

ЕКОНОМІКО-МАТЕМАТИЧНЕ МОДЕЛЮВАННЯ БІЗНЕСОВИХ ПРОЦЕСІВ

UDC 336.7

JEL classification: G17

DOI: 10.20535/2307-5651.23.2022.264665

Mazhara GlibPh. D. in Economics, Senior Lecturer
ORCID ID: 0000-0002-7882-3942**Sazonova Mariia**Student
ORCID ID: 0000-0001-5842-4816National Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute"**Мажара Г. А., Сазонова М. О.**Національний технічний університет України
«Київський політехнічний інститут імені Ігоря Сікорського»

FUND INDEXES AND ECONOMIC INDICATORS BEHAVIOR AS CRISIS RED FLAGS

ПОВЕДІНКА ІНДЕКСІВ ФОНДУ ТА ЕКОНОМІЧНИХ ІНДИКАТОРІВ ЯК КРИЗОВІ ПРАПОРЦІ

Financial crises may happen for different reasons. The most obvious reason is overwhelming the assets or institutions' prices, which are not supported by anything but market demand. If this situation is topped by anticipated human behavior; government non-interference for a long time or just a "black swan", the crisis may cause a recession or depression. The main goal of this article is to discover the root causes of the main global crises of the 20th and 21st centuries and to compare them. Preparing the work, the following methods were used: systematic analysis of the scientific literature; comparative analysis; systematization, comparison and summarizing of the results. As a result, aim of this article: to have a look at the global crises of the previous decades, study their causes, explore how the stock global markets indexes behaved, was reached. After analysis of several crisis with several indexes we can say that for future research it is advisable to use the indicator The Global DOW index as an equal-weighted stock index.

Keywords: Financial markets, crisis, behavior of economic systems, flags.

Фінансова криза – ситуація, коли ціни на активи сильно падають, інвестори розпродають активи, очікуючи дефіциту ліквідності. Фінансові кризи включають вибух спекулятивної фінансової бульбашки, крах фондового ринку, суверенний дефолт або валютну кризу. Фінансові кризи можуть виникати з різних причин. Найбільш очевидною причиною є перевищення цін на активи або установи, які не підтримуються нічим, крім ринкового попиту. Якщо цю ситуацію доповнює очікувана людська поведінка, тривале невтручання уряду або просто «чорний лебідь», криза може спричинити рецесію чи депресію. Головна схожість усіх криз у тому, що вони повторюються. Ось мета цієї статті: поглянути на світові кризи попередніх десятиліть, вивчити їх причини, дослідити, як поводитися індекси світових фондових ринків. Що ще важливіше, ми зараз подивимося на індекси, проаналізуємо ситуацію в банківській системі, щоб мати можливість очікувати найближчої кризи. Стаття на тему «Поведінка індексів фонду та економічних індикаторів як кризові прапорці» написана з метою виявити першопричини основних глобальних криз ХХ–ХХІ століть та порівняти їх. Для вивчення економічної ситуації використовувались валовий світовий продукт і світові індекси: Wilshire 5000, The Global DOW index. Головна схожість усіх криз у тому, що вони повторюються. Тому актуальність теми полягає у тому що кризи це циклічне явище в економіці і розуміючи їх першопричини можна заздалегідь спрогнозувати кризу і підготуватися до неї. Методами дослідження були системний аналіз наукової літератури; порівняльний аналіз; систематизація, порівняння та узагальнення результатів. В результаті дослідження поглянули на глобальні кризи попередніх десятиліть, вивчили їх причини, дослідити, як поводитися індекси світових фондових ринків. Та після аналізу кількох криз з кількома індексами можна сказати, що для подальших досліджень доцільно використовувати індикатор The Global DOW index, як рівнозважений фондовий індекс. Практична цінність статті полягає у тому що тепер, знаючи поведінку низки індикаторів в минулому перед кризами, можна спрогнозувати майбутні кризи. В наступних дослідженнях необхідно побудувати комплексний аналіз показників для поточної ситуації, щоб спрогнозувати спади в економіці.

Ключові слова: фінансові ринки, криза, поведінка економічних систем, прапорці.

Introduction. Financial crises – a situation when asset prices face a strong decline in value, investors sell off assets, expecting liquidity shortages. Financial crises include the bursting of a speculative financial bubble, a stock market crash, a sovereign default, or a currency crisis [1].

