamics.

As the main criterion for the effectiveness of such data, we determine their statistical sensitivity to the change of cyclical phases in the dynamics of reference statistical indicators. Any leading properties (for example, statistically significant lead of time series or technical release and publication of data) allow them to be combined into cyclical early response indicators.

In the academic literature on the use of such indicators in economic analysis and short-term forecasting, a significant synchronous correlation between GDP growth and the dynamics of the aggregate results of European business surveys is noted (Cesaroni 2011, Mourougane and Roma 2003). A number of papers emphasize that the important role of indicators of consumer and entrepreneurial confidence in assessing economic events is determined by their procyclical behaviour (McNabb and Taylor 2007, Bondt and Schiaffi 2015, Christiansen et al. 2014), the promptness of calculation and a wide range of covered variables (Claveria et al. 2015). Lui et al. (2011) establish the consistency between qualitative survey data at the firm level and the quantitative information that are provided by the same respondents to the UK's Office for National Statistics and the ability of the qualitative data to predict quantitative data at the firm level. According to Grech and Ellul (2021), the survey-based indicators for Malta are closely correlated with real GDP growth, particularly when focusing on the first vintage of national accounts data.

These properties justify including survey-based composite indicators in models for nowcasting and forecasting macroeconomic variables. Lahiri et al. (2015) prove the important role of consumer confidence in improving the accuracy of consumption forecasts using the

results of monthly and quarterly consumer surveys; they found that during the recession of 2007–2009, sentiment had a strong effect on all components of aggregate consumption. Lehmann (2015) compares forecasts for export growth used survey-based indicators and hard data and reveals that the former generate less forecast errors for most of European countries; the confidence indicator in the manufacturing sector and the economic sentiment indicator produce the most accurate forecasts. Osterholm (2013) evaluates forecasting models for Swedish business investment growth using the Economic Tendency Survey data; the results suggest that the survey information can be used to improve forecasts.

Lahiri and Monokroussos (2013) study the role of the monthly diffusion indices (manufacturing and non- manufacturing) by the Institute for Supply Management (ISM) in nowcasting quarterly US GDP growth. They find evidence that the ISM indices improve the nowcasts at the beginning of the month, when new ISM information becomes available ahead of other monthly indicators. Siliverstovs (2013) evaluates the predictive content of business tendency surveys by the KOF Swiss Economic Institute aggregated in the KOF Employment Indicator for short-term forecasting of employment in Switzerland and find that inclusion of this indicator improves forecasts accuracy. Lehmann and Reif (2020) investigate the predictive power of the most important leading indicators for the German economy, which are provided by ifo Instituite and IHS Markit and find that both survey providers produce valuable leading indicators to predict German GDP growth. Kobzev and Andreev (2021) analyzed the possibilities of using the results of enterprise monitoring by the Bank of Russia for short-term forecasting of business activity and inflation dynamics. The study demonstrated, in particular, that the business climate index is closely related to the GDP dynamics, despite the different nature of the data and the simplicity of the questionnaires. The authors proved that the use of survey results significantly improves the quality of GDP forecasting in comparison with naive forecasting models.

In addition to examining the predictive power of well-known survey-based confidence and sentiment indicators, a number of studies have focused on creating new composite indices. Gehringer and Mayer (2021) introduce a new Business Cycle Indicator to compile a chronology of business cycle turning points for Germany based on information from 20 economic time series; this can be using as a good proxy for the development of real GDP. Lehmann (2020) demonstrates that the various indicators from the ifo Business Survey can be seen as leading indicators for many variables representing the German economy. Smirnov (2020) provides an overview of leading (including survey-based) indicators for Russia with an analysis of their advantages and disadvantages in terms of the ability to warn about new phases of the economic cycle.

Various aspects of the relationship between the sentiments and behaviour of entrepreneurs with fluctuations in the market equilibrium of supply and demand, including in the context of the coronavirus pandemic, are analyzed in modern economic literature, for example, in Angeletos and Lian (2020), Farboodi and Kondor (2020), Benhabib and Spiegel (2017) and Acharya et al. (2017). The effectiveness and reliability of composite survey-based indicators as leading indicators of GDP growth in Russia, especially during the coronavirus shocks, are confirmed in Kitrar and Lipkind (2021, 2020).

Taking into account the literature review, the study of the nature and short-term tendencies of economic activity, the ratio of market demand and supply, their short-term fluctuations based on the assessments of entrepreneurial behaviour is the main subject of business surveys in all sectors of the economy. We consider it is appropriate to update the surveys methodology in terms of the formation of short-term indicators - predictors of crises, ready for implementation in statistical practice. The proposed flash measures are sensitive to new sectoral phenomena (including those of non-economic nature) that radically affect cyclical development.

The purpose of the proposed statistical measurements is the production of new scientific knowledge about national economic dynamics during the unfolding of the world crisis. The study contributes to expanding the Big Data on the development and potential of business activity and the vulnerability of economic growth, based on new indicators that reflect the opinions and expectations of economic agents. The scientific novelty of the paper lies in the measurements that make it possible to reflect, in a ‘near-real-time’ mode, the unprecedented sharp impact of the coronavirus pandemic and the suddenly exacerbated new sectoral recessive phenomena on the growth of the national economy.

In the study, conducted mainly as a preliminary statistical analysis of the dynamics of new indicator using cross-correlation and visual tools, the following hypotheses were formulated:

H1. New composite indicators not only reflect the ‘common’ profile of changes in key parameters of the business environment, but are also closely related to cyclical reversals in the dynamics of such statistical referents as the output index in basic economic activities and GDP growth. This property allows using survey indicators as early estimates of possible cyclical fluctuations in economic development, including sharp and intense recessions.

