NATIONAL RESEARCH UNIVERSITY
HIGHER SCHOOL OF ECONOMICS

Inna S. Lola

THE STATISTICAL MEASUREMENT OF BUSINESS CONDITIONS FOR SMALL ENTREPRENEURS

BASIC RESEARCH PROGRAM
WORKING PAPERS

SERIES: SCIENCE, TECHNOLOGY AND INNOVATION

WP BRP 71/STI/2017

Inna S. Lola[1]

THE STATISTICAL MEASUREMENT OF BUSINESS CONDITIONS FOR SMALL ENTREPRENEURS[2]

A specific feature of business conditions surveys describing actual and expected short-term trends of company financial and economic activities is the non-quantitative nature of the relevant data. To facilitate its interpretation and visualisation for various user groups, the respondents' answers are typically aggregated into simple and composite indicators (CI).

This study proposes, tests, and validates conceptual and information measurement hypotheses for building and applying such CI, which provide an integrated assessment of small entrepreneur (SE) economic sentiment. These CI demonstrate a strong, statistically significant correlation with growth cycles of reference statistical indicators. A theoretical model for building CI to measure business conditions for SE is presented, and a relevant toolset is described.

Industry-specific features of building business conditions indicators are illustrated using the retail and wholesale sectors as examples. New opportunities for the visualisation and analytical presentation of the cyclic profiles of indicators are demonstrated, based on tracers tracking their phase-to-phase movement. New information and analysis-related areas are identified for the application of nonparametric data to estimate the current state and expected development of SE.

Keywords: small entrepreneurship, business conditions, composite indicators, cycle tracer, business conditions surveys

JEL: E32, C81, C82.

[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.: ilola@hse.ru

[2] The article was prepared within the framework of the Basic Program at the National Research University Higher School of Economics (HSE) and supported within the framework of a subsidy by the Russian Academic Excellence Project`5-100`.

Introduction

Due to the specific features of the current stage of Russia's socio-economic development, attention to small enterprises (SE) is steadily increasing[3]. To develop new growth models it is important to fully utilise the potential strengths of SE such as their ability to adapt quickly to changing business conditions, and to create new jobs. SE play a particularly important role in developing new high-quality products, in technology and service transfer, and in finding new ways to serve customers, contributing to the development of a highly dynamic innovation-based economy [Baranov, 2012; Chepurenko, 2004].

This impression is further enhanced by scholars, economists, and experts such as the laureates of the Global FSF-NUTEK Global Award for Entrepreneurship and Small Business Research[4] [Chepurenko, 2013]. Cooper[5] as early as the mid-1960s concluded that SE were becoming the main driver of economic growth. In 2003 his hypothesis was fully supported by Baumol[6] who extended this statement having proved that SE had exceptional innovation potential [Chepurenko, 2013]. At the same time Birch[7], maintained that empirical research should provide a foundation for SE studies. He suggested an "economic microscope" capable of going beyond dry aggregated statistics to explain how specific firm behaviour affects the employment situation in the US.

The resources for conventional statistical observation currently available in Russia are not sufficient for the timely measurement of or reaction to the cyclic and structural shifts in the development of SE in specific industries [Lola, 2015a; Demidov, 2008; Frenkel', 2007]. This is due to a lack of methodological and empirical statistical studies of the economic activities of SE, based on business conditions surveys. The existing statistical and analytical apparatus requires the development and application of new measurement tools to identify actual and expected short-term business development trends. Therefore the need to upgrade the existing information infrastructure has become increasingly urgent, especially regarding the extension of available statistical tools and techniques for measuring the activities of the these economic agents.

This paper proposes improved techniques and tools for the statistical measurement of the economic activities of SE in Russia. A specially designed and empirically tested methodology for building industry-specific composite indicators (CI) is presented, which allows the regular measurement of business conditions for SE and extends the existing potential for applying business condition surveys to conduct an integrated analysis of various industries.

Extensive international experience provides a valid reference point for developing statistical tools to measure the activities of SE in Russia. Various indicators are used in other countries to measure business sentiment, based on surveys of business conditions [Lola, 2015b; Crosilla, 2009a, b]. The fact that they have been successfully applied in the course of economic decision-making for more than 50 years highlights the need to design and implement short-term business condition indicators in Russia, to regularly analyse the business environment and to measure company resistance (and susceptibility) to various shocks. The study presents an originally

[3] According to the Federal Law N 209-FZ of 24.07.2007, companies employing 16 – 100 people are considered small enterprises.
[4] The Global Award is awarded since 1996 for outstanding achievements in studying entrepreneurship, instituted jointly by the Swedish Foundation for Small Business Research – FSF) and the Swedish Agency for Economic and Regional Growth – NUTEK) [Chepurenko, 2013].
[5] Cooper A.C. Small Companies can Pioneer New Products // Harvard Business Review. 1966. Vol. 44 (5). P. 75–83.
[6] Baumol W.J. Entrepreneurship: Productive, Unproductive and Destructive // Journal of Political Economy. 1990. Vol. 98(5). P. 893–921.
[7] Birch D.L. The Job Generation Process // Cambridge, MA: MIT Program on Neighborhood and Regional Change, 1979.

designed methodology for building CI to measure and analyse business conditions for Russian SE: the Retail Market Indicator (RMI), Retail Business Potential Indicator (RBPI), and Wholesale Market Indicator (WMI).

The choice of sectors for the study was determined by the high volatility of SE. Since these companies essentially act as market drivers the results of their economic activities are among the most important and accurate economic sentiment indicators, due to their close connections with the consumer segment [Bokun, 2007]. Household expenditure on the purchase of goods, in particular in the retail market, exceed 60% of disposable income. On the whole, 40% of the share of GDP generated in the small enterprise segment is created by wholesale and retail companies. The inadequate information and analytical capabilities to accumulate results of surveys by the Russian Federal State Statistics Service (Rosstat) of wholesale and retail business activities is a major factor underlining the need to extend and develop relevant statistical potential.

The results of empirical studies confirm that the suggested methodology for building CI is highly adaptive. Growth cycles of all CI using them show a strong correlation with the retrospective and current dynamics of major national economic macro-aggregates, such as the volume indices of retail turnover and GDP. This allows us to view business conditions indicators based on survey results as relevant and reliable sources of empirical data.

The proposed methodology for analysing business conditions surveys will significantly extend the theoretical and empirical scope for studying industry-specific SE development in Russian statistical practices. The methodology for building CI can be used by Russian ministries and government agencies to improve national policies to promote SE. The practical application of these indicators will allow the development of more efficient immediate anti-recession steps and stabilisation decisions to promote economic growth in acutely volatile business conditions.

Review of international practices

The increasingly quick transformation of statistical approaches, techniques, and methods applied to measure SE trends is evidence of the importance of studying SE in national economies. Countries which have a long empirical experience of studying SE through business surveys, using CI, have established important discussion platforms to exchange relevant results. The US, UK, Sweden, Germany, Italy, Japan, and China are leaders in this area [Lola, 2015b; Mitchell, 1988, 2002; OECD, 2014]. The better-known organisations include the US National Federation of Independent Business (NFIB), the US Bureau of Economic Analysis, the Swiss Economic Institute, The Munich Institute for Economic Studies (Ifo), the Institute for Studies and Economic Analyses (Italy), The Brazilian Institute of Economics, and the South African Bureau for Economic Research.

One widely applied US indicators is the Small Business Optimism Index calculated jointly by NFIB and Wells Fargo[8]. An index describing the current state of SE specialising in different industries (also for specific regions) has been maintained by the Canadian Federation of Independent Business[9] [Minister responsible for Statistics Canada, 2009].

[8] URL: https://wellsfargoworks.com/small-business-index (Accessed: 05.01.2016)
[9] URL: http://www.cfib-fcei.ca/english/research/canada.html (Accessed: 12.01.2016)

The German statistical practice has significant experience in measuring the business climate for SE. Ifo calculates a specialised business climate index for SMEs (KfW ifo SME Barometer)[10], commissioned by the banking group Kreditanstalt für Wiederaufbau. On the whole, the best-known German indicators for tracking and forecasting economic cycles are the ZEW Indicator of Economic Sentiment, applied in the German financial sector, Ifo Index West German business sentiment, Ifo Business Climate Index, measuring the business confidence/climate in Germany, Ifo World Economic Climate Index and Ifo Business Climate Index in the German service sector.

In the UK, the Federation of Small Businesses (FSB)[11] studies and analyses industry-specific SE trends. In particular, it maintains a CI for SE specialising in various industries, and for various UK regions – the Small Business Index. The index is calculated on the basis of quarterly surveys of SE – members of the FSB Big Voice community[12]. The British group Sage[13] assesses the state of SE in various countries. The results were aggregated into the Sage Business Index[14] which monitors the business climate for SE in the UK and 17 other countries[15]. The survey of SE conducted by the major consulting and marketing firm BDRC Continental[16] is commissioned by the Association of Business Recovery Professionals[17]. The monthly Business Distress Index Barometer publishes an index which assesses the scale of British SE financial problems. This study is important for the British economy because it helps to detect companies potentially facing bankruptcy at an early stage, to provide them support and help maintain their market share.

One of the better-known Italian indicators is the Italian Services Purchasing Managers Index (PMI)[18]. This forward-oriented indicator provides up-to-date information about the changing business climate, and is widely applied by companies, government agencies, and financial analysts to better understand business conditions and design investment strategies. Since June 2012 Italian experts have calculated the composite Istat Economic Sentiment Indicator (IESI)[19], broken down by industries.

The Business Trust Index INSEE and the Business Climate Index PMI are the main statistical indicators describing business conditions for SE in France (calculated using the INSEE methodology and published by the financial group BNP Paribas). The business activities of French SE in various industries are also analysed by experts employed by the French Small Business Centres Association (Federation des Centres de Gestion Agréé, FCGA)[20]. Business activity indices are calculated quarterly using a sample of 15 000 retail and service SE.

The Japanese government annually presents a report on SME development trends – the White Paper on SME in Japan – to parliament. The most important business climate indicator in Japan

[10] URL: https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-KfW-ifo-Mittelstandsbarometer/PDF-Dateien-KfW-ifo-Mittelstandsbarometer-2014-EN/KfW-ifo-Mittelstandsbarometer_2014-09_EN.pdf (Accessed: 12.01.2016)

[11] URL: www.fsb.org.uk (Accessed: 12.01.2016)

[12] About 5 thousand respondents participate in online surveys. Regardless of their economic activity, the index includes the following basic components: employment, revenues, entrepreneurs' trust.

[13] URL: http://www.sage.com/ (Accessed: 20.01.2016)

[14] URL: http://www.sage.com/businessindex (Accessed: 20.01.2016)

[15] US, Canada, Germany, Austria, Sweden, France, Ireland, Spain, Portugal, Poland, Malaysia, Singpore, Brazil, Australia, Marocco, and Tunisia.

[16] URL:http://www.bdrc-continental.com/ (Accessed: 02.02.2016)

[17] URL:https://www.r3.org.uk/ (Accessed: 02.02.2016)

[18] The indicator is calculated by the Markit Economics company jointly with the ADACI association (Associazione Italiana Acquisti e Supply Management).

[19] URL:http://dati.istat.it/?lang=en (Accessed: 05.02.2016)

[20] URL: http://www.fcga.fr/(Accessed: 05.02.2016)

is Tankan, published quarterly in the economic review Tankan Report by the Bank of Japan since 1957[21].

The best-known national indicator in China is the Diffuse Business Activity Index (PMI), calculated using a methodology similar to the relevant European indicators. The Small and Medium Business Sentiment Index[22] is calculated in China specifically to analyse business conditions for SE.

In Australia, the National Australia Bank Group[23] publishes the NAB Business Confidence Index and the NAB Business Conditions Index,[24] based on monthly surveys of SE. A similar indicator – the Sensis Business Index – has been calculated since 1993 by Sensis. The results of these studies are published in the quarterly Sensis Business Index Reports[25]. The Australian Chamber of Commerce and Industry (ACCI)[26] studies SE. The results provide the basis for calculating the Expected Economic Performance Index and the General Business Conditions Index. The results and the calculated indices are quarterly published in ACCI Business Expectations Survey reviews[27].

In New Zealand business conditions for SE are assessed by the Australia and New Zealand Banking Group, Limited (ANZ), which calculates the ANZ Business Confidence Index monthly. This diffuse index is published in the monthly ANZ Business Outlook which has established a reputation as an important information source, being the oldest business opinion review and providing a reliable and up-to-date analysis of the current and expected economic situation in New Zealand.

The ranks of prominent international experts on methodologies for business conditions and entrepreneurship studies include Hans Landström, Per Davidson, Ronny Nilsson, Emmanuelle Guidetti, Gyorgy Gyomai (OECD); Cristian Gayer (European Commission); Gian Luigi Mazzi (Eurostat); Jan-Egbert Sturm (KOF-ETH Swiss Economic Institute, Switzerland); Klaus Wohlrabe (Ifo); Luciana Crosilla, Marco Malgarini, Enrico D'Elia (Istituto di Studi e Analisi Economica ISAE, Italy); Aloisio Campelo Jr. (Insitituti Brasiliero de Ecopnomica IBRE-FGV, Brazil); and George Kershoff (Bureau for Economic Research BER, South Africa).

This overview of international practices for the measurement of business conditions for SE shows that, despite the relative simplicity of statistical tools (in most cases the so-called diffuse indices[28]) and analytical techniques applied, they are a necessary and sufficient condition for development of national economies.

[21] URL: http://www.boj.or.jp/en/statistics/tk/index.htm/ (Accessed: 10.02.2016)

[22] Devloped in the scope of research by the China International Cooperation Association of Small and Medium Enterprises; the sample includes more than 20,000 companies.

[23] URL:http://www.nab.com.au/about-us (Accessed: 11.02.2016)

[24] URL:http://business.nab.com.au/wp-content/uploads/2015/05/2015-April-NAB-business-survey.pdf(Accessed: 11.02.2016)

[25] URL: https://www.sensis.com.au/content/dam/sas/PDFdirectory/MediaReleases/SensisBusinessIndex_Dec2014.pdf(Accessed: 11.02.2016)

[26] URL:http://www.acci.asn.au/Home (Accessed: 15.02.2016)

[27] URL:http://www.acci.asn.au/Research-and-Publications/Research/Economic-Surveys/Business-Expectations (Accessed: 15.02.2016)

[28] A diffuse index is calculated as a sum of the positive answers' share ("growth" or "above average") and half of the neutral answers' share ("no change" or "average") [Cuhlo, 2013].

Review of Russian practices

International experience of studying SE through business conditions surveys shows that this tool is considered to be efficient and is widely recognised by the international community [Kitrar, 2003].

During the last 15 years a breakthrough in understanding and perceiving qualitative statistical information has occurred in Russia. The seemingly risky and subjective foreign project has become increasingly more popular with every passing year, testing the reliability of its information potential in the global and Russian crises [Cuhlo, 2010]. The number of research centres working with nonparametric statistical data has grown, along with the number and quality of publications analysing such data. Demand for these data increased accordingly and the range of users has expanded. Many Russian experts have become prominent in the information and academic environment, both in Russia and internationally.

