Assessing the possibility of global economic crisis

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The existing literary sources do not provide an opportunity to forecast or develop measures to overcome the deterioration of economic activity. The authors consider the problems of the money circulation in its various forms, components, and relationships. The necessary parameters were determined by data from various literary sources. It is shown that certain interrelationships make it possible to construct the dependence of the probability of crisis phenomena on time. This dependence shows a singularity corresponding to the manifestation of the crisis. The formula obtained allows to predict the emergence of crisis phenomena and to seek ways to overcome them.

1. Introduction

The assessment of the impact of the sustainability of economic development shows that it is very high as for countries and organizations, and for individuals. Sustainable development provides for the actors of the economic process the opportunity to freely promote their interests and realize their opportunities in the economic and social arena.

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The global economy is experiencing considerable difficulties, primarily in assessing the prospects for its development. Numerous theories explain what happened in hindsight, but they cannot forecast stably even nearest future. This is especially important in the era of the emergence of new financial instruments. Many of these tools are purely speculative. A special role here is played by such conventional units as money, regardless of whether they are they are a fiat money or are based on contractual calculations.

In fact, the economic process on a global scale is unmanageable. No theory from the ones created so far allows to predict the course of this process and manage it, at least in the interests of particular social strata, groups, and individuals. All this is happening against the backdrop of unrestrained population growth, which only aggravates the problems, transferring them from the economic to the social space.

An example of typical problems is the situation with cryptocurrencies, in particular, with Bitcoin. Bitcoin network has grown to gigantic proportions and continues to grow further with each passing hour, complicating the hypothetical task of destroying it. Many Bitcoin collapse scenarios could be implemented with less popular currencies (Lim 2018).

Circumstances which will cause the Bitcoin to come to naught have to be equivalent to the power of Bitcoin network itself. It is obvious that one average person and even hundreds of people cannot force Bitcoin to crash (Bloomberg 2017, Chuck 2018, Meunier 2018, Roberts 2017). The collapse of Bitcoin will be a strong blow to the market of the crypto-currencies. Presence of regulators turnover of cryptocurrency in some countries does not influence global processes as the turnover of cryptocurrencies is by orders of magnitude lower than the level of the fiduciary currencies turnover.

This can cause a wave of crisis, which can capture other currencies. Other areas of human activity may also be affected by the financial crisis.

2. Literature review

Grinin (2009) writes, that huge financial pyramids, speculation, "bubbles", "financial foam" … have created a very unstable situation in an economy of many countries. This cannot but affect the situation in the rest of the world. These technologies are based on increased opportunities for a concentration of capital and management of other people's funds. They are based on the accelerated issuance of loans and the increasing depersonalization of capital, circulating in international markets, etc.

However, in this source, there is no deep understanding of the processes taking place in the economy for reasonable judgments about the necessary sequence of actions.

Koltashov (2008) and Weeks (2015) pointed out that the world economy is entering a period of completion of a large cycle of development. The approaching crisis of efficiency of the neo-liberal system, arising from the previous system crisis demands changes in the world economy. The former system of operation of the world periphery has exhausted the opportunities. The labor force is used extremely irrationally - millions of people with higher education cannot find a job in their specialty. The masses of immigrants are not socialized. The industry needs technical modernization. Bet on cheap unskilled labor is no longer able to give former economic benefits. It requires a lot of change in the world economy. Reducing taxes or subsidizing the stock exchanges is absolutely insufficient in this situation.

Koltashov (2008) enumerates the symptoms but does not disclose the role of individual factors affecting the economic process.

Economic science to date has developed a number of different theories. Their authors believe that these theories explain the causes of economic cycles and crises.

Samuelson and Nordhaus (1998), and behind them Vodolazhskaya (2013) note, for example, the monetary theory, which explains the cycle by expansion (compression) of a bank loan (Hawtrey 1919).

The theory of innovation, which explains the economic cycle by the use in the production of important innovations, is considered by Schumpeter (1934) and Hansen (1964).

The psychological theory, which interprets the cycle as a consequence of the waves of pessimistic and optimistic moods covering the population, seems interesting (Pigou 1932, Bagehot 2017, etc.).