H2. Taking into account the business tendencies that developed during the pandemic in 2020, the highest cyclical conformity with the reference dynamics is revealed in the time series of the indicator, which summarizes the opinions of economic agents regarding the current change in employment.

H3. The growing volatility of the dynamics of cyclical composite indicators (CCIs), in

particular short-term gaps with a long-term average level, signals the strengthening of new cyclical impulses. The Economic Vulnerability Indicator, as a quantitative measure of such a shift in the aggregate dynamics of all CCIs, evaluates the scale and direction of the sectoral response to market shocks and has a countercyclical nature.

Indicators of cyclical response: data sources, concept, measurement method

The study is based on the results of regular large-scale surveys of business activity[4] covered about 20,000 units of observation: 3,100 manufacturing and 500 mining industries, 6,000 construction organizations, 4,000 retail firms, and 6,200 services organizations. Information from these surveys, including business tendencies during the period of the greatest pandemic impact on the national economy in 2020, is analyzed as secondary effects of economic development, associated mainly with the reaction of businesses to the current structural, institutional and anti-crisis government policies.

Let us define the basic concepts of business surveys, which are based on the collection of opinions and expectations of economic agents to reflect the essence of the statistical measurements being made. In the study of market conditions and short-term cyclical tendencies, we use a number of concepts that generally characterize the basic aspects of entrepreneurial activity. First, we define the aggregate *business activity* as a result of the adequacy of all production capabilities of the market with its basic needs, which have developed in specific phases of the business cycle. Business activity is measured by summarizing the opinions of economic agents at each moment (more/less, faster/slower) regarding the level and dynamics of demand, output, profit, employment, and general economic situation.

The aggregate *real demand* in business surveys reflects the existing demand for the results of the enterprise activity in the market. This is determined by the estimates of economic agents of the total books of orders for goods/services at each moment (more/less, faster/slower), taking into account short-term fluctuations in the economic situation. The aggregate *current output* in surveys corresponds to the general scale of the market supply, which is expressed in the estimates of economic agents of the produced goods/services at each moment (more/less, faster/slower) under the prevailing market conditions.

In the closed behavioral model ‘demand – output – business activity’, the assessments of economic agents of the prevailing tendencies in employment, profits, and the general economic situation are considered as endogenous parameters that complement the understanding of the business environment. On short time intervals, the more the estimates of economic agents

[4] The surveys are conducted by the Federal State Statistics Service.

deviate from their long-term average values, the stronger fluctuations in business activity.

The labor market has become an important aspect of all scenario expectations of economic growth throughout 2020 – the period of the strong impact of the coronavirus pandemic on business tendencies. Unlike previous crises, when short-term employment (and unemployment) indicators lagged or coincided, during the coronavirus crisis, labor market dynamics were identified as the driving force behind the economic downturn, which responded quickly to the sectoral crisis events. The significance of the survey-based employment indicator in identifying the cyclical development of the economy has noticeably increased. This is the reason to aggregate individual assessments of economic agents regarding the prevailing employment tendencies into a *Real Employment Indicator* (REI).

It is also important to note that the standard methods for quantitative statistical assessment of employment and unemployment in 2020-2021 tend to be less effective than in previous crises in measuring the crisis 'damage' to the labor market and economic growth in general. In the context of a new type of crisis, slowing down of economic activity, and the local and total lockdowns, it is advisable to use a wider set of flash data, including survey-based measures, to increase the reliability of employment and unemployment data. The algorithm of REI calculation is comparable to the Employment Expectations Indicator (EEI), which is calculated by European Commission based on the results of harmonized business and consumer surveys (EC, 2019). However, unlike the EEI, the REI aggregates information on current changes in employment, rather than its expected tendencies in the next quarter. The cross-correlation coefficients of the dynamics of expected employment across basic economic activities and reference statistics (GDP growth, output index in basic economic activities and the number of employed, as a percentage to the corresponding quarter of the previous year) consistently demonstrate insignificant values (for most kinds of activities - noticeably below 0,60). This means the low efficiency of using this information in cyclical analysis and short-term forecasting of economic growth.

Within the framework of the proposed concept, the new composite *Business Activity Indicator (BAI)* in the basic sectors of the Russian economy is an indicator calculated for the first time based on the results of business activity surveys conducted by Rosstat. The indicator measures the degree to which the production capabilities of the market correspond to its needs in specific phases of the business cycle, reflecting the direction and intensity of the 'common' profile of short-term fluctuations in key parameters of the economic environment.

The main components of the BAI are composite indicators of real demand, current output, real employment, general economic situation, and total profit. They are calculated based on the results of surveys in industry, retail trade, construction and services. The survey results are time

series of ‘balances of opinions’, which are the difference between the shares of positive and negative assessments of the respondents (answers about the increase and decrease of indicator compared to the previous period or about the levels ‘above normal’ and ‘below normal’ in the surveyed period). Such ‘soft’ (ordinal) statistics reflect the specifics of cognitive perception of business tendencies and cyclical events by economic agents in ‘near-real-time’ (Kitrar et al. 2018a, EC 2021, UNECE 2019).

The reference time series of the official statistics for the new survey-based indices are the quarterly dynamics of the index of output in basic economic activities and GDP growth (as a percentage to the corresponding period of the previous year). The results of cross-correlation analysis indicate statistically significant coefficients (more than 0.8) of the survey-based time series, ahead of the reference series by more than a quarter.

The BAI is constructed using principal component analysis as a ‘common’ factor in the dynamics of the five components described above. The calculation is carried out following the procedure proposed in (Kitrar et al. 2018b). All components of the BAI are the result of the aggregation of the weighted average values of the sectoral primary indicators (‘balances of opinions’) of the corresponding business surveys (Table 1).