Studying the economic situation through business conditions surveys is a priority research area such as for the Higher School of Economics Institute for Statistical Studies and Economics of Knowledge Centre for Business Tendency Studies (HSE ISSEK CBTS)[29]. Since 2009 the Centre has maintained the only full-scale database of results of such surveys for large, medium, and small companies in Russia. The Centre conducts research based on surveys by the Federal Statistical Service which cover about 15 000 SE specialising in manufacturing, construction, retail and wholesale trade, and services. Almost all Russian regions are covered, from Kaliningrad to the Far East (more than 80 regions altogether).

The successful experience of the statistical measurement of business development trends and industry-specific events, using qualitative parameters for assessing large companies' operations should be noted here. Large-scale regular studies[30], and a substantial demand for their results summarising development trends for companies specialising in various industries is evidence of the statistical significance and relevance of data, and their high correlation with conventional quantitative statistics [Kitrar et al, 2014, 2015; Smirnov, 2014, 2001; Frenkel, 2007; Cuhlo, 2010].

Moving towards new economic stages of development created an objective need to master and actively implement statistical practices and tools for measuring large businesses' sentiment using CI. The best-known indicator is the Business Confidence Index (BCI) calculated by aggregating data measuring the performance of different sectors of the economy. This indicator is widely applied in business surveys conducted by the European Union countries and members of the Eurozone, who have developed the relevant methodology [The Joint Harmonised EU Programme of Business and Consumer Surveys, 2014].

Non-government organisations whose interests include SE development and who publish analytical materials on its major trends and associated problems include the Public Organisation of Entrepreneurial Associations "Russia's Support", the Public Organisation "Business Russia", the Russian Agency for Small and Medium Business Support, the Small Entrepreneurship Resource Centre, the National Institute for Systemic Studies of Entrepreneurial Problems.

Russian banks have been actively conducting applied and information-gathering studies of SE business activities (e.g. Promsvyazbank, Vnesheconombank), though some of them can be seen as controversial in terms of methodology and results. This is primarily due to problems with

[29] URL: http://issek.hse.ru/dep_conres (Accessed: 10.01.2016)

[30] Since 2009 business climate studies are conducted by the HSE ISSEK Centre for Business Tendency Studies.

building samples, the choice of survey techniques, and the subsequent application of statistical tools to process the results.

The international project Global Entrepreneurship Monitor (GEM)[31] was started in 1999 by UK, US, French, and Italian researchers; currently 70 countries participate in the project including Russia, which joined in 2006[32]. This study of entrepreneurship allows a comparison of the effects of various specifically national business development aspects over the rate of entrepreneurial start-ups in various countries, and identifies the reasons for discontinuing active entrepreneurial activities [Chepurenko, 2013]. The GEM project is focused on studying interconnections between entrepreneurship and economic growth.

Nevertheless, there is still a shortage of methodological and empirical statistical studies in Russia analysing the development of SE through business activity surveys. Designing a new economic development model for Russia, with SE serving as a major potential growth driver involves a transformation of the statistical techniques and tools for studying the genesis of a new socio-economic paradigm. Accordingly, there is an increasing need to extend available, and develop new methodologies for the full-scale statistical measurement of different parameters of business conditions for SE activities.

Most of the works by Russian authors engaged in SE studies and recent research by various non-governmental organisations have a predominantly marketing and sociological orientation. There are practically no publications or reviews presenting scientific and methodological results or describing empirical research practices for applying business conditions monitoring to estimate the financial and economic situation of SE. The phenomenon of entrepreneurship is viewed in the literature as being at the junction of interdisciplinary approaches with minimal or no application of statistical techniques. SE is mostly studied by consulting companies, banks, and analytical agencies which are quite removed from the world of science, and have no potential for applying professional statistical tools. Even these few and, to put it mildly, not exactly perfect works find a demand, confirming that Russia has finally reached the stage of conducting studies based not just on quantitative but also qualitative statistics.

Considering the international and the accumulated Russian experience of measuring the business climate for large and small businesses, it would be reckless to disregard the statistical tools and potential offered by as yet unrealised opportunities to apply business conditions surveys. It was shown that surveys can provide a valuable layer of data on the interpretation by economic agents of the emerging business climate, and more importantly on how their assessments match short-term forecasts. Therefore, surveys should be considered a particularly useful tool; obtaining such data using conventional statistical resources would be impossible.

Methodological and empirical basis of the study

Keeping in mind the high productivity of international statistical tools applied to develop CI, this study is based on the methodological principles used by the OECD [2006] and the European Commission [The Joint Harmonised EU Programme of Business and Consumer Surveys, 2014]. The relevant Russian experience of measuring large companies' business sentiment was also taken into account [Kitrar et al, 2015, 2014; Smirnov, 2014, 2001]. The main techniques applied

[31] http://www.gemconsortium.org/ (Accessed: 20.01.2016)

[32] The GEM project is currently the largest entrepreneurship study in terms of the number of observations: 197,000 respondents and 3,800 experts on entrepreneurship participated in the survey in 2013. Russia is represented by the St. Petersburg State University Higher School of Management and the National Research University Higher School of Economics (Moscow) teams.

in this study is processing the results of business conditions surveys taking into account their spatio-temporal structure include econometrics and applied statistical tools such as the multidimensional statistical analysis of parametric and nonnumeric data. A number of software application suites including Statistica, SPSS, MS Excel, and EViews were employed. To analyse time series, the decomposition of indicator dynamics in the scope of the state space model with unobserved cyclic components was applied. To summarise survey results, dynamic factor models and vector auto-regression apparatus were employed which allowed us to analyse the dynamics of the CI of business conditions for SE.

The study is based on the works of leading Russian and international scientists specialising in applied statistics and economic theory, including: Arkhipova [2008], Dolgopiatova [2008], Mirkin [2013a, 2013b], Mkhitarian [2012], Prescott [1986] and Smirnov [2014, 2001].

The empirical basis for the calculations was provided by quarterly business conditions surveys for Russian retail and wholesale SE conducted by Rosstat between 2000 and 2014[33]. Also, the survey end results (time series) are represented in the statistical database maintained by HSE ISSEK CBTS. The sample for this study comprised of 5 000 economic agents from more than 80 Russian regions, including 3 000 retail and 2 000 wholesale companies.

Methodology and tools for building composite indicators

This study proposes an original interpretation of the term "business conditions", from the perspective of analysing SE activities. A variety of definitions is currently being used. In the broadest sense business conditions can be seen as the set of external macro- and micro-economic conditions. "Business conditions" combine the social, economic, and political conditions which determine the potential and dynamics of economic agents' activities in real time [Lola, 2015a]. The term "early response indicators" used in this study is primarily based on the specific features of the empirical database. In this context business expectations regarding the short-term prospects for their companies are particularly important. The results of business conditions studies (freely available on the Rosstat website) show, if retrospective data analysis is applied, the high accuracy of company reactions to expected changes in business conditions [Lola, 2015c, 2015d]. It was empirically shown that their projections and predictive estimates provide reliable short-term positive or negative signals of the sector's development [Stock, Watson, 2002; Theil, 1975; Smirnov, 2001].

Other criteria for the above definition include a single data source, and timeframes for the collection and official publication of results. This is particularly important, since the results usually become available much earlier than statistical estimates. Given the specific features of Russian statistics (which provided the basis for our calculations) no single methodology for calculating CI could be applied. Diverse empirical practices, which have emerged in this research area in recent years provided the scope for applying some existing methodologies[34], which became an important scientific and practical aspect of building the CI. The raw data were used to obtain business climate survey results for the abovementioned sectors of the economy using specially designed software tools, which can weigh the respondents' answers in line with

[33] The study covers wholesale and retail segments for consumer products included in the sector G of the All-Russian Classification of Economic Activity Types.

[34] The system of composite cyclic indicators built by the European Commission is believed to be the most popular and successful example of applying business development trend surveys' data for short-term analysis; they are quarterly published as European Business Cycle Indicators. URL: http://ec.europa.eu/economy_finance/publications/cycle_indicators/(Accessed: 15.03.2016)

the requirements of international methodologies for these surveys.[35] Further processing of the results for retail and wholesale companies included building a time series of the survey indicators, their seasonal adjustment, and the subsequent calculation of simple and composite indicators [Afanas'ev, 2010; Arhipova, 2008; Buhl, 2002; Fok, 2005; Joint Harmonized EU Programme of Business and Consumer Surveys, 2014].

The general sequence of steps to build CI for SE on the basis of business conditions monitoring is described below, and graphically represented in Figure 1. The initial data for the analysis conducted in the course of the study were provided by a time series of various economic indicators, showing the quarterly dynamics for the period under consideration. In general terms, building an indicator can be reduced to building a representation expressed as a function, described as follows:

$$\boldsymbol{F}\colon \underbrace{\mathbb{R}^N \times \mathbb{R}^N \times \ldots \times \mathbb{R}^N}_{k} \to \mathbb{R}^N, \tag{1.1}$$

$$\boldsymbol{F}\colon \times_1^K \mathbb{R}^N \to \mathbb{R}^N, \tag{1.2}$$

$$\tilde{A} = F(A_1, \ldots, A_K), \tag{1.3}$$

where N is the number of observation periods, and K is the number of metrics used to build the indicator. $a_{i,j}$ is the value of the i-th metric included in the indicator at the j-th moment of time, so: $\forall i = \overline{1..K}\colon\ A_i = (a_{i,1} \ldots a_{i,N}) \in \mathbb{R}^N$. Also, a set, A, is introduced, containing all metrics used in the study, so that

$$A = \{A_1, \ldots, A_K\},\ \mathrm{M(A)} = \mathrm{K},\ A^1, A^2, A^3, A^4 \subset A, \tag{2}$$

where A^p is the set of metrics used to build p-th indicator, $p = \overline{1..4}$.

[35] To weigh results of retail companies' surveys, data on their turnover and number of employees was used; for wholesale companies, it was only turnover data.

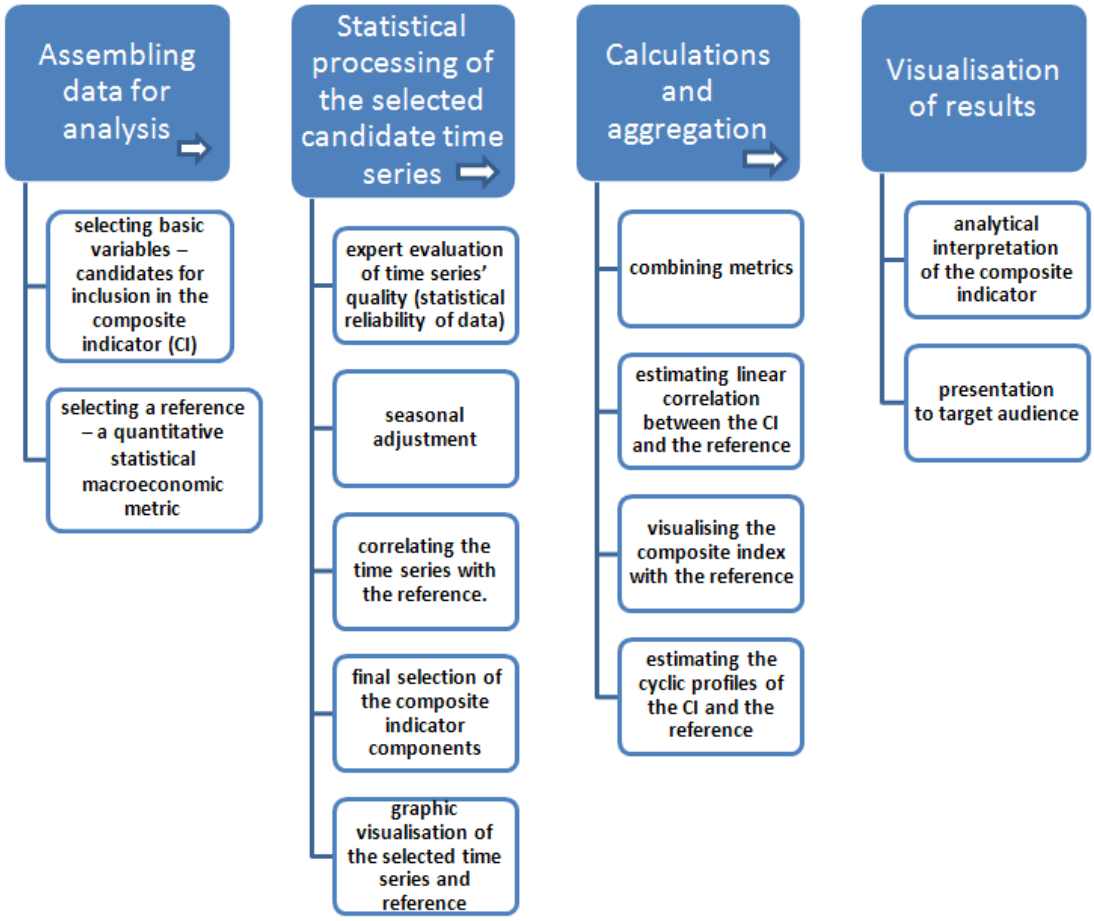


Figure 1. Methodology for building short-term cyclic composite indicators

Note for the "Calculations and aggregation" block: in this context, growth cycle profiles for the indicators under consideration are used

Assembling data for analysis

As the first step in building a qualitative CI candidate, metrics were selected together with standard reference data series objectively reflecting economic trends. A comparison with the reference series is crucial for building a chronology of cyclic turning points, both for its own dynamics and for those of the CI, so the best combination of candidate CI components can be selected on the basis of their statistically significant matching of this chronology. A metric describing the country's economic potential was chosen as the reference – the volume index (VI) of retail turnover between the 1st quarter of 2000 and the 4th quarter of 2014[36]. At the same time the volume index of the GDP (VI GDP)[37] was selected as a reference for the CI measuring

[36] Source of the retail turnover data: current Rosstat publications "Short-term economic indicators for the Russian Federation". Volume index of retail turnover describes combined changes of the overall stock of products during the period in question compared with the reference period (for the purposes of this study, the relevant period in the previous year); it shows how the turnover has changed due to changes of its physical parameters only, regardless of the effect of price changes. VI is calculated using retail turnover deflator index, which in its turn is determined on the basis of consumer price and retail commodity structure indices applied as weights (for more detail seehttp://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/enterprise/retail/#).(Accessed: 17.02.2016)

[37] Source of VI GDP data: current Rosstat publications. Volume index of GDP and its major components are calculated using averaged out prices for the previous year as weights. Dynamics of the VI GDP and its components for relatively long periods are calculated using chain indices technique. A chain index is a series of indices of the same phenomenon calculated with base numbers changing from one period to another (for more detail seehttp://www.gks.ru/free_doc/new_site/vvp/metod.htm). (Accessed: 20.02.2016)

wholesale SE activities. Testing the time series of industry-specific indicators including this particular quantitative macroeconomic aggregate revealed a strong correlation between them. This specific series was chosen to confirm the reliability and validity of the data collected through business conditions surveys and demonstrates the high correlation of the data with retrospective and current dynamics of one of the most important national economic macro-aggregate indicators.

International experience of summarising and analysing qualitative data collected through business conditions surveys shows that a correlation exists between qualitative and qualitative time series [Joint Harmonized EU Programme of Business and Consumer Surveys, 2014; OECD Leading Indicators, 2014; Kitrar et al, 2014].