Financial crises may happen for different reasons. The most obvious reason is overwhelming the assets or institutions' prices, which are not supported by anything but market demand. If this situation is topped by anticipated human behavior, government non-interference for a long time or just a "black swan", the crisis may cause a recession or depression.

The main similarity of all crises is that they are repeated. Here the aim of this article goes: to have a look at the global crises of the previous decades, study their causes, explore how the stock global markets indexes behaved. More importantly, we will have a look at indexes now, analyze banking system situation to have an opportunity to expect the nearest future crisis.

For studying the economic situation, we will use Gross World Product and the global indexes: Wilshire 5000, The Global DOW index.

The gross world product (GWP) is the combined gross national income of all the countries in the world [2]. The data starts from 1985, so using this indicator is impossible while analyzing crises before that.

The Wilshire 5000 Total Market Index (TMWX) is a broad-based market index composed of 3,451 publicly traded companies that are headquartered in the US and traded on the US stock exchange. It is designed to track the overall performance of the American stock markets [3]. As a big part of crises spring up in the USA, we will use this indicator to watch how this country's business sector behaved and reacted. The data starts from 1971, so we will use this index to analyze the crises that happened after this year.

The Global Dow is an equal-weighted stock index. It is composed of the stocks of 150 top companies from around the world as selected by Dow Jones editors and based on the companies' long history of success and popularity among investors. The Global Dow is designed to reflect the global stock market and gives preferences to companies with global reach [4]. The data starts from 2000 year, so we will use this index to analyze the crises that happened after this year.

To spot the similarity in previous crises and future, we will explore the causes of four different biggest crises of the past same as this and previous decade:

1. The great depression – 1932.
2. .com bubble – 2001.
3. Great recession – 2008.
4. COVID-19 crisis – 2019.

And finally, we will look through the economic situations and compare them and their causes to define the similarity.

The aim of the research. The main goal of this article is to discover the root causes of the main global crises of the 20th and 21st centuries and to compare them.

The methods of the research. Preparing the work, the following methods were used: systematic analysis of the scientific literature; comparative analysis; systematization, comparison and summarizing of the results.

Analysis of the current research and publications. When searching for similar ideas on how to predict and evaluate crises, we may find 3 similar articles.

1. 5 Red Flags To Watch For As Recession Anxiety Rises [5].

In 2019 Shoshanna Delventhal published an article on Investopedia where wrote about the flags to monitor before recession. To spot a downturn early and prepare, Goldman Sachs says stock investors should look out for five key developments [5]. Red flags include GDP growth falling below 1% or unemployment spiking, a sharp rise in balances in the private sector, investors continued move towards cash, an ISM manufacturing index below 50, and flat industrial production, per Business Insider [5].

2. Leading indicators of crisis incidence: evidence from developed countries [6].

"We search for early warning indicators that could indicate important risks in developed economies" [6]. In this article author uses BMA methodology to create its continuous EWM. To our knowledge, it has not been applied in (continuous) early warning models so far [6]. It is simple average of three standardized variables (GDP growth, the unemployment rate, and the government budget deficit) that is used as IRCs. In order to explore the behavior of the IRC following the occurrence of systemic events only, the author make use of the COI (conditional on crisis occurrence) based on the binary database of economic crisis occurrence, that contains information on the occurrence of banking, currency, and debt crises.

The key early warning signal comes from growth in domestic credit to the private sector at the horizon of four years. Other identified indicators issue a warning signal 5 or 6 quarters ahead of the materialization of a crisis. For this reason, an increase in government debt, the current account deficit, and FDI inflow, or a fall in house prices and share prices could be considered late early warning indicators [6].

3. Indicators of economic crises: a data-driven clustering approach [7].

"We investigate the ability of several macroeconomic variables telling crisis countries apart from non-crisis economies. We introduce a self-calibrated clustering algorithm, which accounts for both similarity and dissimilarity in macroeconomic fundamentals across countries" [7]. Authors assumed that similarities in the macroeconomic profiles of two countries – measured over several quarters – are indicative of these countries' economic status at the end of this measurement period. GFCF / GDP, a proxy for investment, was the only indicator which was part of the best indicator bundle in every period [7]. So far, their proposed methodology is rather useful as an observational tool for describing the underlying data set and understanding the inherent dynamics. Making the methodology applicable to forecasting exercises and assessing the statistical significance of the results would be further steps into the direction of an early-warning model of economic crises.