Table 1

BAI components – Results of business activity surveys

	Real Demand Indicator	*Current Output Indicator*	*Total Profit Indicator*	*Real Employment Indicator*	*General Economic Situation Indicator*
Mining	Demand for mining products	Mining organizations output	Mining organizations profit	Mining organizations employment	Economic situation in mining organizations
Manufacturing	Demand for manufacturing products	Manufacturing organizations output	Manufacturing organizations profit	Manufacturing organizations employment	Economic situation in manufacturing organizations
Construction	Order books of construction organizations	Volume index of work in construction	Construction organizations profit	Construction organizations employment	Economic situation in construction organizations
Retail Trade	Retail purchase orders	Retail sales	Retail organizations profit	Retail organizations employment	Economic situation in retail organizations
Services	Demand for services	Volume of services	Services organizations profit	Services organizations employment	Economic situation in services organizations

Note: primary indicators are a set of respondents answers (‘balances of opinions’), quantified according to the ranks (-1, 0, 1), about the level and tendency of the survey indicators given in the table (in the current period, in percent).

Unlike traditional indicators of entrepreneurial confidence and economic sentiment (Lipkind et al. 2019, Malgarini 2012, EC 2021, EC 2017, UNECE 2019), the new BAI consists

only of those components that meet the following requirements introduced by the authors, which together determine the novelty of the study:

1) Unification for all sectoral surveys of business activity;

2) Compatibility of dynamics, the presence of pronounced and coherent short-term cyclical profiles, the absence of excessive volatility;

3) Statistically significant correlation between each selected indicator (potential component of the BAI) with the dynamics of reference statistics for the entire observation period;

4) The proximity of the cyclical turning points (short-term cycles with a smoothed amplitude) in the time series of each survey indicator (potential component of the BAI) and a single reference statistical indicator for all kinds of activity (GDP growth and/or output in basic economic activities);

5) One integration order of the time series of each selected component and their 'common' factor (BAI) with the reference dynamics;

6) Substantiation of economic significance and confirmation of Grange causality between the analyzed dynamics;

7) User-friendly visualization and interpretation of composite indicators.

Fulfillment of all these criteria contributes to the effectiveness of the proposed indicators as warning information about possible cyclical reversals in macroeconomic dynamics.

As a result, the CCI is considered relevant for use in cyclical analysis of macroeconomic dynamics, since the following basic conditions are met:

- Absence of 'false' cyclic signals (extra cycles), as well as missing cycles in the dynamics of the indicator;
- A significant increase in the stability of the cyclical pattern of the indicator compared to other survey-based CCIs;
- Smooth dynamics and more pronounced cyclical reversals;
- Improving the correlation between the cyclical 'behavior' of the CCI and the dynamics of the reference statistical indicator;
- High coherence with the dynamics of the reference indicator in terms of the depth, propagation and duration of recessions throughout the economy.

Calculations of all the indicators - the BAI components follow the procedure. The original series of 'balances of opinions' are weighted according to their sectoral weights (the share in GDP). The weighted components are then standardized to achieve comparability of their mean and variation and to neutralize the predominant influence of the higher amplitude components on the BAI change and, in general, to reduce volatility. This study uses a sample for the period from Q1 2013 to Q3 2020 for standardization:

$$Y_t = \frac{\Sigma_j w_{j^*} X_{j,t}}{\left(\Sigma_j w_j\right)_t} \quad (1)$$

where $\left(\sum_j w_j\right)_t$ – the sum of the weights of the series *j* at time *t*.

$$Z_{1,t} = \frac{Y_{1,t} - \overline{Y1}}{S_1} \quad (2)$$

where $S_1 = \sqrt{\frac{1}{31}\sum_{t-1}^{32}\left(Y_{1,t} - \bar{Y}_1\right)^2}$, $\bar{Y}_1 = \frac{1}{31}\sum_{t-1}^{32} Y_{1,t}$

The principal component analysis is then used to determine the 'common' profile of all the time series and to get the composite BAI. This algorithm makes it possible to present each of components both as a common factor of a cyclical nature and as an idiosyncratic factor that reflects the variation of answers only to a specific survey question. The information common to all series is separated from individual changes in components, for which the absence of correlations is assumed.

An increase in BAI values above zero indicates an increase in aggregate business activity up to a cyclical peak, when a reversal to a recession phase is possible. The BAI fluctuations around zero (its long-term average) indicate stagnation of activity; a shift below zero indicates a contraction in business activity to a recessionary turning point towards the growth phase.

The procedure for constructing composite survey-based indicators and the joint assessment of cyclical profiles in time series of such indicators and reference statistics is described in detail in (Kitrar and Ostapkovich 2013). According to this procedure, at the stage of selection of BAI components, a statistically significant cross-correlation relationship between their dynamics and the reference dynamics should be confirmed (not less than 0.75). Then, the primary 'balances of opinions' for each activity are combined into the composite macro-level indicators (using the above algorithm for individual components and principal components method to construct BAI).

Before combining these indicators into a single composite BAI and the subsequent analysis of its cyclic and predictive abilities, we test Granger causality between the components and reference statistics. Then, short-term cyclic profiles with a smoothed amplitude in the dynamics of each CCI and the statistical referent are determined and visualized together based on the built-in algorithm for assessing the cyclical sensitivity of the analyzed time series (Kitrar and Ostapkovich 2013).

The integration order of the analyzed dynamics is preliminarily determined. The time series of the CCIs are tested for stationarity using the Augmented Dickey-Fuller test, the null hypothesis of which is the presence of a unit root. The p-values less than 0.01 for all variables

allow us to reject the null hypothesis and define the analyzed series as stationary at the 1% significance level. The stationarity of the series make possible using a single pass of the Hodrick-Prescott statistical filter (HP) to decompose the dynamics of CCIs and extract unobservable cyclic components with smoothed amplitudes according to the OECD recommendations (OECD 2012) and (Kitrar and Ostapkovich 2013, Hodrick and Prescott 1997, Nilsson and Gyomai 2011). The single pass with the parameter $\lambda = 6.854$ flattens fluctuation with an amplitude of less than 30 months (Kitrar and Ostapkovich 2013).