The choice of candidate metrics for CI was based on general economic and statistical requirements to industry-specific indicator systems commonly applied in international practice, and on the overall expert opinion reflected in works by Russian economic statisticians. The final choice of metrics for inclusion in CI is important, since it determines the significant role of economic theory-based criteria supported by an expert-based approach. Specifically, we mean only the metrics which taken together can adequately characterise the key aspects of the phenomena in the context of trade operations should be included in each CI. This group must fully reflect all the exogenous and endogenous factors affecting the trends and dynamics of the industry's development.

In the scope of the "Statistical processing of the selected candidate time series" block, various statistical techniques and tools were applied to confirm or adjust the time series of various indicators selected at the first stage for integration into the CI.

The initial iteration amounted to decomposing the seasonal component of all the selected time series candidates for inclusion in CI [Fisher, 1995; Fok, 2005; Bessonov, 2005]. This is a necessary condition for trade company operations, since this economic activity is by its very nature prone to significant seasonal fluctuations. After seasonal decomposition, a cross-correlational analysis between retail and wholesale indicators and selected references was performed, to choose a preliminary set of indicators. Empirical examples show that for qualitative indicators, a significant correlation coefficient equals 0,63 or higher; this is confirmed by international and Russian studies [OECD Composite Leading Indicators, 2014; Fulop, Gyomay, 2012; Kitrar, et al., 2013]. Among other things, a forward-oriented indicator was built in the course of the study, which created the need to cross-compare the time series with various lags (specifically, lags falling within the [-5,5] range were used). This determined the choice of the Pearson's pair correlation coefficient as the cross-correlation metrics, which were applied to analyse the series, are biased in relation to each other:

$$r_k = r(k) = \frac{\sum_{t=1}^{n-k} X_t Y_{t+k} - \sum_{t=1}^{n-k} Y_t \sum_{t=1}^{n-k} X_{t+k} / (n-k)}{\sqrt{\left[\sum_{t=k}^{n-k} Y_t^2 - \sum_{t=k}^{n-k} Y_t^2 / (n-k)\right]\left[\sum_{t=k+1}^{n} X_t^2 - \sum_{t=k+1}^{n} X_t^2 / (n-k)\right]}}, \quad (3)$$

where the series $X \in A^p$ (according to the expression (2)), series Y is the reference series, and k is the lag value. Next experts selected from A^p indicators for further analysis on the basis the cross-correlational analysis results. In effect a new set of indicators was built:

$$A^p_{new}: \quad A^p_{new} \subset A^p \quad (4)$$

The necessary testing of the significance of the resulting values was conducted using the Student's distribution at significance level α = 5%, in accordance with the following criterion:

$$F_n(t_\alpha) = 1 - \alpha, \tag{5}$$

where t_α is distribution quantile, F_n is distribution function *t* with *n* degrees of freedom.

Calculations and aggregation

At the final stage of building CI the selected indicators were aggregated by conducting principal component analysis (PCA). This technique is considered to be a classic and efficient data reduction method which allows, on the basis of numerous attributes, the identification of their meaningful numbers and explains the cause-and-effect relations in space and time [Dubrov et al., 2011; Stock, Watson, 2002]. The essence of this technique, and the specific features of its application are also described in Maxwell et al., [1967]. PCA was chosen because in the vast majority of cases the first component explains a significant share of the dispersion (in this study, it was 80-95%), which is the main argument in favour of using this technique. PCA allows the adoption of a new system of coordinates $(B_1 \dots B_q)$ in the initial attribute space $A^p = (A_1 \dots A_q)$*:*

$$\begin{cases} B_j(X) = w_{j,1}(A_1 - M_1) + \dots + w_{j,q}(A_q - M_q) \\ \sum_{i=1}^{q} w_{i,j}^2 = 1, \qquad j = \overline{1..q} \\ \sum_{i=1}^{q} w_{i,j} w_{i,k} = 0, \qquad j,k = \overline{1..q}, j \neq k \end{cases}, \tag{6}$$

where M_i is mathematical expectation of the attribute A_i.

In turn, the calculation of coefficients of principal components $w_{i,j}$ was based on the fact that vectors $w_1 = (w_{1,1} \dots w_{p,1})', \dots, w_p = (w_{1,p} \dots w_{p,p})'$ are eigenvectors of the system's correlational matrix. A very useful iteration at this stage was the cyclic comparison of the series. Taking into account the available experience of studying economic cycles, such as the phase-average trend method (PAT) with months for cyclical dominance (MCD) smoothing[38]; Christiano-Fitzgerald (CF) filter [Christiano, Fitzgerald, 1999], and Hodrick-Prescott (HP) filter [Hodrick, Prescott, 1997]. The latter was chosen to identify cyclic components in the indicator dynamics.

Recent OECD studies of various techniques for the statistical filtration of cyclic profiles suggest that the HP filter should be given preference when studying economic cycles. Specifically, Nilsson and Gyomai [2011] offer convincing empirical arguments in favour of the double application of the HP filter. It was also established that this method allows not only the minimising of the sum of deviations between the trend and the original series in a way that was optimal for the series, but also the minimising, in the first application, of the trend's curve by adjusting the parameter λ[39] which is directly responsible for the acceptable volatility of the long-term profile of the indicator dynamics. At the same time the filter's frequency corridor can also be adjusted, since it is an established value. During the first application of the algorithm the objective of filtration was to decompose the initial series $Y = (y_1 \dots y_N)$ into two components:

[38] NBER – URL: http://www.nber.org/chapters/c2300.pdf

[39] The parameter λ determines the flatness of the target series: the higher the value of λ, the flatter the series, and is calculated using the formula: $= \left(2 * \sin\left(\frac{\pi}{cut-off\ frequency}\right)\right)^{-4}$ where cut-off frequency is the parameter which describes the fluctuations elimination period (e.g. to eliminate fluctuations of less than 18 months in the case of quarterly dynamics the cut-off frequency should equal 6).

the long-term one and the unsmoothed cyclic component (Y^{lc} и Y^{usc}) in such a way that $Y = Y^{usc} + Y^{lc}$. When the HP filter is applied for the first time, Y^{lc} is determined by the following minimisation problem:

$$\sum_1^N \left(Y_i - Y_i^{lc}\right)^2 + \lambda \sum_2^{N-1} \left(\left(Y_{i+1}^{lc} - Y_i^{lc}\right) - \left(Y_i^{lc} - Y_{i-1}^{lc}\right)\right)^2 \rightarrow min. \quad (7.1)$$

Then, applying the HP filter to the series $Y^{usc} = Y - Y^{lc}$ for the second time, we get a short-term cycle with smoothed amplitude (Y^{ssc}), which is determined by the minimisation problem identical to (7.1):

$$\sum_1^N (Y_i^{usc} - Y_i^{ssc})^2 + \lambda \sum_2^{N-1} \left((Y_{i+1}^{ssc} - Y_i^{ssc}) - (Y_i^{ssc} - Y_{i-1}^{ssc})\right)^2 \rightarrow min. \quad (7.2)$$

During filtration the parameter λ determines the filter's sensitivity to various changes of the trend. This parameter is calculated using:

$$\lambda = \frac{1}{4}\left(1 - \cos\frac{2\pi}{\tau}\right)^{-2}, \quad (8)$$

where τ is the number of periods between turning points of the same type.

Thus the following key λ values were used in the study: λ 18 months – 1,0; λ 24 months – 2,9; λ 30 months – 6,9; λ 8 years – 677,1; λ 10 years – 1649,3; λ 15 years – 8330,7.

When the EC methodology is applied to study cyclic profiles, the HP filter is typically used with fluctuation smoothing starting at 18 months. This fluctuation amplitude was established empirically, and is now successfully applied by various researchers to study cycles. Gayer [2008] also cites this fluctuation exclusion period, and the λ parameter value calculated on this basis, as standard for such studies. The HP filter was applied in Russia to decompose cyclic profiles in the dynamics of business conditions indicators for the first time by the Russian statisticians Kitrar and Ostapkovich in 2011, when they were building the Higher School of Economics Economic Sentiment Index (ESI HSE)[40], and subsequently tested as a measure of large company short-term growth cycles [Kitrar et al, 2014].

The analysis of the CI cyclic profile conducted in the course of the study using the HP filter was among other things based on the successful application of this technique by the OECD, the EU, and Russia alike.

Visualisation of results

At the final stage the results of CI calculations were visualised. The following data was presented in the diagram format:

– combined dynamics of the developed CI and quantitative macroeconomic indicators;

– cyclic profiles of CI (medium-term cycle; short-term unsmoothed amplitude cycle; short-term smoothed amplitude cycle; smoothed short-term cycle;

– CI cyclicity tracers.

[40] Russian ESI calculation practice is based on the European Harmonised system for building a similar international indicator (Economic Sentiment Indicator – ESI). It's a composite indicator combining dynamic results of industry-specific business conditions monitoring surveys conducted by the Rosstat, which cover about 22 thousand Russian companies specialising in various sectors of the economy (manufacturing, construction, retail, services), and 5 thousand respondents representing adult Russian population. For more details see: http://issek.hse.ru/news/141723352.html (Accessed: 20.02.2016)

Calculation and results (the Retail Market Indicator)

At the first stage, based on the national statistical observation form N1-business conditions (retail), the best candidate metrics were selected to characterise the dynamics of retail SE performance. Table 1 presents these metrics with subsequent seasonal adjustment.

Table 1. Retail SE performance indicators selected for possible inclusion in the RMI

№	Indicator	Designation	Survey indicators (ordinal scale)		
			Current level	Actual trend	Expected trend
1	Retail turnover	tovobo	-	tovobo_ft	tovobo_et
2	Sales volume in actual terms	opnvo	-	opnovo_ ft	opnovo_ et
3	Product orders	ptro	-	ptro_ ft	ptro_ et
4	Product range	asto	-	asto_ ft	asto_ et
5	Assessment of overall economic situation	oekpt	oekpt_fl	oekpt_ ft	oekpt_ et
6	Warehouse stocks volume	ozszs	ozszs_fl	ozszs_ ft	ozszs_ et
7	Warehouse area	skpo	-	skpo_ ft	skpo_ et
8	Number of employees	chiso	-	chiso_ ft	chiso_ et
9	Availability of own financial resources	ofco	-	ofco_ ft	ofco_ et
10	Assessment of selling prices' growth	izcro	-	izcro_ ft	izcro_ et
11	Company's competitiveness	konkur	конkur_fl	konkur_ ft	konkur_ et

Source: composed by the author

At the next stage, a cross-correlational analysis between the time series data and the dynamics of the quantitative statistical indicator Retail Turnover VI was conducted. The testing revealed a weak correlation between retail turnover cycles' dynamics and the following variables: tovobo_et, opnovo_et, oekpt_et, конkur_fl, chiso_et, izcro_ft, izcro_et. The variables skpo_et, skpo_et, oekpt_fl, ozszs_fl had low negative cross-correlation values, and have been excluded from further calculations.

The strongest correlation with the reference indicator was established for the following variables: tovobo_ft, opnovo_ft, ptro_ft, oekpt_ft, ozszs_ft, ofco_ft. Cross-correlation coefficients between each of the above indicators and the reference indicator were in excess of 0,7, so they were included in the group of primary candidates for integration into the CI.

Along with these, a moderate correlation was established for the variables ptro_et, asto_ft, asto_et, which were included in the number of CI components. The variables конkur_ft, конkur_et, and chiso_ft were described by forward-oriented characteristics: the highest

correlation coefficient values for them were established with (-1) lag: 0,65; 0,68, and 0,67, respectively.

On the basis of the results obtained after the analysis, 12 variables were provisionally included in the CI measuring business conditions for retail SE (highlighted in bold font in Table 2)

Table 2. Results of testing indicators for their potential inclusion in the RMI, using cross-correlational function

№	Indicator	Abbreviation/ indicator change type	Lag[41]	Correlation coefficient R[42]	№	Indicator	Abbreviation/ indicator change type	Lag	Correlation coefficient R
1	tovobo	**tovobo_ft**	**0**	**0,763869**	15	skpo	skpo_ ft	0	-0,06265
2		tovobo_et	0	0,396155	16		skpo_et	0	-0,09818
3	opnvo	**opnovo_ ft**	**0**	**0,739666**	17	chiso	**chiso_ ft**	**-1**	**0,670115**
4		opnovo_et	0	0,478273	18		chiso_et	0	0,251431
5	ptro	**ptro_ ft**	**0**	**0,789433**	19	ofco	**ofco_ ft**	**0**	**0,73233**
6		**ptro_от**	**0**	**0,690247**	20		ofco_et	0	0,536185
7	asto	**asto_ ft**	**0**	**0,686435**	21	izcro	izcro_ ft	0	0,271077
8		**asto_et**	**0**	**0,679245**	22		izcro_ ft	0	0,234083
9	oekpt	oekpt_fl	0	-0,00023	23	ozszs	ozszs_fl	0	-0,35208
10		**oekpt_ ft**	**0**	**0,70561**	24		**ozszs_ ft**	**0**	**0,74837**
11		oekpt_et	0	0,186243	25		ozszs_et	0	0,405327
12	konkur	конkur_fl	0	0,010703					
13		**конkur_ ft**	**-1**	**0,65883**					
14		**конkur_et**	**-1**	**0,68245**					

Source: composed and calculated by the author

CI calculation practices show that the optimal number of indicator components usually does not exceed 10 variables.

Therefore the following 7 metrics were included in the CI: *retail turnover; sales volume; product orders; number of employees; warehouse stocks volume; competitiveness*; and *economic situation*. This set of variables makes the CI precise and balanced, characterising the industry development on a more aggregated level.

[41] Maximum value of correlation coefficient. Negative value indicates counter-cyclic forward-oriented properties of the time series.
[42] Values highlighted in bold font can be used at the next selection stage.

At the final stage, the indicators were aggregated using PCA. Table 3 presents the sensitivity threshold, and the cumulative percentage of data interpretation by principal components.

Table 3. Total dispersion of principal components (RMI)

Component	Initial original values			Extraction of sums of squared loadings		
	Total	Dispersion %	Total %	Total	Dispersion %	Total %
1	5,44	85,54	85,54	5,44	85,54	85,54
2	0,65	6,14	91,68	-	-	-
3	0,37	3,47	95,15	-	-	-
4	0,25	2,35	97,51	-	-	-
5	0,16	1,52	99,04	-	-	-
6	0,06	0,57	99,61	-	-	-
7	0,41	0,38	100,0	-	-	-

Source: composed and calculated by the author

On the basis of the analysis, a single principal component was identified, responsible for 85,54% of all variation and representing the sought composite index (RMI).

The results of graphic and cross-correlational comparisons (see equations (3) and (5)) of the RMI and the quantitative macroeconomic indicator (Retail Turnover VI) dynamics (see **Ошибка! Источник ссылки не найден.**) reveal a stable statistical relationships between these indicators, with a meaningful synchronous correlation (0,83), a one quarter lead, and a high cross-correlation coefficient (0,79).