The under-consumption theory sees the cause of the cycle in an excessively large share of income going to the rich and thrifty people, compared to what can be invested (Gobson 1900).

On the other hand, it seems appropriate to consider the theory of excessive investment. Its supporters believe that the cause of the recession is sooner an excessive than an insufficient investing (Seligman 1870, Mises 1996, etc.).

Samuelson (1998) also cites the theory of sunspots (Jevans 1871, Chizhevsky 1924)

All these theories are of a private nature and do not offer the general patterns of the onset of crises.

Chossudovsky (2014) believes that, in fact, crises are a means of regulating the number of people. Though really reduction of the population is a consequence of crises, this theory doesn't explain the nature of crises.

Grinkevich (2008) notes that, in his opinion, the basis of modern financial crises is the excessive dependence of the world economic system on financial bubbles that "inflated" in the United States. But this would mean the existence of an evil will in the emergence of world crises. But it is well known, that no one manages the world economy, if, of course, conspiracy theories aren't taken into account.

Khazin (2008) indicates that, in his opinion, the main problem of the US economy is the presence of an "excess" part. This excess part has grown over the past 30 years due to the ever-increasing emissive stimulation of consumer demand. Today the USA can't neither finance this part of an economy nor "close down" it, as she became too great. Theoretically, such a situation should be recognized, and a direct anti-crisis policy should be launched. But this is completely impossible for purely political reasons. This scale of the fall of the world's largest economy makes absolutely impossible for the US a preservation of the role of the world's sole leader. It makes absolutely impossible also the continued existence of the global financial system based on the dollar and American banks.

All of these sources illuminate the causes of crises are not fully and make it impossible to answer the question of measures to prevent these crises. This article is devoted to the identification of features of crises and formulation of their reasons.

3. Materials and methods

The research belongs to economic problems of society. The work was focused on identifying the key points in this area. The objects of research are crises in the economy, the subjects of research are the processes occurring in the population. The necessary parameters were determined by data from various literature sources. The data obtained with the help of search engines are used. The resulting list was reduced by successively deleting less significant sources. The data obtained thus were processed by means of standard statistical programs. In some cases, basic data have been already presented in the acceptable form. In particular, this applies to data from the World Bank website.

4. Theory

Crises occur in various spheres of human existence. They range from religious and ideological to financial crises, crises of overproduction and crises the growing problem of unemployment. In this paper, the problems of financial crises are considered. Since figuratively speaking, money in any of their forms is the blood of the economy, then financial crises affect all other areas of human life.

Therefore, it is appropriate to consider the following hypothesis.

Hypothesis: The global economic system is close to entering the era of the global crisis.

The indicators used below are not endogenous, as they do not meet the definition from Christopher (2017).

This equation is constructed in the image and likeness of the equations in the source:of Kouri (1976).

Other parameters than those used in this paper have less impact on the process of world economic development, therefore, as a first approximation, it was decided to abandon them.

Let's construct a simple equation for the amount of money in the world:

(1) $$E_{\sum}=E_0-E_d-k_1 \sum B_i +Q,$$

where $E_{\sum}$ - the total money supply (including money, various obligations, and borrowing) in the world,

E_0 - the world's secured money supply,

E_d - a conditionally speculative addition to the money supply,

B_i - various factors counteracting the overheating of the economy,

k_1 - a dimensional coefficient of proportionality,

Q –cumulative criminal money of the world.

B_i includes in own composition the intangible motivation, the economic component of the national idea and currency imbalances.

The probability of a crisis occurs when money is too much, and they move quickly from one country to another. Accordingly, the likelihood of a crisis for financial reasons can be defined as the impact of funds that do not have a fiat form. But these values can be determined through means whose measurement is possible in the accepted units.

Money is constantly moving, they are changing form, owners, scope of application. On the other hand, for certain reasons, some of the money does not move, does not change owners and does not participate in economic turnover.

The likelihood of a crisis is associated with the excessive use or underutilization of money in the world. In this case, we have adopted a variant of underutilization, as is the case in the real world, which means the appearance in the world of a certain amount of money that is not used in the production process.