For the feasibility of analyzing the impact of a shock (impulse) of business activity on GDP growth rates and subsequent forecasting, the Granger causalities are tested again. The results showed that in the period under review, the fluctuations of the BAI with a lead over 2 and 3 quarters are the cause for the change in the short-term tendencies of GDP growth at a 5% significance level ($\chi2 = 3.5965$, p-value = 0.0230). Consequently, it is highly probable that the business activity in the current quarter may affect the changes in the GDP growth rates in 2-3 quarters. At the same time, the current shock in the dynamics of GDP growth may cause a change in business activity in the next quarter, as evidenced by the test results at the 1% significance level ($\chi2 = 14.2834$, p-value = 0.0007).

The results of calculations and statistically significant cyclical sensitivity CCIs of a leading nature, as compared to the quarterly dynamics of the output indices in the basic sectors of the economy and the GDP growth confirm hypotheses 1 and 2. This allow including the BAI and its components in the group of early response indicators.

As the main limitation of business activity, we construct an *Economic Vulnerability Indicator (EVI*) with a counterdirectional profile and varying degrees of symmetry of its dynamics relative to the short-term BAI movement. Its main economic meaning is as follows: in business surveys, the concept of ‘vulnerability of activities’ implies the possibility of ‘damage’ to the economic system, for example, as a result of a crisis. The EVI evaluates the scale and direction of sectoral response to market shocks. The assessment is based on short-term gaps between the main BAI parameters with their potential level, which directly indicates the growth of business risks and the strengthening of ‘economic anxiety’ in the country.

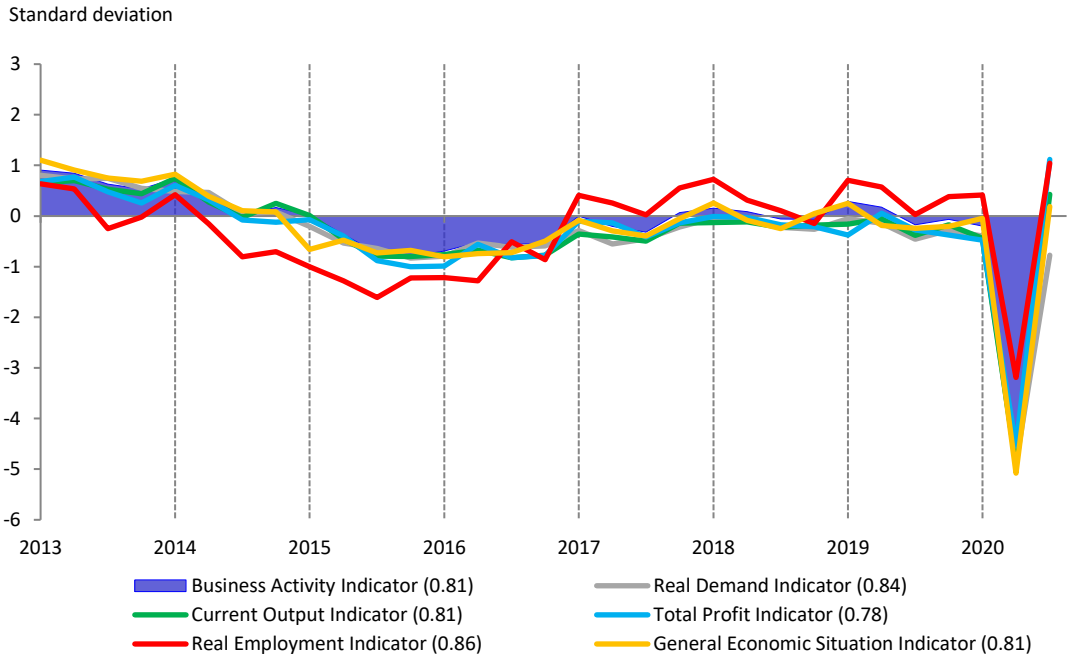
This is the difference between this concept and the concept of sectoral sustainability, which is usually defined in analytical practice as the ability of an economic system to adapt to crises, challenges and risks and therefore has a pronounced procyclical nature. Proactive monitoring of emerging vulnerabilities in the business environment is necessary to prevent their large-scale accumulation, the increase in the risks of economic downturns and ensure the highest possible macroeconomic stability.

The composite EVI is a quantitative measure of the aggregated opinions and expectations

of managers. The basis for its calculation is the weighted average graduated values, at each moment of time corresponding to the breaks in the trends of the main components of the BAI with their long-term average levels. Then they are formatted in the range of values set in accordance with the conditional criteria.