Results.

The Great Depression

The Great Depression is one of the worst economic downturns that started in 1929. October 25, 1929 the New York Stock Exchange saw 13 million shares being sold in panic selling [8]. A third of all banks failed. Unemployment rose to 25%, and homelessness increased. Housing prices plummeted 67%, international trade collapsed by 65%, and deflation soared above 10%. It took 25 years for the stock market to recover [9].

These are the consequences of the Great depression that the whole world faced. Will explore the main reasons for these to happen.

During 1920–1929, the wealth of the US more than doubled, the economy grew 42%. The consumption and manufacturing of goods skyrocketed. Moreover, airline, auto and radio industries expanded. The overall optimism on the market caused stocks to go far beyond the true value- people turned their savings into investments. Banks started to make too many loans for stock speculations.

The American economy entered a mild recession during the summer of 1929, as consumer spending slowed and unsold goods began to pile up, which in turn slowed factory production. Nonetheless, stock prices continued to rise, and by the fall of that year had reached stratospheric levels that could not be justified by expected future earnings [10].

To analyze this crisis in digits we will use the GDP of the United States of America as America's continent representative to figure out the rapidity of its growth as a factor of crisis runup.

According to a presentation by the California State University, Northridge, real gross domestic product was as follows (Fig. 1).

We can make a conclusion, that from 1920 to 1930 real GDP of America grew in 61,4 % and then declined in 26,3% for 3 years after 1930. Also, we can make conclusion due to this situation, that can help us predict the future crises. U.S Federal Reserve System was responsible for fixing interest rates through extending loans to other financial institutions in the U.S. Operations of the Federal Reserve System faced a setback in 1928 and 1929, as a result of the Wall Street Speculation which forced it to increase interest rates to counter the financial hitch. Consequently, it reduced its money supply to the local banks and this was the principal cause of the recession [11].

We allocate from the variety of causes one indicator that played key role- exorbitant demand. So, if we will find in future some similar situations, where excessive demand will be significantly and for years push the market prices up- we can anticipate some crises.

.com bubble

The dotcom bubble was a rapid rise in U.S. technology stock equity valuations fueled by investments in Internet-based companies during the bull market in the late 1990s [12].

The frenzy of buying internet-based stocks was overwhelming, as many internet-based companies, so-called dotcoms, were starting up [12]. As new businesses, they needed funding, which came from venture firms and individual investors. One of the main causes of the bubble was speculation. The price of shares rose without their value increase, but was based on artificial demand. While investing, people were not looking at information concerning business plans, industry analysis, revenue of the company, P/E ratio. Many investors focused on the wrong metrics such as traffic growth to their website propelled by the startup companies [13].

Most startups did not adopt viable business models, such as cash flow generation; hence, they were overvalued and highly speculative. It culminated in a bubble that grew rapidly for several years [13].

The data set for this period was prepared and analyzed. The result of this is on the Fig. 2 and the overall conclusion drafted in Table 1.

As it was already mentioned, this crisis mostly impacted the USA, so the influence on the global indicator might be a slight one. Despite the fact that may see the 0,8% decline in the GWP during the time when the .com bubble crashed.

Using Wilshire 5000 indicator we may see that despite the negligible influence on the global market, the .com bubble had a huge impact on the US economy and business – almost half of the initial growth.