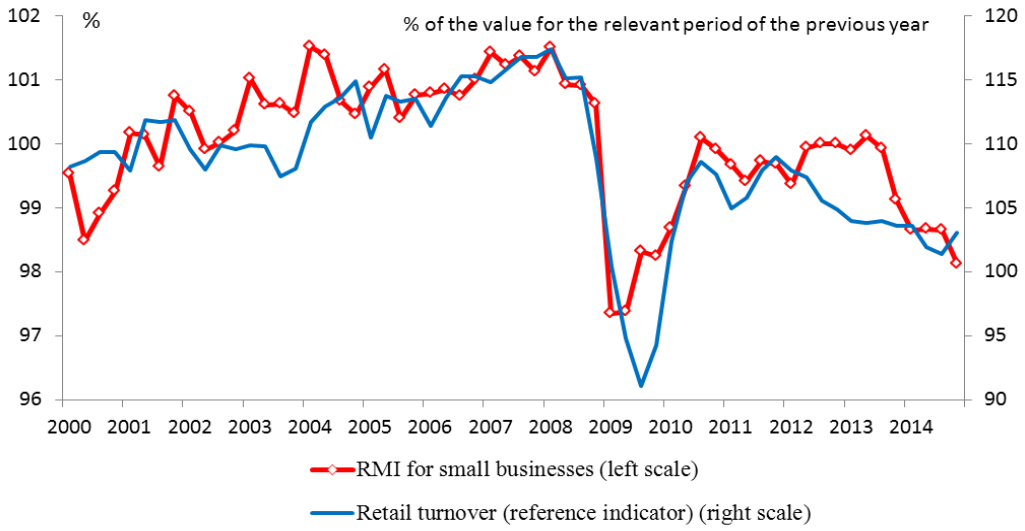


Figure 2. The combined dynamics Retail Market Indicator (RMI) values for small businesses and statistical reference - Retail Turnover

Next iteration included analysis of the SE RMI cyclic profile. The RMI's cyclic component was analysed by identifying a 14-year medium-term cycle (MTC) and selecting between 18, 24, and 30-month short-term cycles (STC)[43], determined by the periodisation of the available time series. Decomposing the RMI by applying the HP filter with λ=6323,30 for the first time allowed us to identify a 14-year MTC, and a short-term cycle with an unsmoothed amplitude (STUC) (see **Ошибка! Источник ссылки не найден.**).

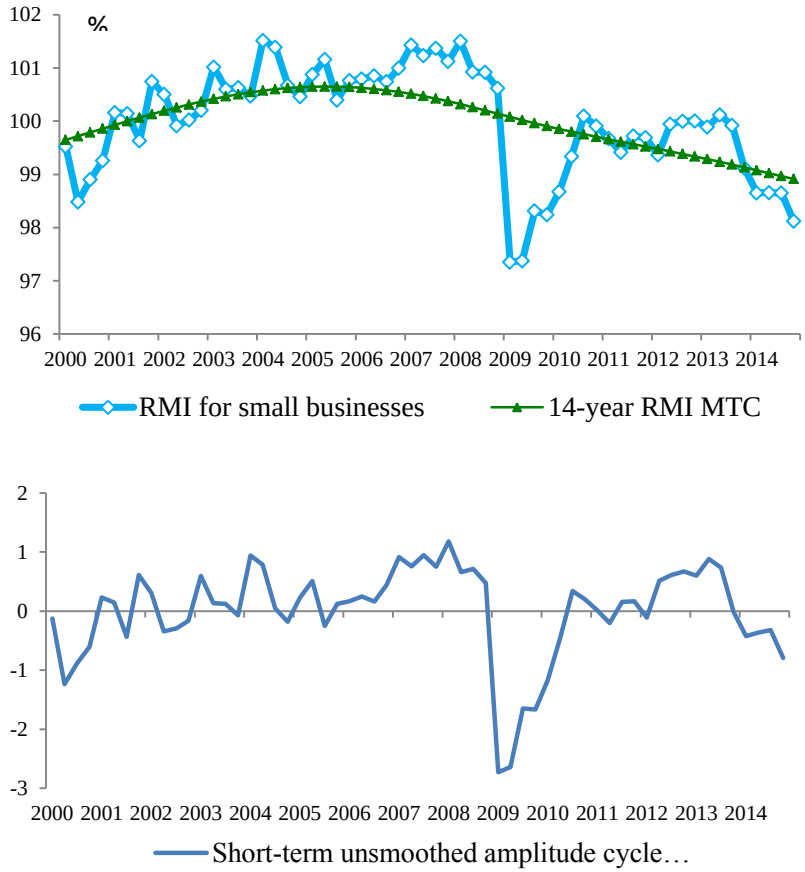


Figure 3. RMI medium-term cycle (MTC) and short-term unsmoothed amplitude cycle (STUC)

The subsequent cyclic indication amounted to the selection of STC with excluded 18-, 24-, and 30-month cycles, which in principle match their classic 2-3 year Kitchin periodisation[44]. Accordingly, the second application of the filter with λ ranging between 1 and 6,8541 allowed to identify 18-, 24-, and 30-month short-term smoothed amplitude cycles (STSC) (**Ошибка! Источник ссылки не найден.**).

[43] Results of small businesses' sampling observations in the study are presented as time series dynamics for the period between 2000 – 2014, which did not allow to identify a classic long-term cycle.

[44] Short-term (3-4 years) economic cycles discovered in the 1920s by the British economist Joseph Kitchin.

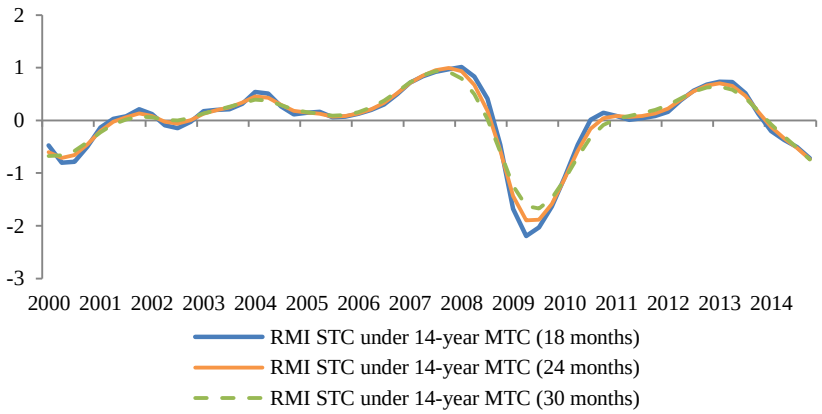


Figure 4. RMI short-term smoothed amplitude cycles (STSC)

A combined cross-correlational analysis with the initial dynamics revealed a statistically significant and persistent STC. Between the 1st quarter of 2000 and the 4th quarter of 2014 a cyclic interval of 18 months was the most obvious, if the effect of the 14-year cycle is eliminated (see **Ошибка! Источник ссылки не найден.**). This is due to the prevailing cross-correlation between RMI STSC 18 months, with eliminated 14-year cycle (0,84). Correlation coefficients smoothed with 24- and 30-month amplitudes amounted to 0,80 and 0,79, respectively.

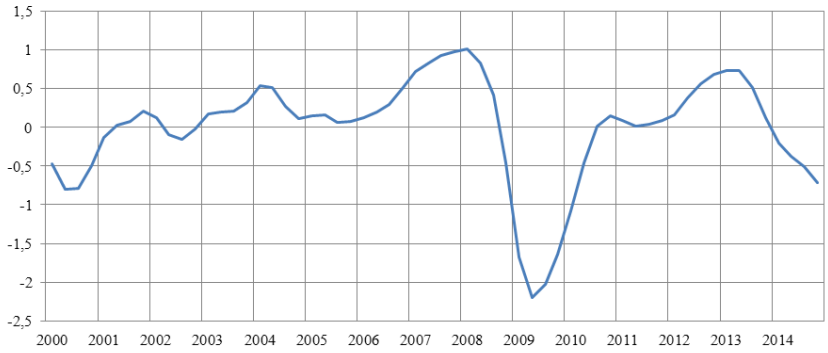


Figure 5. RMI smoothed short-term cycle (STSC) under 14-year STC (18 months)

The results illustrate the high adaptability of the suggested algorithm when applied to a statistical array of qualitative, simple and composite SE indicators in Russia. SE RMI dynamics were visualised by graphically representing them as a cyclicity tracer[45] (see **Ошибка! Источник ссылки не найден.**6), with a levelled impact of MTC (14 years) and the smoothed amplitude of 18 months (filter frequency λ=1). According to the EC methodology, the indicator's levels were marked on the ordinate axis, and its quarterly changes on the abscissa axis. The tracer's movement between the four quadrants of the diagram (anticlockwise) allows us to track the indicator passing through the four economic cycle phases; the cyclical peaks are located in the upper central section of the diagram, and cyclical troughs are in the lower central section. Here and subsequently the STC is visualised on the graphs in accordance with the four phases of the cycle.

[45] See European Business Cycle Indicators, Annex 1: The Economic Climate Tracer – URL: http://ec.europa.eu/economy_finance/publications/cycle_indicators/2013/pdf/1_en.pdf (Accessed: 15.04.2016)

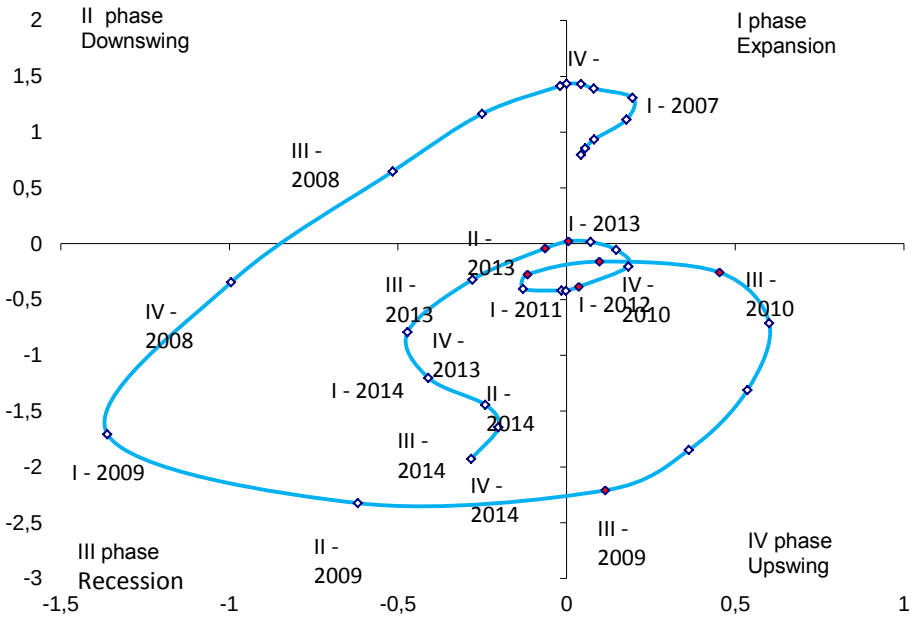


Figure 6. RMI cyclicity tracer

The graphic representation of short-term RMI cycle tracer movement clearly reflects the industry's growth trends: the expansion of 2006-2007, the recession of 2008-2009, the post-recession compensation of 2010-2012, and the stagnation/crisis scenario of 2013-2014. For the period of retail SE peak business activity (the pre-recession year of 2007) the tracer's cyclic peaks fall into the upper central section of the diagram, reflecting the highest rise of entrepreneurial activity. The indicator's movement to the decline phase, with the subsequent plunge into the least favourable cyclic contraction zone, reflects the pre-crisis economic situation in the first half of 2008. Accordingly, between the 4th quarter of 2008 and the 2nd quarter of 2009 the tracer remained in critical phase, signifying a sharp contraction of the sector's growth. The RMI value for the 1st quarter of 2009 fell to 97,3 – the lowest for the whole history of observations. To compare, even in the 1st quarter of 2008 it was 101,5.

The tracer's subsequent movement illustrates the post-recession recovery. Moving within the recession quadrant, as early as in the 3rd quarter of 2009 the tracer had entered the growth phase. It was probably one of the least favourable periods for SE, when all sorts of strategic manoeuvres were performed to achieve a compensatory recovery. However, given the ambiguous external economic situation, the tracer did not stay in that quadrant for long. Already by the 4th quarter of 2010 we can see it approaching the border with the lower left quadrant of recession, crossing it in the 1st quarter of 2011 and remaining there until the 3rd quarter of 2011. Only after the end of 2011, more specifically from the 1st quarter of 2012, did the RMI's cyclic growth leave the recession phase and move into expansion. The indicator's further cyclic movement, which describes the state of SE between the beginning of 2012 and the 1st quarter of 2013, can be assessed as moderately positive.

The last six indicator values covering the period between the 3rd quarter of 2013 and the 4th quarter of 2014 fall into the cyclic contraction stage, indicating predominantly negative business conditions for retail SE. During 2014 the RMI value dropped from 98.6 to 98.1 – one of the lowest since 2009.

Calculation and results (the Retail Business Potential Indicator)

Several reasons determined the need to design a retail business potential indicator (RBPI) with the relevant measurement scope and characteristics. The most obvious was to extend analytical application of business conditions survey results for the retail sector, to more objectively assess its market situation. However, there is another equally important reason which prompted development of the RBPI. That is the need to apply, within the national statistical system, an indicator capable of highly accurately measuring retail SE potential by integrating a number of specific metrics which would reflect not just the actual current changes, but also the expected trends. In the context of measurement, "potential" means the segment's hidden modes which, even if they remain latent, are capable of producing new drivers for, and promoting the further growth of, retail SE. Such measuring capability was achieved for the CI by its fine adjustment through the careful selection of its components, and due to the unique forecasting potential of business conditions surveys, which was due to the latter producing short-term entrepreneurial predictive estimates (the survey questionnaire allows company managers to report expected performance indicator values for one quarter ahead)[46].

As the practice of business conditions monitoring shows, an important aspect is the application of forward-oriented indicators, due to entrepreneurs' highly perceptive reaction to possible changes in relevant industries. The respondents' predictive estimates have accurately forecasted the changes in SE performance indicators in 2014 and early 2015. The application of such an indicator as an additional tool to analyse and measure retail SE potential allows a more precise visualisation of the business landscape, and helps make timely administrative decisions to strengthen SE positions.

Taking into account specific features and economic principles affecting the emergence of factors which influence retail business operations, the range of candidate qualitative indicators was limited both conceptually, and in line with the results of calculations previously performed for the RMI indicator described above, to establish cross-correlation with the referent metric (retail turnover). Accordingly, the selection process was based on economic considerations (maximising the potential index components' information content), and on the processed data array. Groups of indicators measuring business development potential used the following characteristics:

– expected dynamics of product orders;

– existing and expected sales potential;

– financial and economic situation;

– existing investment opportunities;

– expected market competition.

The performance indicators of retail SE presented in Table 4 were selected for inclusion in the CI.

[46] Metrics for inclusion in this indicator were selected on the basis of the national statistical observation form N1-business conditions "Survey of business conditions and business activities in the retail sector".

Table 1. Small retail companies' performance indicators selected for calculation of the RBPI

№	Indicator	Designation	Survey indicators (ordinal scale)		
			Current level	Actual trend	Expected trend
1	Product orders	ptro	-	-	ptro_et
2	Product range	asto	-	asto_ft	asto_et
3	Availability of own financial resources	ofco	-	ofco_ft	-
4	Investments in business expansion, repairs and upgrading	idrmo	-	idrmo_ft	-
5	Company's competitiveness	konkur	-	-	konkur_et

Source: composed by the author

The next stage of the statistical processing of the time series – potential RBPI components – included their seasonal adjustment. During the subsequent iteration, the cross-correlational analysis of the candidate indicators and the quantitative statistical macro-aggregate Retail Turnover VI was conducted. The testing revealed a strong stable correlation between all such variables and retail turnover dynamics (Table 5). The cross-correlation coefficients between each of the preliminary indicators and the reference indicator were in excess of 0,65, which confirmed the expert-based metrics selection results and allowed us to include these components in the CI. The konkur_et variable was based on forward-oriented characteristics: with (-1) lag, the correlation coefficient was 0,68.