Business activity and economic vulnerability of organizations of basic economic activities during the Corona crisis in 2020

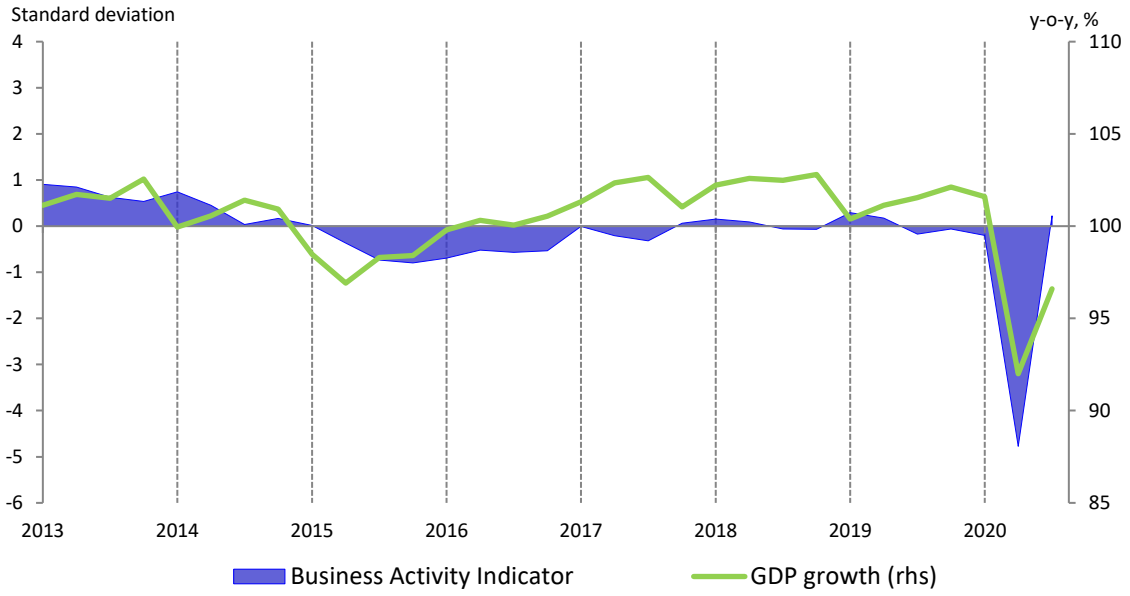
The main hypotheses of the study are illustrated with examples of graphical and cross-correlation comparisons. The visualization of the new early response indicators is presented in the following figures. In Figures 1-7, the dynamics of BAI and EVI reflect the cyclical interconnections of the analyzed indicators and the reference dynamics in accordance with H1 and H2. The quarterly BAI and its components react to upcoming changes in the reference macroeconomic indicators (according to a statistically significant cross-correlation coefficients), as a rule, with a lead of at least two months due to the prompt publication of the survey results.



Note: The coefficients of synchronous correlation of the BAI and its components with the dynamics of the GDP growth (as a percentage to the corresponding quarter of the previous year) are given in parentheses.

Sources: Rosstat, authors' calculations.

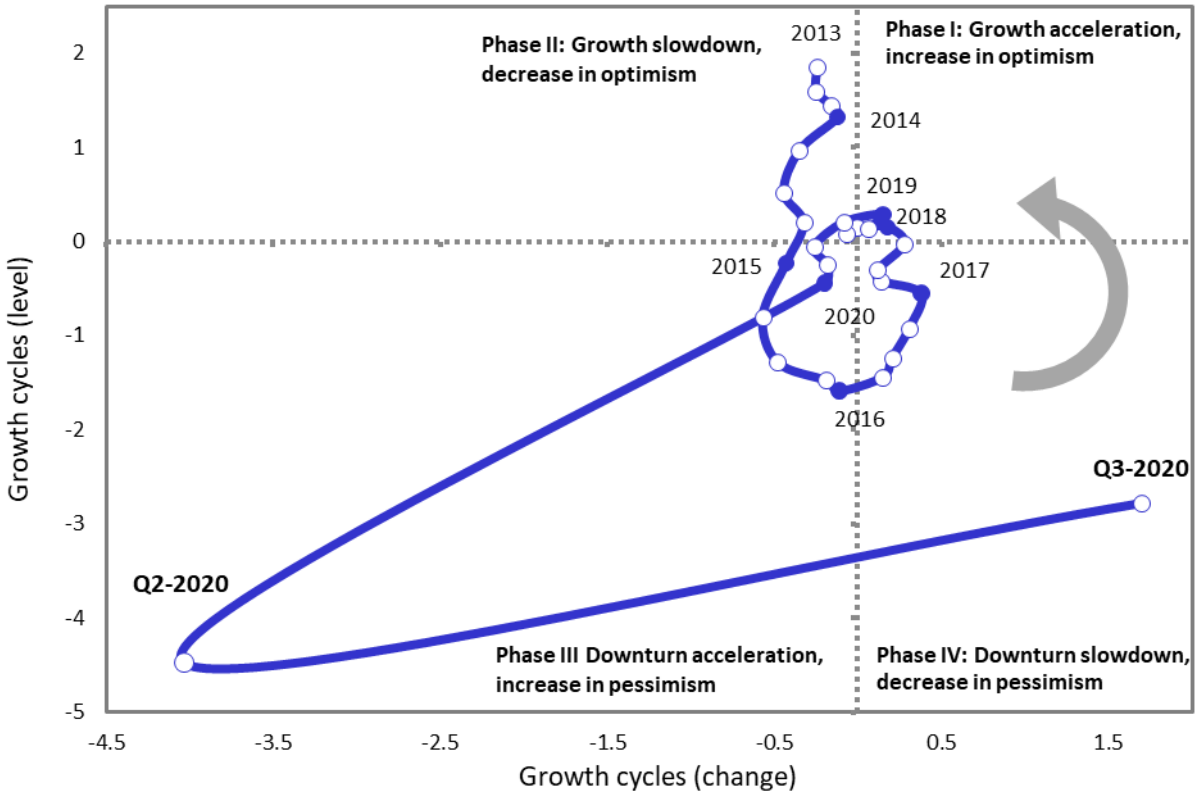
Figure 1. Dynamics of BAI and its components



Sources: Rosstat, authors' calculations.