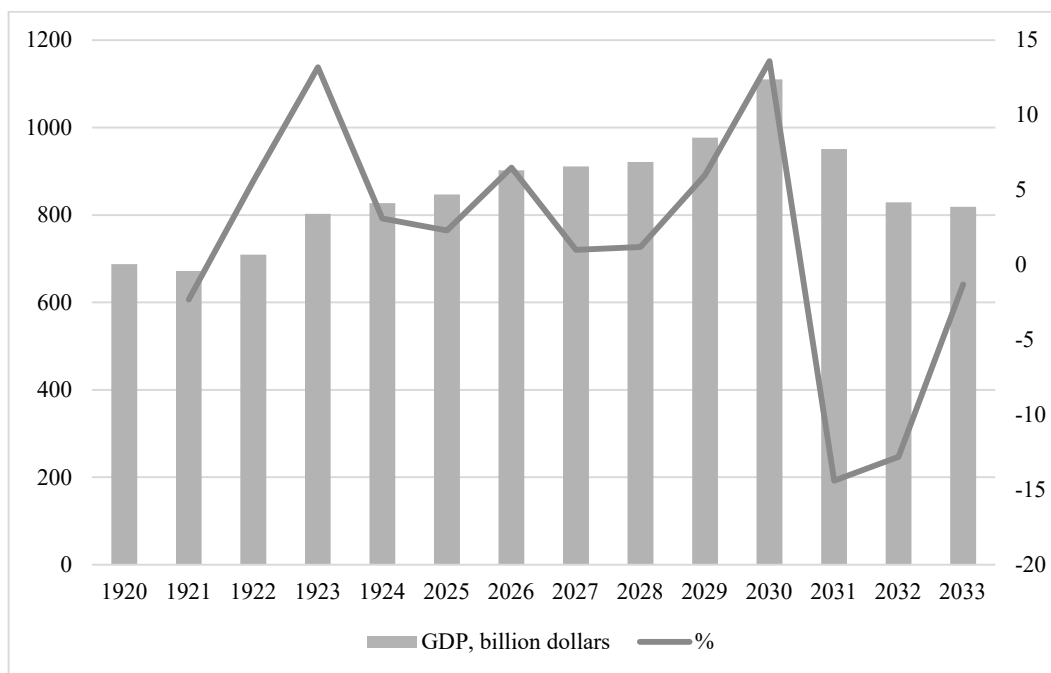


Fig. 1. GDP, billion dollars and it's changing from 1920 to 2033

Source: own author's draft based on data from staista.com and thebalance.com

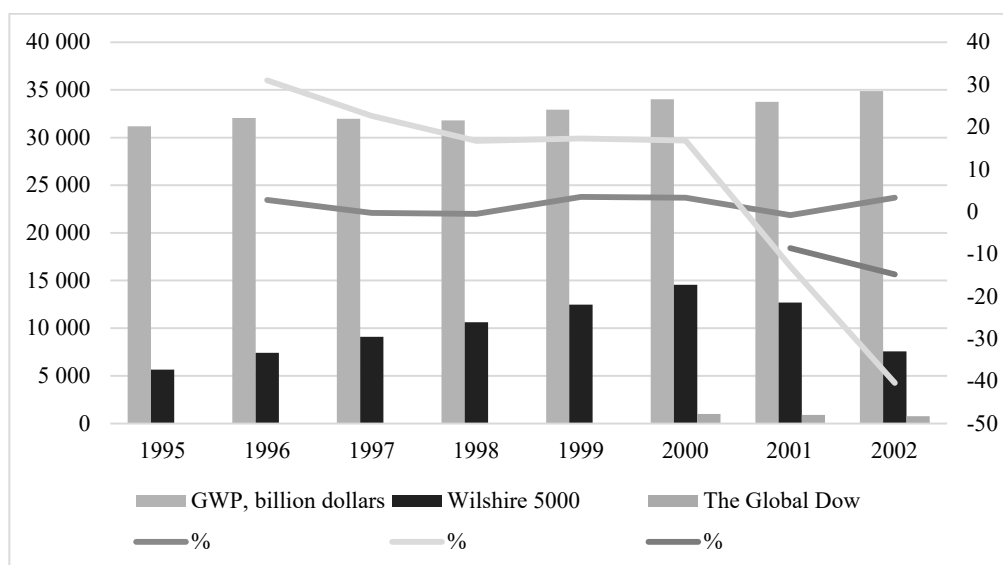


Fig. 2. index fluctuation and their changes during the crisis period

Source: own author's draft based on data from staista.com

Table 1

Index changes during crisis period

Results	GWP	Wilshire 5000	The Global Dow
Increase, %	8,8	104,5	
Decrease, %	-0,8	-53,3	-23

Source: own author's calculation on the dataset

Unfortunately, we can't have the full analyze of The Global Dow indicator as its calculation was started in 2002. However, we can still observe a high impact on it.

Great recession

A recession is a macroeconomic term that refers to a significant decline in general economic activity in a designated region [14].

The Great Recession is an economic crisis that began after 2007 year and devastated global financial markets, real estate and banking industries. It is considered to be the longest period of decline since the Great Depression, which caused millions of people to lose their houses, savings and jobs.