Therefore, the formula for the probability of financial turmoil must take into account the proportion of the total amount of money that remains unclaimed for use. This share is $E_{\sum}=E_0+E_d+k_1 \sum B_i +Q$ (1). Said share should be normalized to $E\sum$ and divided by 2, taking into account the averaging over the entire time interval. Then the expression looks like $E_{\sum}= (E_0+E_d+k_1 \sum B_i +Q)/2E_{\sum}]$.

The probability of a crisis can be determined in form of a fraction. Its numerator will be the cumulative amount of money in the world, its denominator will be the amount of unused money. This money can be used at any time, and therefore pose a threat to sustainable development.

Then the probability of a new crisis is determined by the ratio of the doubled square of the right-hand side of equation (1) and the denominator defined above:

(2) $\mu= E_{\sum}/(1- (E_0+E_d+k_1 \sum B_i +Q)/2E_{\sum}))= 2E_{\sum}^2/ [2E_{\sum}- (E_0+E_d+k_1 \sum B_i +Q)]$,

where E_0 - a gross product of all countries of the world,

$E_d = E_{d1} + E_{d2}$, the components of E_d are as follows:

E_{d1} - the housing price index;

E_{d2} - the cost of precious metals extracted annually.

The global companies annually lose an equivalent of nearly one percent of world GDP (gross domestic product) because of cybercrime. This affects the creation of jobs, innovations and an economic growth (Palmer 2018).

The United Nations has estimated the annual volume of bribes in the world at one trillion dollars. According to the UN development programs, the world economy because of a corruption component annually loses 2,6 trillion dollars. At the same time, the losses in developing countries connected with bribery surpass the volume of official development assistance by 10 times (World Bank News 2004).

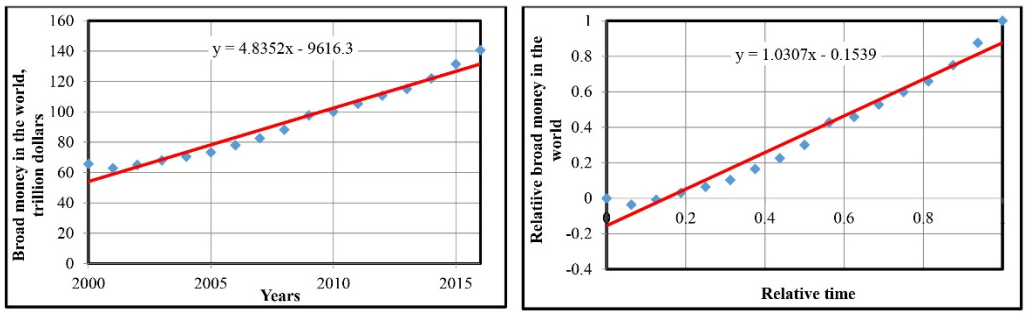
In general, criminal money is not only difficult to track, but also difficult to assess. Their influence on world financial stability has negative character. But their variability is not very large, and in this consideration, they can be neglected. The coefficients of proportionality at this stage, without loss of generality, can be taken equal to unity.

5. Results

Data on the total amount of broad money in the world are given in the source~~s~~ (John Williams' Shadow Government Statistics 2018). Dependencies of the total amount of money in the world in absolute form (a) and relative form (b), constructed on the basis of these data, are shown in Fig.1.

The linear regression correlation coefficient for these graphs is 0.862 and is substantial for all significance levels exceeding level 0.01. The regression equation in relative form has the form:

(3) $$E_{\Sigma} = 0{,}992t + 0{,}173.$$



a) b)