Table 5. Results of testing indicators for their potential inclusion in the RBPI using cross-correlational function

№	Indicator	Abbreviation/indicator change type	Lag[47]	Correlation coefficient R[48]
1	ptro	ptro_et	0	**0,69**
2	konkur	конkur_et	-1	**0,68**
3	asto	asto_ft	0	**0,68**
4		asto_et	0	**0,679**
5	ofco	ofco_ft	0	**0,73**
6	idrmo	idrmo_ft	0	**0,72**

Source: composed and calculated by the author

[47] Maximum value of correlation coefficient. Negative value indicates counter-cyclic forward-oriented properties of the time series.

[48] Values highlighted in bold font can be used at the next selection stage.

The following 6 indicators were included in the RBPI:

– expected changes of product orders;

– expected changes of their companies' competitiveness;

– actual and expected changes in product range;

– actual changes of investments;

– availability of own financial resources.

This set of variables allows us to assess retail SE growth potential as accurately as possible. Each selected component describes to a certain aspect of their financial and economic capabilities, and the scale of their strategic plans for the next quarter.

At the final stage, the these indicators were aggregated using the PCA. Table 6 presents the sensitivity threshold and the cumulative percentage of data interpretation.

Table 2. Total dispersion of principal components (RBPI)

Component	Initial original values			Extraction of sums of squared loadings		
	Total	Dispersion %	Total %	Total	Dispersion %	Total %
1	4,05	82,45	82,45	4,05	82,45	82,45
2	0,88	7,97	90,42	-	-	-
3	0,45	4,12	94,55	-	-	-
4	0,36	3,33	97,89	-	-	-
5	0,13	1,17	99,07	-	-	-
6	0,10	0,92	100,00	-	-	-

Source: composed and calculated by the author

The results of the graphic and cross-correlational comparison of the RBPI and the quantitative macroeconomic indicator (Retail Turnover VI) dynamics reveal a stable statistical relationship between these indicators, with a meaningful synchronous correlation (0,77), a one quarter lead, and a high cross-correlation coefficient (0,69).

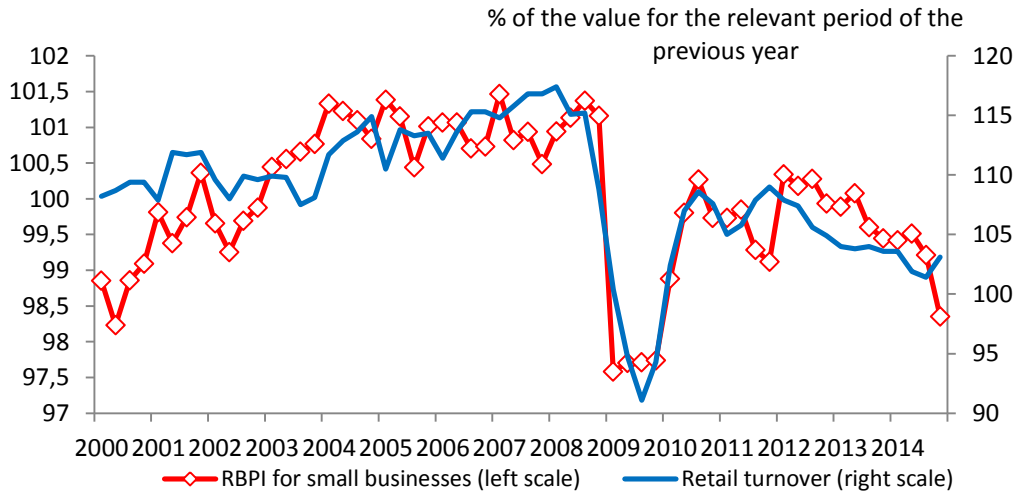
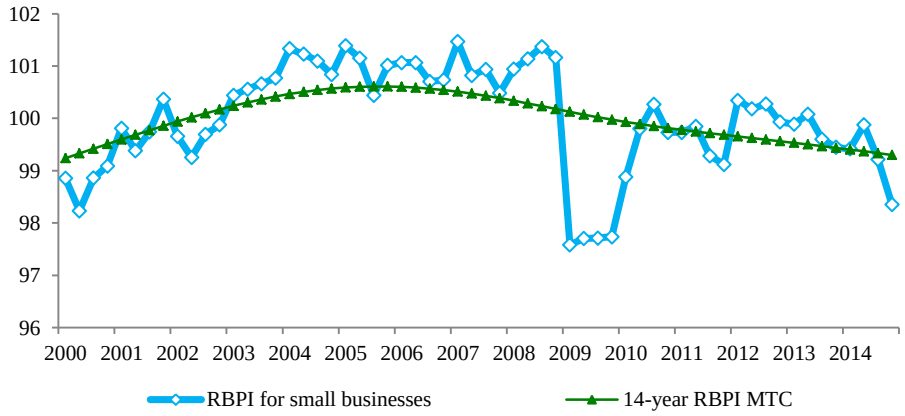


Figure 7. Combined dynamics Retail Business Potential Indicator (RBPI) values for small businesses and statistical reference – the Retail Turnover

The next iteration involved analysis of the SE RBPI cyclic profile. Taking into account the specific features and periodisation of the business conditions surveys of retail SE, the RBPI's cyclic component was analysed by identifying a 14-year MTC and selecting between 18, 24, and 30-month STC[49].

Decomposing RBPI by applying the HP filter with λ=6323,30 for the first time allowed us to identify a 14-year MTC, and STUC (see Figure 8).



[49] Results of small businesses' sampling observations in the study are presented as time series dynamics for the period between 2000 – 2014, which did not allow to identify a classic long-term cycle.

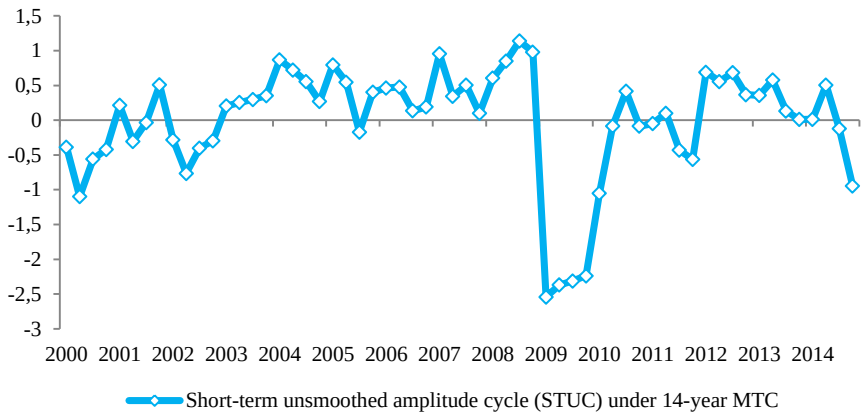


Figure 8. RBPI medium-term cycle (MTC) and short-term unsmoothed amplitude cycle (STUC)

The subsequent cyclic indication amounted to selecting STC with excluded 18-, 24-, and 30-month cycles. The second application of the filter with λ ranging between 1 and 6,8541 allowed us to identify 18-, 24-, and 30-month STSC in the RBPI dynamics (see **Ошибка! Источник ссылки не найден.** 9).

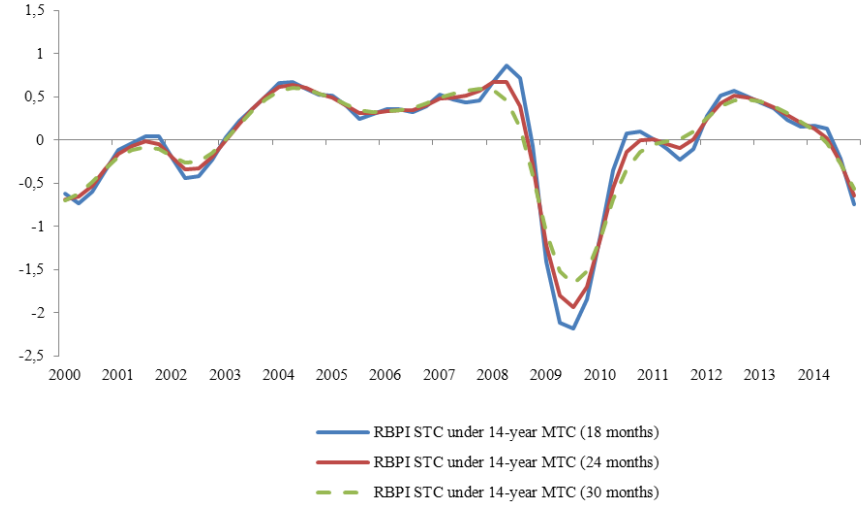


Figure 9. RBPI short-term smoothed amplitude cycles (STSC)

A combined cross-correlational analysis with initial dynamics revealed a statistically significant and persistent STC. Between the 1st quarter of 2000 and the 4th quarter of 2014 the 18 month cyclic interval became the most obvious, if the effect of the 14-year cycle was eliminated (see Figure 10).

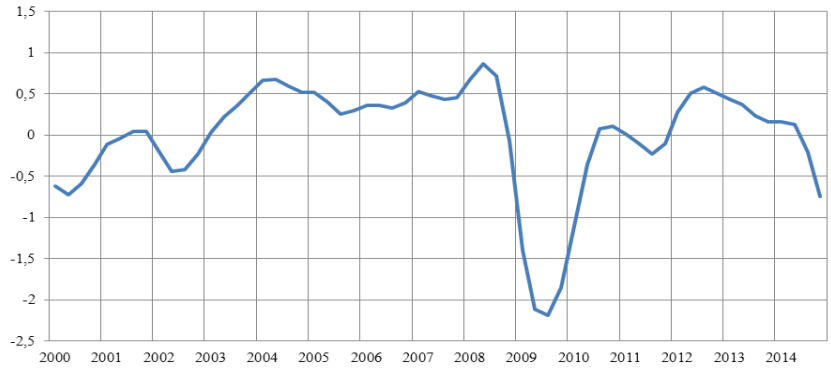


Figure 10. RBPI Smoothed short-term cycle (STSC) under 14-year STC (18 months)

This is due to the prevailing cross-correlation result between RBPI STSC 18 months, with excluded 14-year cycle (0,88). Correlation coefficients smoothed with 24- and 30-month amplitudes were 0,86 and 0,83, respectively. A graphic representation as a cyclicity tracer (see Figure 11) with a levelled impact of the MTC (14 years) and smoothed 18-month amplitude (filter frequency λ=1)[50] allowed us to visualise RBPI growth trends for SE.

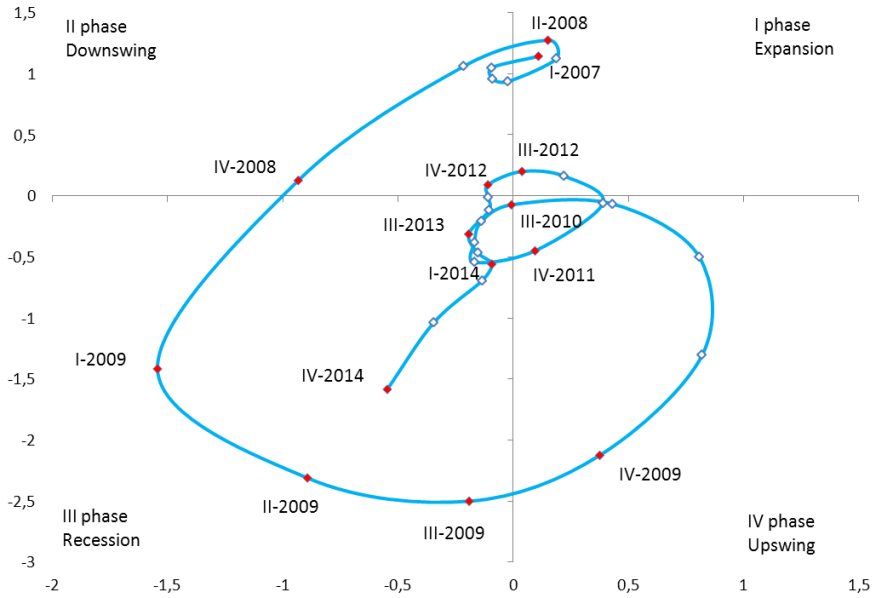


Figure 11. RBPI cyclicity tracer

The graphic representation of the RBPI cyclic component illustrates the nature of business trends affecting retail SE potential in various market development phases. An analysis of the tracer's movement between the quadrants which determine specific features of the indicator's business cycles reveals important objective nuances, which describe the highest and lowest retrospective coordinates (the critical bottom of 2009, and the subsequent unsteady recovery period are quite obvious in the RBPI dynamics). The tracer's movement also shows a very important aspect which characterises the potential "safety margin" retail SE had when they encountered the 2009 crisis, and the resources available to entrepreneurs in the harsh realities of 2014. Specifically, the cyclic component in RBPI dynamics throughout 2007 and until the end of 2008 shows the tracer remaining exclusively within the two upper quadrants. The RBPI did not stay in the recession

[50] See http://ec.europa.eu/ economy_finance/publications/cycle_indicators/2013/pdf/1_en.pdf (Accessed: 25.04.2016)

phase for long either: already in the 4th quarter of 2009 the tracer had crossed the border into the growth quadrant. This is indirect evidence that despite the crisis, entrepreneurs did have a certain "safety margin" which helped them to endure significant market swings. The tracer's movement after the 4th quarter of 2012 indicates retail SE gradual fall into stagnation. During 2013 and 2014 the RBPI remained in the recession quadrant. The direction of the tracer's movement in the 4th quarter of 2014 clearly indicates it was moving further away from the growth quadrant's border. In the 4th quarter the RBPI dropped to 98,3 – the lowest value since 2009.

Calculation and results (the Wholesale Market Indicator)

The importance of designing and implementing a composite indicator measuring industry-specific dynamics of SE in the wholesale segment (the WMI) is due to the exceptional role wholesale SE play in the overall market interaction process. An important feature of wholesale companies is their ability to react early to changing business conditions, providing reliable signals of upcoming developments for the national economy and its many specific segments.

This property is particularly important. Serving as middlemen and strategic partner,s this segment harmonises the consumer market and sets reference points for retail marketing, product, and especially price policies. Increased attention to the wholesale segment should also be attributed to its dominance over the retail one. According to sample surveys, the share of wholesale SE including trading agents (except automobile and motorcycle trade) is more than 60% of all small trading firms[51].

The lack of a statistical database for wholesale SE and their business conditions increases the need to develop CI to measure key trends in the industry. This CI will allow the tracking of the development of wholesale SE on a quarterly basis, which, combined with the relevant indicator for the retail segment, will help better understand the current and expected economic situation in the trade sector and in the related consumer market. On the basis of the theoretical concept and methodology described above, we move on to building the composite Wholesale Market Index (WMI).

Qualitative metrics for inclusion in the WMI were selected on the basis of the available data collected in the course of sampling business conditions surveys of wholesale organisations using form N1-business conditions (wholesale) "Surveying business conditions and business activities in the wholesale segment" approved by the Rosstat order of 27.08.2014 №536.