With the housing boom in the United States in the early to mid-2000s, mortgage lenders seeking to capitalize on rising home prices were less restrictive in terms of the types of borrowers they approved for loans. And as housing prices continued to rise in North America and Western Europe, other financial institutions acquired thousands of these risky mortgages in bulk (typically in the form of mortgage-backed securities) as an investment, in hopes of a quick profit [15].

Banks created and purchased risky mortgage-backed securities (MBSs) and collateralized debt obligations (CDOs) in the first place, and ignored early warnings of market failure in 2006–2007 [16].

The official year when the economy started recovering from the .com bubble consequences was 2002, so this year will be the first to start our analysis.

The data set for this period was prepared and analyzed. The result of this is on the Fig. 3 and the overall conclusion drafted in Table 2.

Due to the results table, we can make the conclusion, that crises had the most influence on American market, we can see that on Wilshire 5000 indicator. It has less influenced the counties, that was chosen by The Global Dow to build this index, however the 8% decrease from the 8-year increase cannot be neglected. The lowest, however still efficient, influence was on GWP – 5.6% decrease from the 8-year increase.

COVID-19 Crisis

This crisis is caused by the virus and does not count to be a crisis caused by people's behavior. We will not explore the reasons for the crisis, we will look at it from the perspective of the latest crisis that happened.

Will start from analysis from 2015 – the lowest point after global trade slowdown.

The data set for this period was prepared and analyzed. The result of this is on the Fig. 4 and the overall conclusion drafted in Table 3.

The most significant decline we can observe in The Global Dow indicator – more than a half from its initial increase.

So, in 4 years from 2015 to 2019 GWP had grown for 15.7% and had fallen for 3.3% in a year from 2019 to 2020, that is almost ¼ from a 4-years growth. The Wilshire 5000 had also fallen for nearly half.

After analysis of several crisis with several indexes we can say that for future research it is advisable to use the indicator The Global DOW index as an equal-weighted stock index. In Fig. 5 this index and it's representation for every crisis of 21 century.

Conclusion. The main similarity of all crises is that they are repeated. Here was the aim of this article: to have

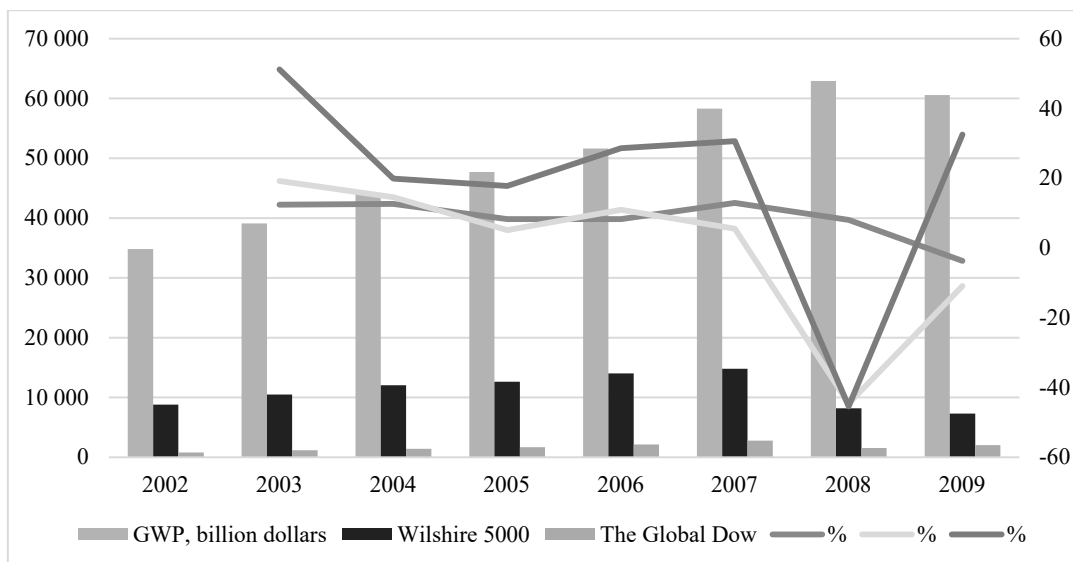


Fig. 3. index fluctuation and their changes during the crisis period

Source: own author's draft based on data from staista.com

Table 2

Index changes during crisis period

Results	GWP	Wilshire 5000	The Global Dow
Increase, %	62,4	55,4	148,1
Decrease, %	-3,7	-55,6	-45,4