Figure 2. Dynamics of BAI and GDP growth

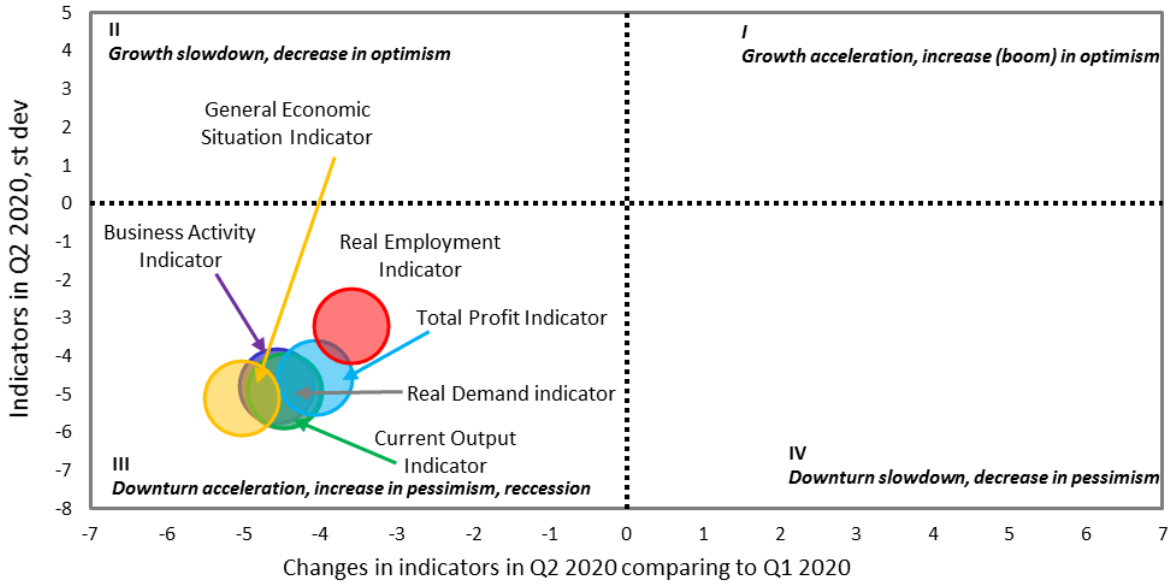
According to the recommendations of the European Commission, a tracer is a tool for visualizing growth cycles in the dynamics of survey indicators (EC 2017). It is based on the extraction (using the HP statistical filter) of the cyclical component of the indicator's time series with a fluctuation amplitude of at least 18 months. Standardized values of the cyclical component with a long-term mean of zero and a standard deviation of one are plotted along the Y-axis, and their quarterly changes are plotted along the X-axis. The movement of the tracer in the four quadrants of the diagram in a counterclockwise direction reflects the indicator moving through the four phases of the growth cycle. Cyclical peaks are located in the upper center area of the graph, and cyclical troughs are located in the lower center area (Figure 3).

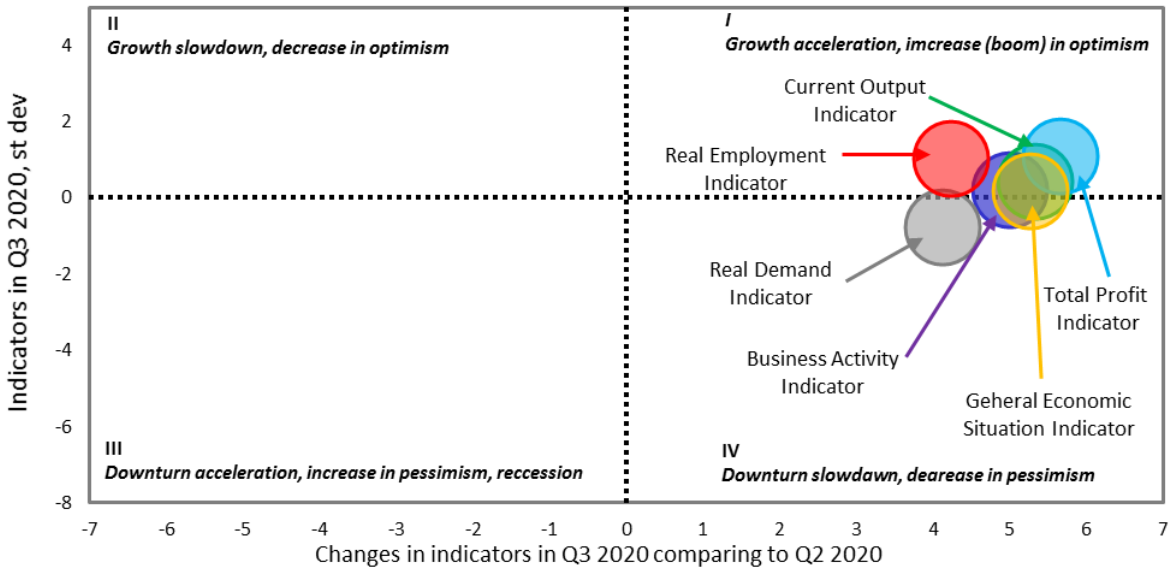


Sources: Rosstat, authors' calculations.

Figure 3. Cyclical phases in the BAI dynamics

The figures below show the dynamics of the new CCIs. In 2020, their trajectories correspond to the sectoral events that dominated the Russian economy at the peak of the coronavirus crisis. They first reflected the business response to quarantine measures during the first wave of COVID-19, and then a slow recovery in business activity despite localized pandemic outbreaks, low immunization rates, and uncertainty of business and overall economic development.





Sources: Rosstat, authors' calculations.

Figure 4. Levels and changes of BAI components in 2020

Pandemic containment measures have become unprecedented and sudden constraints for businesses. The reaction of entrepreneurs to the shocks immediately led to a sharp contraction in business activity. The indicators of real demand and current output, total profit and the general economic situation in the first coronavirus wave (in April and May 2020) dropped into the negative zone. The rate of their fall was the highest for the entire observation period: losses averaged about 50% of the long-term potential level. The dynamics of the real employment indicator decreased somewhat less.