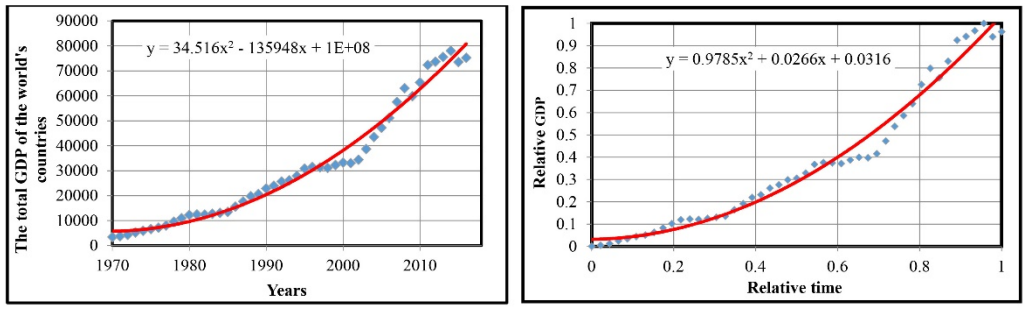
Source: Shadow Government Statistics, Walter J. Williams; author's calculations.

FIGURE 1. CHANGE IN THE TOTAL AMOUNT OF BROAD MONEY IN THE WORLD BY YEARS IN:

(a) absolute form,

(b) relative form.

E_0 represents the secured part of the money supply. Essentially, this value is equal to the aggregate GDP of the world. GDP data are taken from the source (World Bank national accounts data 2016).



a) b)

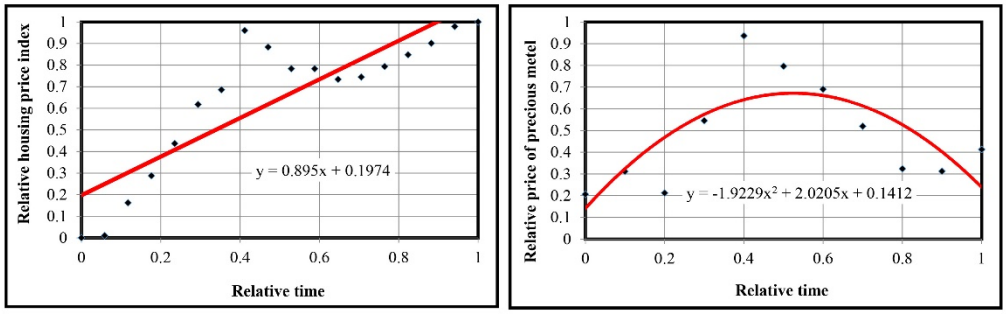
Source: GDP (current US$), World Bank national accounts data, and OECD National Accounts data files, author's calculations.

FIGURE 2. CHANGE OF CUMULATIVE GDP OF THE WORLD BY YEARS IN:

a) absolute form, b) relative form.

The correlation coefficient for the graphs in Fig.2 is equal to 0.999. It is substantial for all levels of significance exceeding the level of 0.01.

Further, we will consider E_{d1} - the value of real estate. The cost of the House Price Index by years is taken from International Monetary Fund (2018). The results of the comparison of the data from these sources are presented in Fig.3a).



a) b)

Sources: International Monetary Fund and The Denver Gold Group, author's calculation.

FIGURE 3. CHANGE IN THE RELATIVE AGGREGATE VALUE BY YEARS:

a) for the real estate, b) for precious metals

The correlation coefficient for the graph in Fig.3a) is equal to 0,863. It is substantial for all significance levels exceeding the level of 0.01. Recalculation of the formula through substitution allows you to get the following equation:

(4) $E_{d1}=0,895x + 0,197.$

The last component of equation (1) E_{d2} is the cost of precious metals extracted annually. The composition of this indicator includes the cost of mined gold, platinum, silver and palladium (Precious Metal Prices and Charts by The Denver

Gold Group 2018). The total value of precious metals over the years is presented in Fig.3b).

The correlation coefficient for the curve in Fig.3b) is 0.916. It is substantial for all levels of significance exceeding the level of 0.01. The regression equation has the form:

$$E_{d2} = 0{,}876t^3 - 0{,}044t^2 + 0{,}160t - 0{,}001. \quad (5)$$

k1 ΣBi in equation (1) can be determined from the following considerations. Let's consider the impact on the economy of projects that are considered to be the basis of national security and absorb a significant proportion of public budgets.