Source: own author's calculation on the dataset

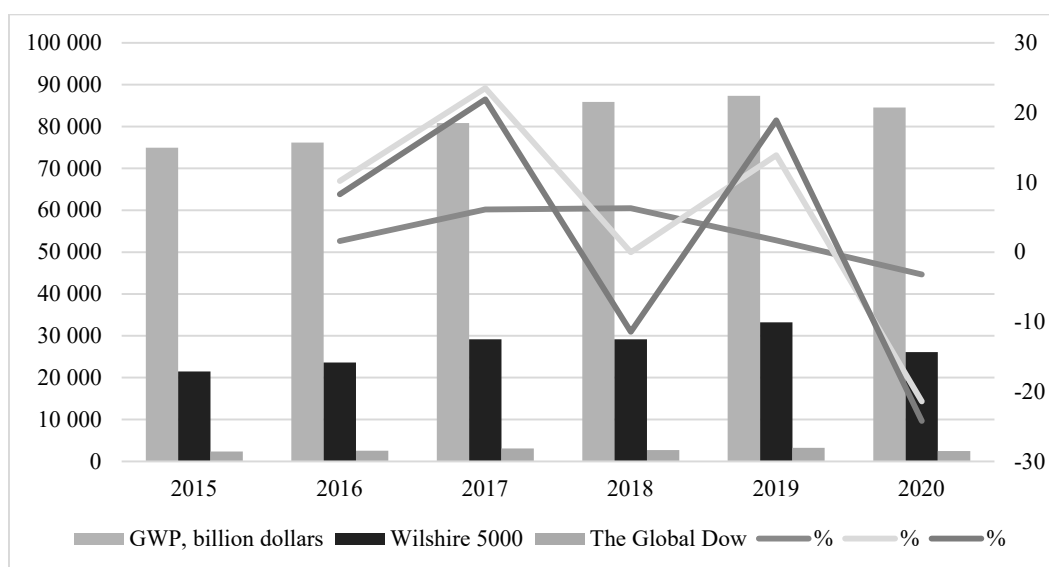


Fig. 4. index fluctuation and their changes during the crisis period

Source: own author's draft based on data from staista.com

Table 3

Index changes during crisis period

Results	GWP	Wilshire 5000	The Global Dow
Increase, %	15,7	47,5	37,7
Decrease, %	-3,2	-21,4	-24,2