If the contraction of entrepreneurial activity continued for another three months, this would indicate the beginning of a deep recession. However, the economic policy measures taken to contain the coronavirus attack, restore and support businesses and households, and rebalance supply and demand in Q3 2020 contributed to a sharp turnaround. The prevailing negative profiles in the dynamics of entrepreneurial opinions have sharply changed to the opposite. The indicator of real demand recovered to a lesser extent, while the indicators of current output, real employment, total profit and general economic situation approached the cyclical phase of growth acceleration.

Indicator overheating — Indicator cooling

	Demand			Output			Prices			Profit			Employment			Economic situation			Economic Vulnerability Indicator		
	current tendency*		expectations**	current tendency		expectations	current tendency		expectations	current tendency		expectations	current tendency		expectations	current tendency		expectations			
	Q2	Q3	Q4	Q2	Q3	Q4	Q2	Q3	Q4	Q2	Q3	Q4	Q2	Q3	Q4	Q2	Q3	Q4	Q2	Q3	Q4
Mining	12.3	9.0	8.7	12.4	9.4	8.0	9.2	1.9	1.8	12.5	10.5	6.1	5.8	6.5	1.7	14.6	5.3	5.8	11.6	8.3	7.2
Manufacturing	18.4	2.8	4.3	16.5	2.4	3.4	0.6	0.2	0.6	17.9	7.6	7.5	3.1	1.4	1.1	17.2	4.8	5.5	16.4	5.0	2.6
Electricity, gas, steam and air conditioning supply	5.8	1.9	9.5	9.1	0.6	10.3	2.2	1.1	2.6	1.2	1.8	6.0	0.3	0.7	0.9	3.9	4.6	5.0	-18.0	4.6	7.5
Construction	8.4	7.4	8.4	8.1	7.1	6.9	3.0	2.0	4.7	11.4	7.4	2.7	4.5	2.5	7.5	6.9	4.9	3.2	8.0	5.9	6.3
Retail trade	19.1	3.1	4.1	19.6	0.6	4.6	11.0	7.0	6.6	19.8	2.8	7.8	4.3	2.3	0.3	21.7	4.7	6.9	11.2	4.4	6.4
Services	48.2	0.8	7.8	47.4	0.6	9.2	25.5	10.5	8.2	43.2	1.2	8.3	12.7	1.7	3.9	48.4	10.4	11.4	37.6	10.5	8.8

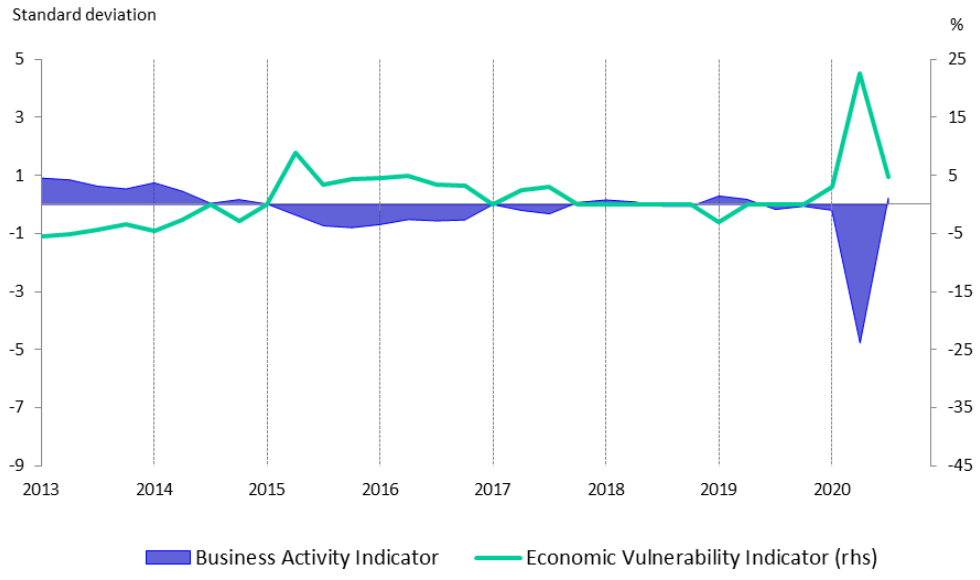
All deviations of the survey indicators from their long-term average levels (LAL) are color-coded in accordance with the following gradations of assessments of economic vulnerability:

- below LAL up to 20 inclusive, extreme deviations, weight (-5) → "extremely critical vulnerability"
- below LAL from 20 to 10 inclusive, weight (-3) → "excessive vulnerability"
- below LAL from 10 to 5 inclusive, weight (-2) → "high vulnerability"
- below LAL from 5 to 2 inclusive, weight (-1) → "low vulnerability"
- below LAL from 2 to 0 and above LAL from 0 to 2 inclusive, weight (0) → "neutral (uncertain) vulnerability"
- above LAL from 2 to 5 inclusive, weight (1) → "moderate invulnerability"
- above LAL from 5 to 10 inclusive, weight (2) → "high invulnerability"
- above LAL from 10 to 20 inclusive, weight (3) → "very high invulnerability"
- above LAL from 20, extreme deviations, weight (5) → "maximum resilience"

Notes: deviations of the survey indicators in the Q2, Q3 and Q4 2020 from the long-term average levels of their dynamics for 2013-2020 (above/below), percentage points, * – current changes relative to the previous quarter, ** – expected changes relative to the current quarter.