Simple indicators most suitable for inclusion in the CI were selected on the basis of the criteria of economic logic, and ability to fully reflect the dynamics of the trading process. The following candidate variables measuring economic performance of wholesale SE were chosen for calculation of the CI (Table 7).

[51] According to the Rosstat's sampling data, 45 thousand wholesale companies operated in Russia in 2014. The complete survey of 2010 revealed more than 1 million retail and wholesale economic agents.

Table 7. Small wholesale companies performance indicators selected for calculation of the composite WMI

№	Indicator	Designation	Survey indicators (ordinal scale)		
			Current level	Actual trend	Expected trend
1	Number of employees	chiso	-	chiso_ft	chiso_et
2	Wholesale turnover	tovobo	-	tovobo_ ft	tovobo_ et
3	Sales volume in actual terms	opnovo	-	opnovo_ ft	opnovo_ et
4	Product range	asto	-	asto_ ft	asto_ et
5	Warehouse area	skpo	-	skpo_ ft	skpo_ et
6	Availability of own financial resources	frso	-	frso_ ft	frso_ et
7	Products orders portfolio	prz	-	prz_ ft	prz_ et
8	Warehouse stocks volume	ozsz	-	ozsz_ ft	ozsz_ et
9	Assessment of overall economic situation	oekp	-	oekp_ ft	oekp_ et

Source: composed by the author

The next stage of statistical processing was the seasonal adjustment of potential components of the WMI . During the subsequent iteration, a cross-correlational analysis of candidate indicator data and the quantitative macro-aggregate – GDP VI – was conducted. Out of the 18 candidate indicators, the following 5 had the strongest correlation with the reference variable: A^4_{new} = (chiso_ft, tovobo_ft, opnovo_ft, frso_ft, prz_ft); most of them had forward-oriented properties (with (-1) lag). Other variables had low cross-correlation coefficients and were excluded from subsequent calculations. This completed the selection of qualitative metrics for inclusion in the composite indicator WMI.

This set of selected variables is adequate in economic relevance terms, i.e. sufficient to provide a reliable aggregated measurement of business conditions for wholesale SE. The following metrics were included in the WMI (highlighted in bold in Table 8): *number of employees (chiso_ft), turnover (tovobo_ft), sales* (*opnovo_ft), availability of own financial resources (frso_ft), orders portfolio (prz_ft).*

Table 8. Results of testing candidate metrics for their potential inclusion in the WMI, using cross-correlational function

№	Indicator	Abbreviation/indicator change type	Lag[52]	Correlation coefficient R[53]	№	Indicator	Abbreviation/indicator change type	Lag	Correlation coefficient R
1	chiso	**chiso_ft**	**-1**	**0,69**	10	skpo	skpo_фт	0	0,23
2		chiso_et	0	0,17	11		skpo_et	0	0,23
3	tovobo	**tovobo_ft**	**-1**	**0,75**	12	frso	**frso_ft**	**0**	**0,70**
4		tovobo_et	0	0,20	13		frso_et	0	0,39
5	opnovo	**opnovo_ft**	**-1**	**0,80**	14	prz	**prz_ft**	**-1**	**0,73**
6		opnovo_et	0	0,25	15		prz_et	0	0,18
7	ozsz	ozsz_fl	0	-0,38	16	oekp	oekp_ft	0	-0,20
8		ozsz_ft	0	0,15	17		oekp_et	0	0,42
9		ozsz_et	0	0,29	18		oekp_fl	0	0,41

Source: composed and calculated by the author

At the final stage of building the CI, the selected components were aggregated using the PCA. Table 9. Total dispersion of principal components (WMI) presents the total dispersion of the principal components.

Table 9. Total dispersion of principal components (WMI)

Component	Initial original values			Extraction of sums of squared loadings		
	Total	Dispersion %	Total %	Total	Dispersion %	Total %
1	3,84	76,81	76,81	3,84	76,81	76,81
2	0,51	10,27	87,08	-	-	-
3	0,32	6,49	93,57	-	-	-
4	0,25	5,16	98,73	-	-	-
5	0,06	1,26	100,00	-	-	-

Source: composed and calculated by the author

The results of the graphic and cross-correlational analysis of the qualitative CI WMI and the quantitative macroeconomic reference indicator GDP VI dynamics (see Figure 12) reveal a significant statistically meaningful stable relationship with synchronous correlation (0,75), a one quarter lead, and a high coefficient (0,83).

[52] Maximum value of correlation coefficient. Negative value indicates counter-cyclic forward-oriented properties of the time series.
[53] Values highlighted in bold font can be used at the next selection stage.

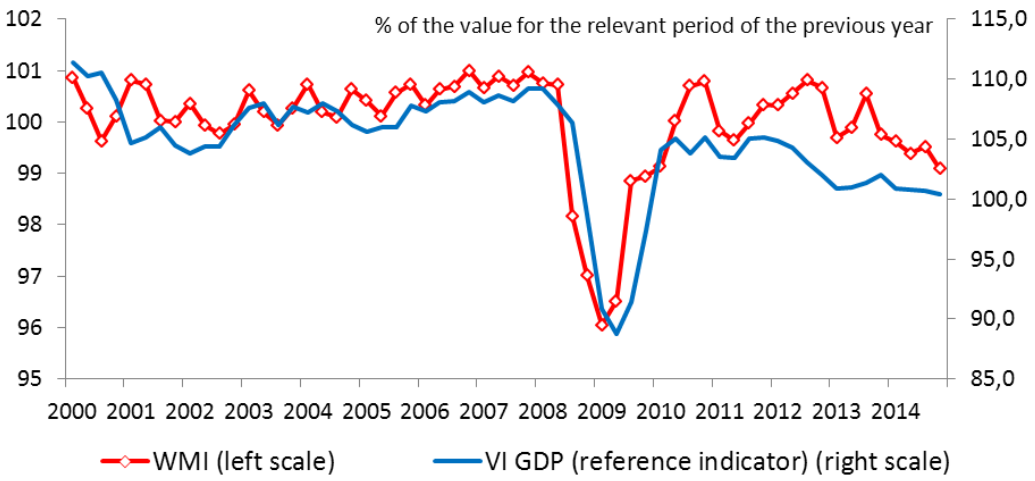
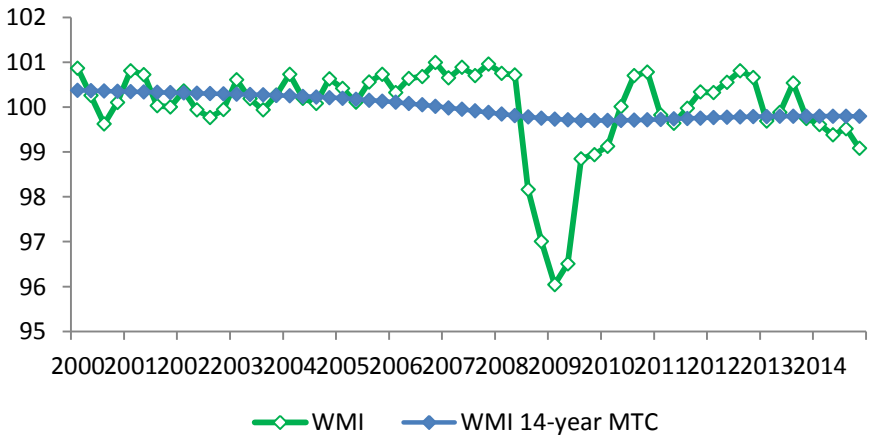


Figure 12. Combined dynamics Wholesale Market Indicator (WMI) values for small businesses and statistical reference – GDP VI

The next iteration included an analysis of the SE WMI cyclic profile. Taking into account the specific features and periodisation of the available business conditions surveys for wholesale SE, the WMI's cyclic component was analysed by identifying a 14-year MTC and 18, 24, and 30-month STC.

Figure 13 presents the results of the WMI decomposition after the first application of the HP filter[54] – the identified MTS, and STUC.



[54] Estimated value of the parameter λ which has determined the indicator's 14-year MTC equaled 6323,3.

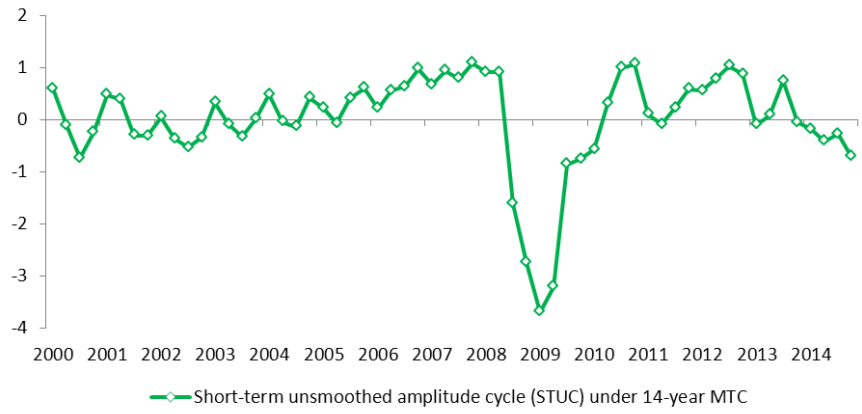


Figure 13. WMI medium-term cycle (MTC) and short-term unsmoothed amplitude cycle (STUC)

The second application of the HP filter with λ ranging between 1 and 6,8541 allowed us to identify 18-, 24-, and 30-month STSC (Figure 14).

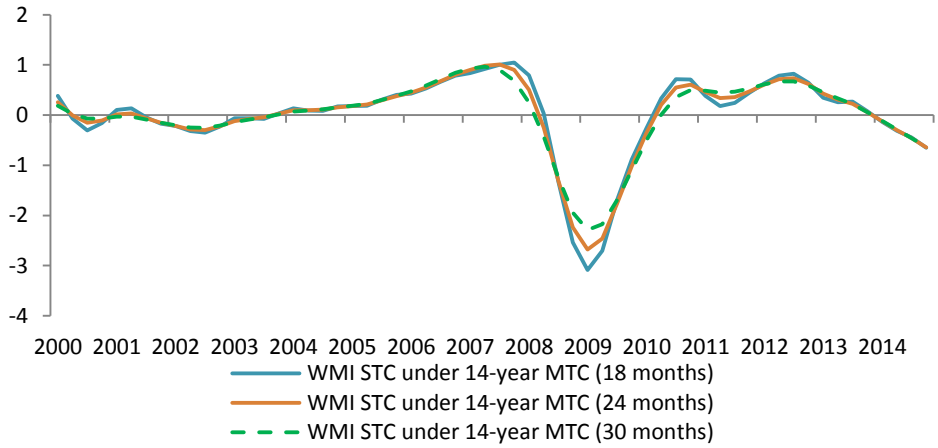


Figure 14. WMI short-term smoothed amplitude cycles (STSC)

A combined cross-correlational analysis revealed a statistically significant and persistent STC. Between the 1st quarter of 2000 and the 4th quarter of 2014 the cyclic interval of 18 months was the most obvious, if the effect of the 14-year cycle was eliminated.

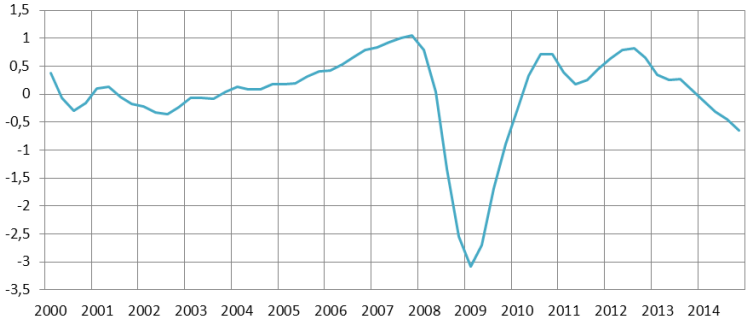


Figure 15. WMI smoothed short-term cycle (STSC) under 14-year STC (18 months)

This is due to the prevailing cross-correlation result between WMI STSC of 18 months, with eliminated 14-year cycle (0,93). The correlation coefficients smoothed with 24- and 30-month amplitudes were 0,90 and 0,87, respectively. These results illustrate the adaptability of the EC methodology when applied to process the qualitative, simple, and composite statistical indicators measuring wholesale SE performance. Below a visualisation of WMI dynamics is presented based on the cyclicity tracer with levelled impact of MTC (14 years) and smoothed amplitude of 18 months (Figure 16).

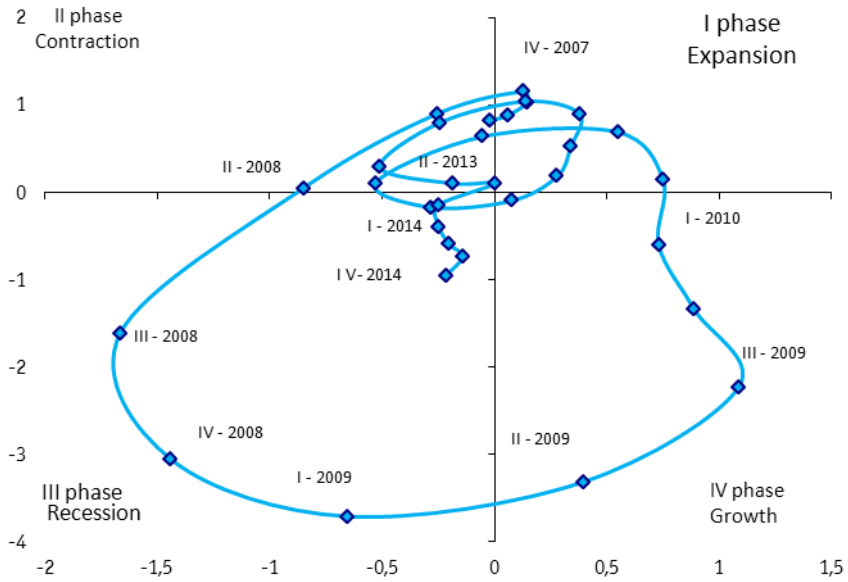


Figure 16. WMI cyclicity tracer

The tracer's movement highlights specific features of the wholesale segment emerging in various phases of the business cycle. In particular, an important feature of the segment was confirmed, namely its early reaction to business conditions changes, which is clearly demonstrated by the WMI's movement through each of the quadrants. The 2009 crisis gives a good demonstration of the CI's potential (as an aggregate business condition characteristic) to provide a warning about forthcoming turning points in the business cycle, i.e. entering phases of growth or recession. The last active period for wholesale SE was the 2nd quarter of 2008. That was when the tracer came very close to the border of the quadrant representing a sharp contraction of the sector's growth. Already in the 3rd quarter of 2008 wholesale SE reacted to the deteriorating business conditions by a sharp, unprecedented contraction of their business activities. The forward-oriented properties of the wholesale market indicators are particularly evident when they are compared with the dynamics of the composite RMI. Figure 17 shows that, unlike wholesale SE, retail SE only started to move towards the contraction phase in the 3rd quarter of 2008, and crossed its border only in the 4th quarter. Their recovery was also different. Wholesale firms moved into the growth phase in the 2nd quarter of 2009, giving the market a signal about the beginning of a compensatory recovery. Meanwhile the recovery in the retail sector started one quarter later.