Source: own author's calculation on the dataset

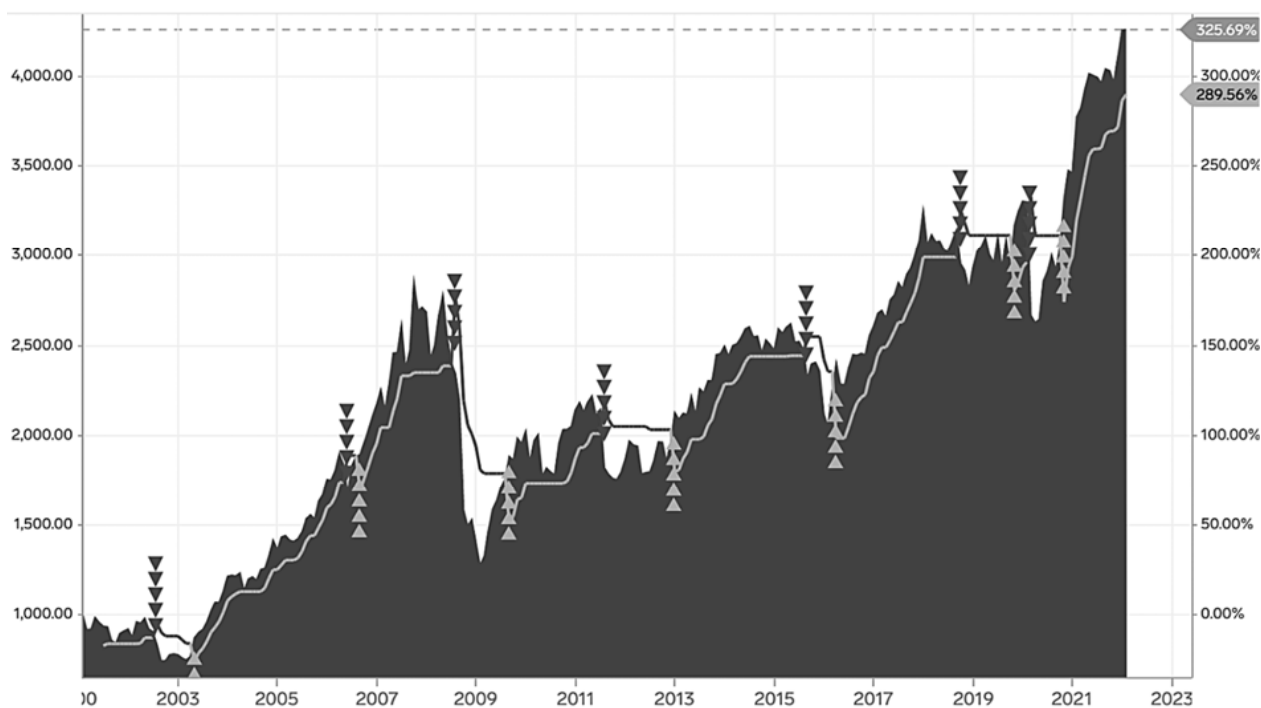


Fig. 5. The Global DOW index for 21 century

Source: businessinsider.com

Table 3

Index changes during crisis period

	dot com bubble	Great recession	COVID-19 Crisis
Increase, %		148,1	37,7
Decrease, %	-23,4	-45,4	-24,2

Source: own author's calculation on the dataset

a look at the global crises of the previous decades, study their causes, explore how the stock global markets indexes behaved.

In the article was analyzed several crises such as "The Great Depression", ".com bubble", "Great recession", "COVID-19 Crisis" their causes and results. The idea was to check several indexes and economic indicator: were used Gross World Product and the global indexes: Wilshire 5000, The Global DOW index and to

analyze their behavior and their change in order to use them in current situation as a red flag. Graphs for this analysis were build and results tables of changes was created. The main goal was to choose one of these indicators and the best suite for this is "The Global DOW" index. The graph of its changes is provided and per-crisis comparison as well. In the next studies it's necessary to build a comprehensive analysis of this indicator for current situation in order to be to predict incoming crises.

References:

1. WILL K. Financial Crisis. KENTON WILL. Investopedia. 2022. Available at: <https://www.investopedia.com/terms/f/financial-crisis.asp> (accessed: 13.05.2022).
2. Gross world product . Wikipedia. 2022. Available at: https://en.wikipedia.org/wiki/Gross_world_product (accessed: 15.05.2022).
3. FT Wilshire 5000 Index (FTW5000). Investopedia. 2022. Available at: <https://www.investopedia.com/terms/w/wilshire5000-equityindex.asp> (accessed: 15.05.2022).
4. KENTON W. The Global Dow. WILL KENTON. Investopedia. 2022. Available at: <https://www.investopedia.com/terms/g/globaldow.asp#citation-1> (accessed: 16.05.2022).
5. DELVENTHAL S. 5 Red Flags To Watch For As Recession Anxiety Rises. SHOSHANNA DELVENTHAL. Investopedia. 2019. Available at: <https://www.investopedia.com/5-red-flags-to-watch-for-as-recession-anxiety-rises-4584553> (accessed: 20.05.2022).
6. LEADING INDICATORS OF CRISIS INCIDENCE EVIDENCE FROM DEVELOPED COUNTRIES. European Central bank. 2012. Available at: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1486.pdf> (accessed: 26.05.2022).
7. Indicators of economic crises: a data-driven clustering approach. SpringerOpen. 2020. Available at: <https://appliednetsci.springeropen.com/articles/10.1007/s41109-020-00280-4> (accessed: 10.06.2022).
8. V.SRINIVAS,. MAJOR FINANCIAL CRISIS From Great Depression to Great Recession. 2021. Available at: http://nationalarchives.nic.in/sites/default/files/new/Final_Major_Financial_Crisis-i_0.pdf (accessed: 26.06.2022)
9. KIMBERLY AMADEO. 9 Principal Effects of the Great Depression. The balance. 2022. Available at: <https://www.thebalance.com/effects-of-the-great-depression-4049299>. (accessed: 26.06.2022).