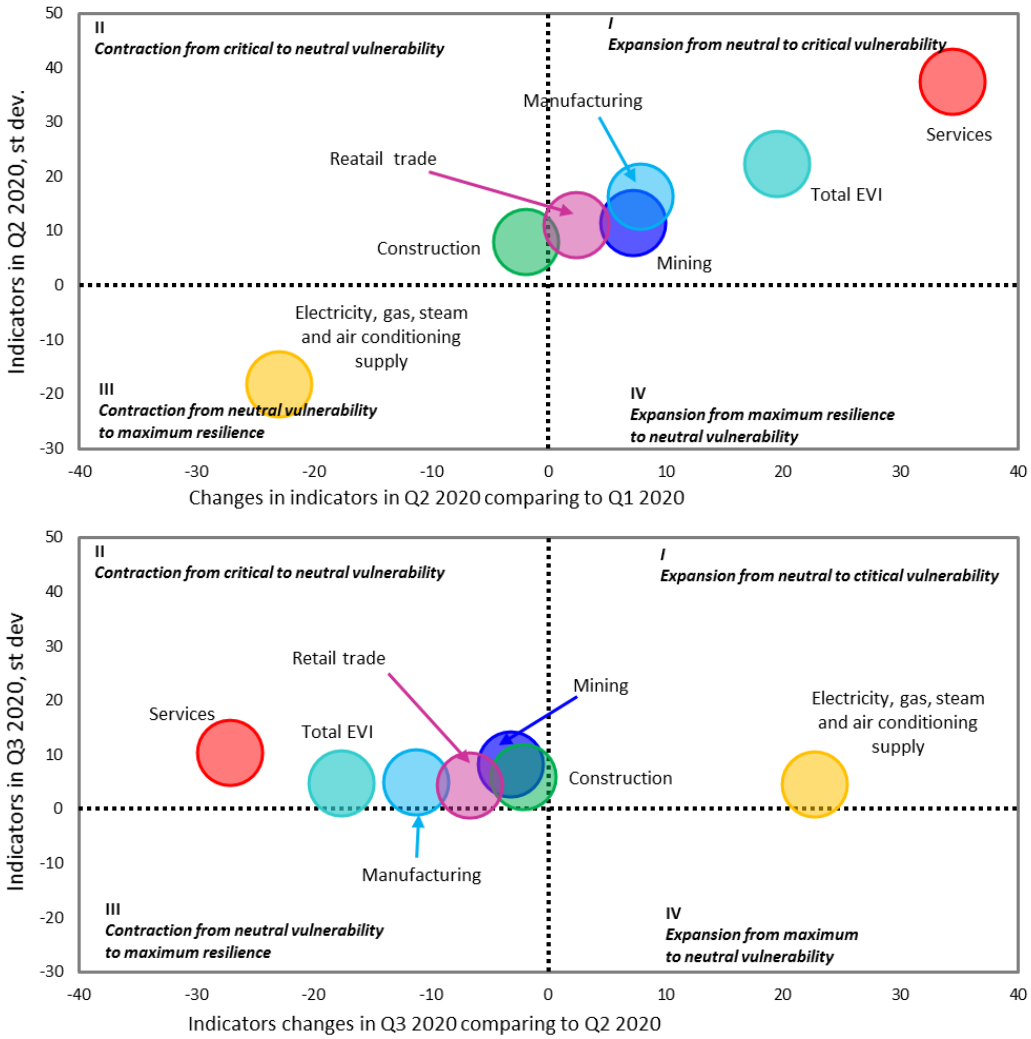
Sources: Rosstat, authors' calculations.

Figure 5. Cross-sectoral assessment of economic vulnerability of basic economic activities – Heat chart



Sources: Rosstat, authors' calculations.

Figure 6. Countercyclical relationship between the BAI and EVI



Sources: Rosstat, authors' calculations.

Figure 7. Level and change of sectoral components of the Economic Vulnerability Indicator in 2020

After a sudden upward 'bounce' at the beginning of the pandemic (to the highest and almost critical value in an eight-year period), the EVI in Q3 2020 sharply and significantly dropped again to almost the level of moderate business security.

The highest values of the EVI were observed in the service sector. The least vulnerable organizations providing electricity, gas and steam in Q2 2020 expected the situation to worsen by the end of the year. In Q3 2020, retail organizations were in the most favorable situation in terms of the impact of the coronavirus shocks.

There was no further improvement in the expected EVI dynamics until the end of 2020. Growing geopolitical risks, falling oil prices, upcoming the second pandemic wave, local lockdowns prevented the accumulation of 'economic optimism' of entrepreneurs and a decrease in vulnerability of their activities in short term perspective. The EVI again showed an increase in pessimistic assessments in basic economic activities.

Conclusions

The paper proposes a methodology for calculating short-term indicators - predictors of crises based on the results of surveys of business activity of organizations conducted by Rosstat and proves their relevance as early information on possible cyclical reversals of macroeconomic dynamics. The proposed indicators are more timely and sensitive to new phenomena (including non-economic ones), which radically affect the cyclical sectoral development.

The new composite Business Activity Indicator (BAI) and its aggregated components - the indicators of real demand, current output, real employment, total profit and general economic situation react to upcoming changes in reference macroeconomic indicators, as a rule, ahead of at least one quarter due to the timeliness of publication the survey's results.

As the main constraint on business activity, a new Economic Vulnerability Indicator (EVI) is introduced, to assess the scale and direction of the sectoral response to market shocks. The assessment is based on short-term gaps between the main parameters of the BAI and their potential level, the magnitude of which directly indicates the growth of business risks in the country.

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Liudmila Kitrar

National Research University Higher School of Economics, Russian Federation. Institute for Statistical Studies and Economics of Knowledge, Centre for Business Tendency Studies. Deputy Director. lkitrar@hse.ru.