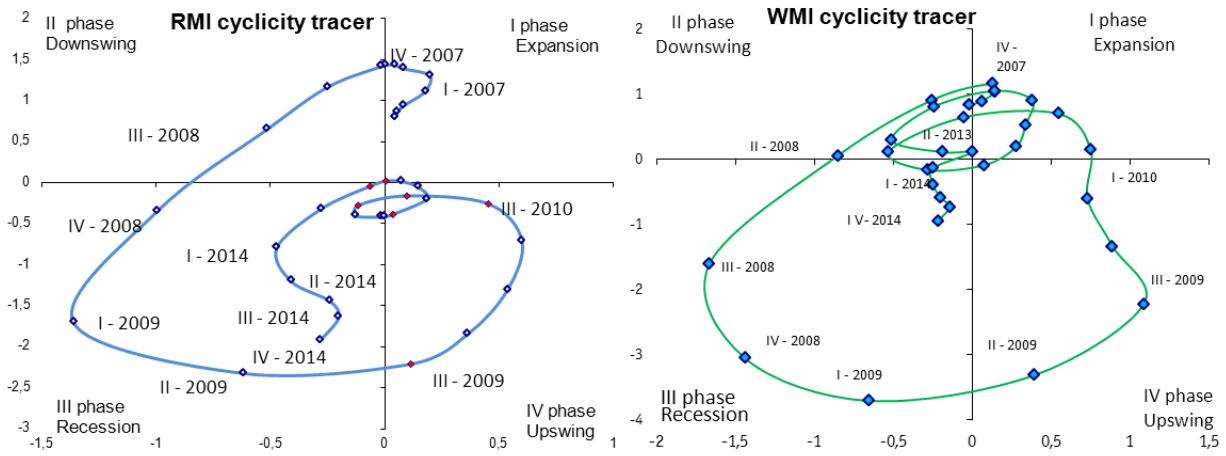


Figure 17. RMI and WMI cyclicity tracers

The results of these observations stress the need to apply the WMI widely. The timely publication of its dynamics, and the inclusion of this data in national statistics will provide, in addition to the available economic measurements, reliable indicators of forthcoming high and low points of the business cycle. Such indicators would be particularly important during periods of sharp destabilisation, because that is when companies try to find, and make use of additional sources of growth which could help them to survive the crisis and provide a basis for subsequent growth.

The application of small enterprise business conditions surveys, measuring small retail company innovation and technological activities using composite indicators (RMI, RBPI)

As noted, detailed statistical processing of SE behaviour patterns requires precise reference points which should not be limited to the theoretical and marketing concepts of recent studies. Steps based on government regulation to support SE reflect the main development vectors of national statistics and socio-economic analysis. In particular, measures currently seen as priorities include the statistical observation of SE, and the processing, analysing, and dissemination of the collected data. Implementing various programmes to integrate the government's SE promotion policies increases the importance of surveying business conditions for SE, and their development trends. Aggregating the collected assessments into various industry-specific composite indicators for basic sectors of the economy whose performance affects the overall added value created in the country would significantly extend the scope for the timely monitoring the development of such industries, and fill the gaps in the availability of economic data. This would meet the existing demands of government agencies and scholars for extending the range of data sources.

In particular, the further development of methodology for collecting official statistics on SE is an important aspect of the national programme "Economic Development and Innovation Economy", and the subprogram "Production of Official Statistical Information". These documents clearly state that putting together an adequate array of data for implementing the Federal Law "On promoting small and medium entrepreneurship in Russia" is an important requirement for accomplishing its objectives. Given the diverse nature of the trade sector, measuring the current business climate using a single (or a few) indicators will not provide an adequate picture of all

industry-specific trends. The numerous and close connections between various components of the trading process require constructing other CI in addition to the ones presented in this study, e.g. for measuring and interpreting competitiveness, investment and innovation activity. Measuring these would identify important extensive and intensive factors affecting the dynamics of company development, and provide reference points for making legal and political decisions to optimise entrepreneurial activities.

The development and application of statistical practices in the Small Retail Company Competitiveness Indicator (RCCI) based on the proposed methodology would help to extend the analytical visualisation of segments, by measuring the following parameters:

— The efficiency of the trading process, and entrepreneurs' adaptability to various business conditions and market situations;

— Current and potential growth based on changing development strategies, and company willingness to apply new technologies and innovations;

— Company potential for competing with similar products, taking into account the immediate effect of external and internal business conditions;

— Economic agents' adaptability to external shocks.

Using business conditions surveys to measure retail company competitiveness is particularly relevant against the background of national strategies, concepts, and programmes which set as short- and long-term priorities for the creation of conditions to promote fair competition, as a major form of promoting and supporting SE. Specifically, promoting competition is a key factor for increasing the potential of the retail and wholesale sectors, stepping up their productivity, and improving the supply of the consumer market. Putting in place an efficient product distribution infrastructure in line with an innovation-based scenario for the development of the Russian economy is a major objective of the Trade Development Strategy for the Russian Federation 2020, designed by the Ministry of Industry and Trade. The list of major steps to be taken in the framework of this strategy (which is based on the Concept for Long-Term Socio-Economic Development of the Russian Federation Until 2020 concerning promotion of SE) includes monitoring market competition, and preventing unfair competition.

At the same time such factors as company investment activities, and therefore their potential for applying innovations and technologies are traditionally viewed through the prism of increasing competitiveness. For small businesses, upgrading their equipment, extending the supply of resources, and acquiring relevant assets (which involves various kinds of investments) is a major issue which remains relevant at all development stages. The current phase of market development makes the investment component particularly important, since it provides an additional impulse for economic growth, building up potential, and strengthening competitive positions [Jasin et al, 2013]. Despite the fact that retail SE initially require only minimal investments (which is particularly important in any economic situation), investments play an important role in their subsequent development. Specifically, investments affect such strategic growth points for the trade sector as:

— The application of innovations and technologies;

— The development of new marketing models, and market positioning;

— The ability of companies to distinguish themselves from the competition;

— Extending target market segments and consumer groups;

— Diversification, i.e. entering new target markets with new products and sales formats;

— Job creation and the development of human potential;

— Cutting costs.

Investment contributes to upgrading retail company capital assets, leading to a higher quality of customer service and increased potential to offer personalised products. Accomplishing these objectives typically involves investing in visual merchandising, extending or renovating shops, and generally creating the best possible conditions for retail operations as a key revenue-generating and socially oriented industry [Antonov, 2014] through application of innovative retail automation techniques. A major objective of investing in retail SE is building up their potential, which during more favourable market phases can provide a powerful impulse to upgrade their SE status. When consumption grows, financial potential increases, and competitive positions strengthen, SE grow into medium-sized ones. Therefore building a Small Retail Company Investment Activity Index (RCII) would allow, among other things, the indirect monitoring of company activities in the context of their willingness and potential to innovate – i.e. the processes which within retail firms increase competitiveness, productivity, and profit margins.

The forms N1-business conditions (retail) and N1-business conditions (wholesale) do not allow the collection of entrepreneurs' assessments of retail company innovation and technology-related activities. Accordingly, using RCII as an indirect source for measuring retail firm innovation potential would be quite useful.

As noted, at this stage only the statistical observation form N1-business conditions (retail) allows the collection of entrepreneurs' assessments of relatively short-term (actual and expected) changes of their company investment and competitiveness levels, on a quarterly basis (the form for surveying wholesale companies does not collect such information). The availability of such survey-generated data for retail companies allowed its inclusion in the RMI and RBPI (see Calculation and results: the Retail Market Indicator and the Retail Business Potential Indicator sections) as an important component affecting business conditions in the context of interpreting entrepreneurs' willingness to apply innovation and technology.

Further studies in this area should include extending the application of this business conditions measurement methodology covering other SE segments not represented in this paper to calculate industry-specific composite indicators which would provide a detailed picture of the overall state of SE in Russia. The proposed methodology for building composite indicators can serve as a basis for calculating Small Entrepreneurship Barriers Index, and an integral aggregated Business Conditions for Small Companies Index (BCI).

We believe macro-aggregate indicators of SE activities can also be applied in econometric models where a set of composite indicators based on business conditions surveys can be used as a component of their endogenous blocks. This would allow a significant strengthening of the predictive potential of the model's exogenous variable, which describes the SE segment's contribution to Russia's GDP.

Limitations of the informational and analytical content in terms of measuring business conditions for small companies

With the turbulent growth of the Russian economy and the increasingly tough competition between SE, the requirements for quality of information and analytical support (and statistical data is playing an ever more important role here) are becoming increasingly urgent. The importance of information content is growing due to the development of the market economy which increases the need to study effects of a wide range of factors on economic agents' performance, reflecting business conditions on macro-, meso-, and micro-level.

As noted (see Methodological and empirical basis of the study section), the empirical basis for calculating CI was quarterly business conditions surveys for Russian retail and wholesale SE conducted by Rosstat 2000–2014. The sample of companies was about 5 000 economic agents from more than 80 Russian regions.

The information was provided as raw non-personified object-specific data collected through surveys of retail and wholesale companies:

– The business conditions for, and activity of retail organisations (form N1-business conditions (retail));

– The business conditions for, and activity of, wholesale organisations (form N1-business conditions (wholesale)).

Our attempt to carefully study industry-specific trends and aggregate this data by building various composite indicators for retail and wholesale SE confirmed the need to adjust the current questionnaires by adding a number of economic indicators which would extend the information and analytical scope for interpreting such trends, and build additional industry-specific CI.

The available SE statistics for these and other industries, produced by Rosstat in the course of its operations as an important, in fact essential, economic analysis tool, does not quite match present-day realities. The array of existing quantitative, and particularly qualitative data describing SE operations is not sufficient for the growing need to thoroughly study results of all production and economic activities.

The analysis of SE statistics reveals that opportunities to study business conditions are significantly limited by the insufficient availability (or complete lack) of data on many important aspects of modern business operations, which hinders further research into the economic trends emerging in the retail and wholesale sectors. In our opinion the existing statistical observation forms do not describe the business conditions for retail SE in sufficient detail, and only provide a general picture of their development, with no scope for in-depth analysis.

One of the gaps in the on-going statistical monitoring based on the above mentioned forms is the lack of qualitative assessments of such major aspects as innovation and the application of new technologies.

The history of retail is closely linked with technological innovations and with changes in consumer lifestyles. Classic retail emerged in the 1860s together with railways, which connected producers, distribution centres, and shops into an integrated value chain. During the previous decade technological development has led to the emergence of new formats and opportunities for consumer interaction with suppliers. According to IDC FutureScape's global estimates, by 2017

three times more companies than now will be able to successfully link their customer relations strategies with the so-called "third platform" technologies, which combine processing and visualising large arrays of data with social, mobile, and cloud technologies. The ability to serve tomorrow's clients directly depends on the successful application of new technologies.

However, despite the obvious need to collect such data, statistical observation forms for surveying wholesale and retail companies do not include indicators measuring business trends on the application of innovation and technology, making it impossible to build relevant indicators. At this stage the only way to measure innovation and technology-related activities of such companies is on the basis of quantitative statistical estimates produced by the Rosstat (observation form 2MP – innovation).

Given the dynamic and multifaceted nature of retail SE operations, the existing statistical observations form must be improved by increasing attention to specific features of SE financial and economic activities and extending the sections identifying relevant business-related problems. It would make sense to more thoroughly survey entrepreneurs' opinions about the processes affecting their financial circumstances. In particular, the data array containing entrepreneurial assessments within the main business activity indicators block should be extended by adding an indicator measuring the actual and expected availability of credit resources to retail SE. The current stage of economic development and the targets for adjusting interest rates declared in SE promotion programmes, dictate the need to thoroughly study such processes.

The block of questions on respondents' reactions to various factors limiting their company operations must be extended. We believe this aspect to be particularly important due to the need to quickly assess the problems hindering retail company growth. Obtaining such assessments on a quarterly basis would focus the attention of the relevant public associations, government officials, and mass media on such issues – helping to more quickly (and therefore more efficiently) find ways to deal with them and improve relevant support structures. The list of barriers included in the questionnaire has not been adjusted since the start of business conditions surveys in 2000. This lack of change allowed the accumulation of an impressive array of data and their dynamics, however the changes in the economic system which have taken place since then have led to the emergence of additional limiting factors. Now, on top of traditional retail problems (such as insufficient demand or lack of credit) there are other major threats to company operations. This 15 year-long history suggests the need to review the approaches to studying business development issues, focusing on the assessments and opinions of respondents representing SE.

The existing observation form for surveying wholesale companies also has drawbacks: it only allows the collection of a small range of statistical data. Specifically, due to absence of a number of indicators in the questionnaire, it is currently impossible to extend national statistics by introducing composite indicators which would allow the measurement, on a quarterly basis, of parameters such as wholesale company investment activity and competitiveness.

This observation form also does not identify specific factors limiting (or promoting) the growth of the wholesale segment. The list of barriers included in the questionnaire has not been amended since 2003. Due to increased business risks, if the current range of factors limiting the growth of wholesale SE has not radically transformed it has certainly significantly changed, with a number of new industry-specific factors emerging. If the national statistics system did not allow the collection of such data previously, now, due to the annually updated sample and total

coverage surveys, obtaining additional entrepreneurial opinions and assessments on a wide range of problems should not be too difficult.

Therefore, as this study shows, the existing data array containing qualitative assessments of retail and wholesale SE economic activities is struggling to meet the growing demand for such data. Current surveys conducted by the Rosstat do not cover all the aspects of economic realities which together determine business conditions for SE hindering the development of industry-specific macro-aggregates.

Conclusion

This study analysed statistical approaches and techniques for studying SE and identified relevant methodological aspects for building business condition indicators for application in Russian and international statistical surveys. It was established that business conditions surveys for SE practically on all continents are a valuable source of up-to-date short-term data for assessing industry-specific development.

The lack of methodological and empirical statistical research of various aspects of SE and their dynamics in Russia was replenished. Accordingly, we believe the available knowledge and practical experience of observing industry-specific SE processes should be extended. A system of SE statistics can become an irreplaceable element of the overall national information support system, providing the government and non-government business promotion organisations, expert and academic communities with official data on emerging business development trends. Given the dynamic nature of economic transformations, an integrated, objective, timely, and multifaceted information resource is required, sufficient to support applied research and economic analysis, set parameters for regulation, and make evidence-based management decisions for development of SE.

The analysis of SE-related statistical patterns reveals that studying business conditions is severely limited by the insufficient availability (or total lack) of data on many major aspects of modern business operations. Therefore there is a need to update on-going statistical observations and the tools to obtain aggregate industry-specific measurements.

Using the retail and wholesale segments as examples, the study described procedures for building CI to measure SE economic activities in Russia, sufficient for in-depth industry-specific analysis. The results indicate the high adaptability of the proposed methodology for building CI, which is based on recommendations by international organisations (the OECD, the EC) and Russian experts.

A strong correlation between the time series reflecting the indicator dynamics and the qualitative time series describing the rate of their change was empirically proven, which allows us to consider business conditions surveys relevant and reliable data sources, and apply macroeconomic analysis, short-term forecasting, and the calculation of industry-specific composite indicators.

The cyclic dynamics of all composite indicators designed in the scope of the study (RMI, RBPI, and WMI) show a strong correlation with retrospective and current dynamics of major national macro-aggregates –VI of retail turnover and VI GDP.

Visualising the cyclic profiles of CI using tracers shows their high information value, their compatibility with macroeconomic quantitative aggregates, and suitability of such statistical tools for industry-specific analysis.