10. Great Depression History. History. 2021. Available at: <https://www.history.com/topics/great-depression/great-depression-history> (accessed: 26.06.2022).
11. The Great Depression. GRIN. 2022. Available at: <https://www.grin.com/document/430703> (accessed: 26.06.2022).
12. Dotcom Bubble. Investopedia. 2019. Available at: <https://www.investopedia.com/terms/d/dotcom-bubble.asp> (accessed: 07.07.2022)
13. Dotcom Bubble. CFI. 2021. Available at: <https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/dotcom-bubble> (accessed: 10.07.2022).
14. Guide to Economic Recession. Investopedia. 2022. Available at: <https://www.investopedia.com/terms/r/recession.asp> (accessed: 15.07.2022).
15. Great Recession. History. 2019. Available at: https://www.history.com/topics/21st-century/recession#section_2 (accessed: 15.07.2022).
16. What Really Caused the Great Recession? IRLE. 2018. Available at: <https://irle.berkeley.edu/what-really-caused-the-great-recession/> (accessed: 15.07.2022).

Література:

1. WILL K. Financial Crisis. KENTON WILL. Investopedia. 2022. URL: <https://www.investopedia.com/terms/f/financial-crisis.asp>. (дата звернення: 13.05.2022).
2. Gross world product. Wikipedia. 2022. URL: https://en.wikipedia.org/wiki/Gross_world_product (дата звернення: 15.05.2022).
3. FT Wilshire 5000 Index (FTW5000). Investopedia. 2022. URL: <https://www.investopedia.com/terms/w/wilshire5000equityindex.asp> (дата звернення: 15.05.2022).
4. KENTON W. The Global Dow. WILL KENTON. Investopedia. 2022. URL: <https://www.investopedia.com/terms/g/globaldow.asp#citation-1> (дата звернення: 16.05.2022).
5. DELVENTHAL S. 5 Red Flags To Watch For As Recession Anxiety Rises. SHOSHANNA DELVENTHAL. Investopedia. 2019. URL: <https://www.investopedia.com/5-red-flags-to-watch-for-as-recession-anxiety-rises-4584553> (дата звернення: 20.05.2022).
6. LEADING INDICATORS OF CRISIS INCIDENCE EVIDENCE FROM DEVELOPED COUNTRIES. European Central bank. 2012. URL: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1486.pdf> (дата звернення: 26.05.2022).
7. Indicators of economic crises: a data-driven clustering approach. SpringerOpen. 2020. URL: <https://appliednetsci.springeropen.com/articles/10.1007/s41109-020-00280-4>. (дата звернення: 10.06.2022).
8. V.SRINIVAS., MAJOR FINANCIAL CRISIS From Great Depression to Great Recession. 2021. URL: http://nationalarchives.nic.in/sites/default/files/new/Final_Major_Financial_Crisis-i_0.pdf. (дата звернення: 26.06.2022).
9. KIMBERLY AMADEO. 9 Principal Effects of the Great Depression. The balance. 2022. URL: <https://www.thebalance.com/effects-of-the-great-depression-4049299> (дата звернення: 26.06.2022).
10. Great Depression History. History. 2021. URL: <https://www.history.com/topics/great-depression/great-depression-history> (дата звернення: 26.06.2022).
11. The Great Depression. GRIN. 2022. URL: <https://www.grin.com/document/430703> (дата звернення: 26.06.2022).
12. Dotcom Bubble. Investopedia. 2019. URL: <https://www.investopedia.com/terms/d/dotcom-bubble.asp> (дата звернення: 07.07.2022).
13. Dotcom Bubble. CFI. 2021. URL: <https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/dotcom-bubble> (дата звернення: 10.07.2022).
14. Guide to Economic Recession. Investopedia. 2022. URL: <https://www.investopedia.com/terms/r/recession.asp> (дата звернення: 15.07.2022).
15. Great Recession. History. 2019. URL: https://www.history.com/topics/21st-century/recession#section_2 (дата звернення: 15.07.2022).
16. What Really Caused the Great Recession? IRLE. 2018. URL: <https://irle.berkeley.edu/what-really-caused-the-great-recession> (дата звернення: 15.07.2022).