Business tendency surveys allow the scale and short-term dynamics of simple and composite indicators to be measured reflecting the business sentiment of SE. The proposed methodology for processing and analysing the results of business conditions surveys significantly extends the theoretical and empirical scope for statistical studies of SE development trends.

The proposed methodological approach to designing a system for statistical measurement of the business conditions of SE allows the creation of composite indicators measuring SE economic activities on an aggregated level. The suggested macro-aggregate indicators can be applied in econometric models where a set of industry-specific CI based on business conditions surveys can be used as endogenous ones, which would make significantly more accurate forecasts of the SE segments' contribution to Russian GDP.

The experimental testing of all composite indicators using wholesale and retail statistics for the period between 2000 and 2014 confirmed the validity of modelling results. The analysis of the RMI, RBPI, and WMI cyclic profiles based on the application of tracers revealed the high suitability of the suggested approach for anticipating forthcoming highs and lows of the business cycle.

References

Antonov G.D. Upravlenie konkurentosposobnost'ju organizacii / G.D. Antonov , O.P.Ivanova, V.M.Tumin. – Moskva : INFRA, 2014. – 300 p. (In Russian).

Arhipova M. Ju., Jekonometrika : uchebno-metodicheskij kompleks / V. S. Mhitarjan, M. Ju. Arhipova, V. P. Sirotin ; Mezhdunarodnyj konsorcium "Jelektronnyj un-t", Moskovskij gos. un-t jekonomiki, statistiki i informatiki, Evrazijskij otkrytyj in-t. – 2008. – p. 143. (In Russian).

Afanas'ev V. N., Analiz vremennyh rjadov i prognozirovanie: ucheb. dlja studentov vyssh. ucheb. zavedenij / V. N. Afanas'ev, M. M. Juzbashev. – 2-e izd., pererab. i dop. – 2010. – 317 p. : il., Tablica – Bibliogr.: p. 301-302. (In Russian).

Baranov A. Ju., et al. Innovacionnoe povedenie firm i delovoj klimat v stranah s perehodnoj jekonomikoj // Rossijskij zhurnal menedzhmenta. – 2012. – Vol. 10, № 4. – P. 3-30. (In Russian).

Bessonov V. A., Problemy analiza rossijskoj makrojekonomicheskoj dinamiki perehodnogo perioda / V. A. Bessonov ; In-t jekonomiki perehodnogo perioda. – 2005. – 244 p. (In Russian).

Bokun N.Ch. Problemy izmereniya rezul'tatov deyatel'nosti sub'yektov malogo i srednego biznesa [Problems of measurement of results of small and medium businesses activities]. Voprosy statistiki, 2007, no. 11, pp. 32-38. (In Russian).

Buhl, A. Analiz statisticheskih dannyh i vosstanovlenie skrytyh zakonomernostej : per. s nem. / Ahim Bjujul', Peter Cjofel'; pod red. V. E. Momota. – 2002. – p.602. (In Russian).

Chauvet, M. Dating business cycle turning points / M. Chauvet, J. D. Hamilton // NBER Working Paper. – 2005. – № 11422, Iss. June. P. 72

Christiano L. J., Fitzgerald T. J. The Band Pass Filter [Electronic resource] / L. J. Christiano., T. J. Fitzgerald – 1999 – NBER Working Paper No.W7257 – URL: http://www.nber.org/papers/w7257 (Accessed: 15.02.2016).

Crosilla, L. Leading indicators on construction and retail trade sectors based on ISAE survey data / L. Crosilla, S. Leproux // OECD. Journal of Business Cycle Measurement and Analysis. – 2009a. – Vol. 2, № 27. – P. 97-123.

Crosilla, L., Leproux, S., Malgarini, M. and Spinelli, F. Factor Based Composite Indicators for the Italian Economy [Electronic resource] / L. Crosilla, S. Leproux, M. Malgarini, F. Spinelli, – 2009b – URL: http://ssrn.com/abstract=1506944 or http://dx.doi.org/10.2139/ssrn.1506944 (Accessed: 26.08.2016).

Chepurenko A. Ju. et al. Maloye predprinimatel'stvo v Rossii: proshloye, nastoyashcheye i budushcheye; pod obshch.red. Ye. Yasina [Small business in Russia: past, present and future. Ed. by Ye. Yasin]. Moscow, Liberal Mission Foundation Publ., 2004. 265 p. (In Russia).

Chepurenko, A. Ju. Sovremennye klassiki teorii predprinimatel'stva. Laureaty Mezhdunarodnoj premii za vklad v issledovanija predprinimatel'stva i malogo biznesa (1996-2010). Moscow. – 2013. 526 p. (In Russian).

Cuhlo S. V., Metodologicheskie osnovy organizacii i analiticheskie vozmozhnosti konjunkturnyh oprosov v rossijskoj promyshlennosti / S. V. Cuhlo. 2010. – 133 s. : il., Tablica – Bibliogr.: P. 131-133. (In Russian).

Demidov O. Razlichnyye indeksy prognozirovaniya ekonomicheskoy aktivnosti v Rossii [Various indices for forecasting economic activity in Russia]. Kvantil, 2008, no. 5, pp. 83-102. (In Russian).

Dolgopjatova T. G., Jempiricheskie obsledovanija predprijatij: metody i praktika / T. G. Dolgopjatova // Jekonomicheskij zhurnal Vysshej shkoly jekonomiki. – Moskva, 2008. – T. 12, № 1. – P. 76-105. (In Russian).

Dubrov A. M., Mnogomernye statisticheskie metody : dlja jekonomistov i menedzherov : ucheb. dlja studentov jekon. special'nostej vysshih ucheb. zavedenij / A. M. Dubrov, V. S. Mhitarjan, L. I. Troshin. – 2011. – p.349. (In Russian).

Fischer, B. Decomposition of time series : comparing different methods in theory and practice / Bjorn Fischer. – Luxembourg : Eurostat, 1995. – II, 68 p. : Ill., tab.

Fok, D. Performance of Seasonal Adjustment Procedures : Simulation and Empirical Results [Electronic resource] / D. Fok, Philip Hans Franses, R. Paap. – Rotterdam : Econometric Institute ; Erasmus University. – 2005. – 28 p. – Series: Econometric institute report, EI 2005-30. – https://clck.ru/9T5yj (Accessed: 07.10.2016).

Frenkel' A. A., Izmerenie i analiz hozjajstvennoj konjunktury v Rossii / A. A. Frenkel' [i dr.] // Jekonomicheskie nauki. – 2007. – № 35. – P. 111-117. (In Russian).

Fulop, G. Transition of the OECD CLI system to a GDP-based business cycle target, 2012 [Electronic resource] / G. Fulop, G. Gyomay. - URL: http://www.oecd.org/std/leading-indicators/49985449.pdf (Accessed: 10.03.2015).

Gayer, C. Report: The Economic Climate Tracer. A tool to visualise the cyclical stance of the economy using survey data. [Electronic resource] / C. Gayer C. –2008 – URL: http://ec.europa.eu/economy_finance/db_indicators/surveys/documents/studies/economic_climate_tracer_en.pdf (Accessed: 20.09.2016).

Hodrick R.J., Prescott E.C. Postwar U.S. Business Cycles: an Empirical Investigation [Electronic resource] / R.J. Hodrick, E.C. Prescott – 1997 – Journal of Money Credit and Banking 29 (1),pp. 1–16 – URL: http://www.jstor.org/stable/2953682?seq=8#page_scan_tab_contents (Accessed: 15.12.2016).

Jasin E. G. et al., Vybor puti: scenarii razvitija Rossii / E. G. Jasin, N. Akindinova, L. Jakovlev // Investicii v Rossii. – Moskva, 2013. – № 6. – P. 45–48 (In Russian).

Kitrar L., Lipkind T., Lola I., Ostapkovich G., and Chusovlyanov D. (2015) The HSE ESI and short-term cycles in the Russian economy // Papers and Studies of Research Institute for Economic Development SGH, N 97. Warsaw: Warsaw School of Economics.

Kitrar L., Lipkind T., Ostapkovich G. (2014). Decomposition and joint analysis of growth cycles in time series of the Economic Sentiment Indicator and the Gross Domestic Product. Voprosy statistiki (Statistical Issues). No 9, p. 41–46 (in Russian).

Kitrar, L. A. et al. (2013), Problemy izmerenija delovyh ciklov: razvitie konceptual'nyh konstrukcij i osnovnyh parametrov nabljudenija // Voprosy statistiki. – № 4. – P. 22-27. (in Russian).

Lola I.S., Izmerenie delovoj konjunktury malyh predprijatij posredstvom kompozitnyh indikatorov (2015a) // Voprosy statistiki (Statistical Issues). No 10, p. 26–38 (in Russian).

Lola I. S., Mezhdunarodnyj opyt statisticheskogo izmerenija delovogo klimata malogo biznesa (2015b) Voprosy statistiki (Statistical Issues). No 3 p. 71-80 (in Russian).

Lola I.S., Ostapkovich G.V. Delovoy klimat v malykh roznichnykh organizatsiyakh vo II polugodii 2014 goda [Business climate in retail organizations of small business in the II half of 2014]. Moscow, HSE Publ., 2015c. 9 p. (In Russian).

Lola I.S., Ostapkovich G.V. Postkrizisnyye tendentsii razvitiya malykh promyshlennykh organizatsiy Rossii. HSE Economic Journal, 2014, no.1.1. (in Russian).

Lola, I. S. Sostojanie delovogo klimata v roznichnoj torgovle v I i II kvartalah 2015 goda / I. S. Lola, G. V. Ostapkovich // Sovremennaja torgovlja. – 2015c. – № 6. p. 28-35 (in Russian).

Lola, I. S. Delovoj klimat v optovoj torgovle v III i IV kvartalah 2014 goda / I. S. Lola, G. V. Ostapkovich // Sovremennaja torgovlja. – Moskva, 2015d. – № 1. P. 30-40 (in Russian).

Lucas, R. E. Econometric policy evolution: a critique // Studies in Business Cycle Theory / R. E. Lucas. – Cambridge, 1981. – P. 105-130.

Maxwell A., E.g. D. Lawley (1967) Factor Analysis as a. Statistical Method / Translated from English by Yu.N. Blagoveschensky. Mir Publishers, Moscow, 1967. 144 p. (in Russian)

Mirkin, B. G. Individual approximate clusters: Methods, properties, applications / B. G. Mirkin // Lecture notes in computer science. – Berlin ; New York, 2013a. – № 8170. – P. 26-37.

Mirkin, B. G. Least squares consensus clustering: criteria, methods, experiments / B. G. Mirkin // Advances in information retrieval : 35th European Conference on IR Research, Moscow, Russia, 24-27 March 2013 : proceedings / Pavel Serdyukov [et al.]. – Berlin ; New York, 2013b. – P. 764-768.

Mitchell, B. R. British historical statistics / B. R. Mitchell. – Cambridge [Cambridge shire] ; New York : Cambridge University Press, 1988. – XI, 886 p.

Mitchell, J. Aggregate versus disaggregate survey-based indicators of economic activity / J. Mitchell, R. J. Smith and M. R. Weale // National Institute of Economic and Social Research. – London, 2002. – № 194. – 33 p. – Series: National Institute discussion paper.

Mhitarjan V. S. Issledovanie vlijanija nominal'nyh faktorov na rezul'tativnyj pri-znak metodami dispersionnogo analiza / V. S. Mhitarjan, L. I. Troshin // Meto-dologija statisticheskogo issledovanija social'no-jekonomicheskih processov / otv. red. V. G. Minashkin. – Moskva, 2012. – P. 52-109. (in Russian)

Nilsson, R. Cycle Extraction: A Comparison of the Phase-Average Trend Method, the Hodrick-Prescott and Christiano-Fitzgerald Filters, OECD Statistics Working Papers, 2011/04, OECD Publishing [Electronic resource] / R. Nilsson, G. Gyomai. - URL: http://dx.doi.org/10.1787/5kg9srt7f8g0-en (Accessed:10.03.2016).

OECD leading indicators and business cycles in member countries, 1960-1985 / Organisation for Economic Cooperation and Development. – Paris, 1987. – 197 p.: ill. – Series: Sources and methods, № 39.

OECD. Business Tendency Surveys: A Handbook [Electronic resource] – 2006 – URL: http://www.oecd.org/std/leading-indicators/31837055.pdf (Accessed: 05.06.2016)

OECD Composite Leading Indicators [Electronic resource] // OECD System of Composite Leading Indicators. – 2014 (April). – 18 p. – URL: https://clck.ru/9T5yy (Accessed: 10.03.2016).

Prescott, E. Theory Ahead of Business-Cycle Measurement / E. Prescott // Carnegie-Rochester Conference Series on Public Policy (Autumn, 1986). – 1986. – P. 11-44.

Smirnov, S. V. Russian cyclical indicators and their usefulness in real time: an experience of the 2008-09 recession / S. V. Smirnov // Journal of Business Cycle Measurement and Analysis. – 2014. – № 1. – P. 103-128.

Smirnov S. Sistema operezhayushchikh indikatorov dlya Rossii [The System of Leading Indicators for Russia].Voprosy ekonomiki, 2001, no. 3, pp. 23-42. (In Russian).

Stadler, G. W. Real Business Cycles / G. W. Stadler // Journal of Economic Literature. – 1994. – Vol. 32, № 4. – P. 1750–1783.

Statistics Canada. Statistics Canada Quality Guidelines, October 2009 – Ottawa : Minister responsible for Statistics Canada, 2009. – 89 p. – Series: Catalogue (Statistics Canada), № 12-539.

Stock, J. H. Forecasting Using Principal Components From a Large Number of Predictors [Text] / J. H. Stock, M. W. Watson // Journal of the American Statistical Association. – 2002. – Vol. 97, № 460. – P. 1167-1179.

Stock, J. H. Macroeconomic Forecasting UsingDiffusion Indexes. 2002 / J. H. Stock, M. W. Watson // Journal of Business and Economic Statistics. – 2002. – Vol. 20. – P.147-162.

The joint harmonized EU programme of business and consumer surveys / European Commission. Directorate-General for Economic and Financial Affairs. – Luxembourg : Office for Official Publications of the European Communities, 1998. – V, 231 p. : ill. – Series: European economy, Reports and studies, 1997/6.

The Joint Harmonised EU Programme of Business and Consumer Surveys [Electronic resource] // A User Manual to the Joint Harmonised EU Programme of Business and Consumers Surveys / European Commission, Directorate-General for Economic and Financial Affairs. – 2014 (March). - URL: http://ec.europa.eu/economy_finance/db_indicators/surveys/method_guides/index_en.htm (Accessed: 09.06.2016).

Theil, H. Economic forecast and policy / Henri Theil. – Amsterdam, North-Holland, 1975. – xxxii, 567 p. : ill. – Series: Contributions to economic analysis, № 15.

What is a Business Cycle? / Victor Zarnowitz ; National Bureau of Economic Research. – Cambridge, Mass., 1993. – Series : National Bureau of Economic Research, № 3863.

Contact details and disclaimer:

Inna S. Lola

National Research University Higher School of Economics (Moscow, Russia). Deputy Head of the Centre for Business Tendency Studies, Institute for Statistical Studies and Economics of Knowledge.

E-mail: ilola@hse.ru,

Any opinions or claims in this Working Paper do not necessarily reflect the views of HSE.