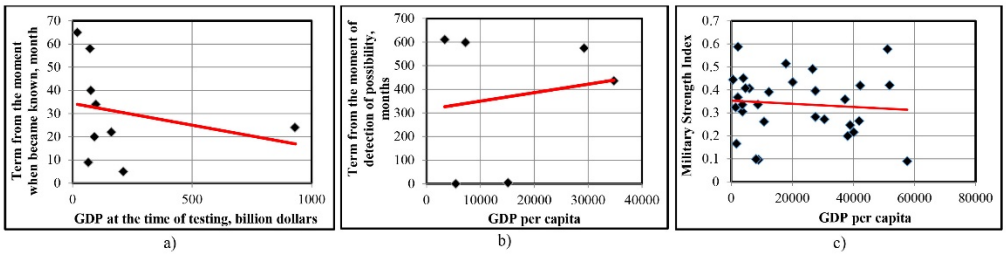
Events which in the opinion of the heads of states define their national independence are presented in Fig.4. Starting date of nuclear tests was compared with GDP per capita in Fig.4a) (International Campaign to Abolish Nuclear Weapons 2016). The point "out of line" cannot be discarded, as it represents a real State. And there isn't enough data for constructing a separate ascending branch of the graphic. Therefore, the correlation coefficient for this graph 0.145 is not substantial for any reasonable significance levels.

Fig.4b) shows the comparison of the date of the beginning of national space research and GDP per capita (NASA Space Science Data Coordinated Archive. 2018). It is seen from Fig.4b) that there is an indefinite scattering of points with a correlation coefficient of -0.033. This value shows that the correlation coefficient is not substantial for any reasonable levels of significance.

Fig.4c) shows a comparison of the national military capabilities (The complete Global Firepower list 2018) and GDP per capita. It is easy to see that the graph is a field freely filled with dots. And even the regression line is practically parallel to the y-axis. This, together with the calculated correlation coefficient -0.094,

inessential for any reasonable levels of significance, indicates a lack of interconnection.

These examples show that, in fact, the government circles of various countries are equally irresponsible way related to the problem of maintenance of financial stability of their economies. Instead, they spend money on the projects which don't have any relation to ensuring this stability.



a) b) c)

Sources: International Campaign to Abolish Nuclear Weapons, NASA Space Science Data Coordinated Archive, The complete Global Firepower list for 2018; author's calculation.

FIGURE 4. CHANGE OF PARAMETERS DEPENDING ON GDP PER CAPITA:

a) the starting date of national nuclear tests;

b) the starting date for Space Research, determined by the launch of an artificial Earth satellite;

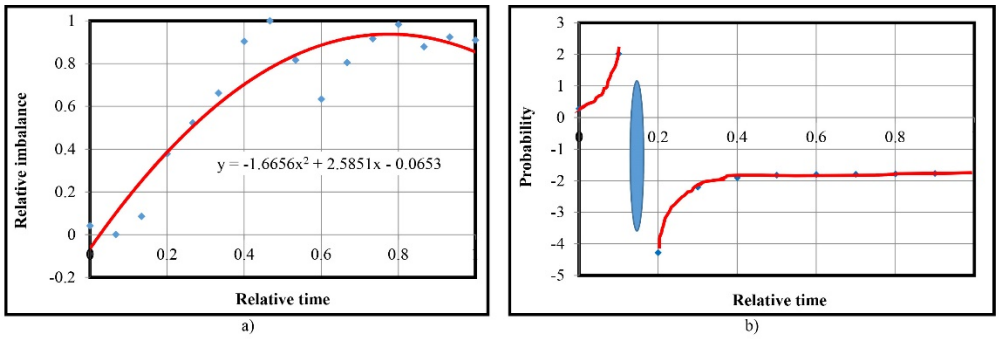
c) the rating of military potential.

Since these activities are not aimed at maintaining financial stability, then in the composition of the member $k_1 \sum B_i$ remain only currency imbalances.

Politicians and economists have advocated the creation of more stable and predictable external conditions, which are contributed to the recovery of world economic growth. Particular attention of experts was drawn to the problems of a deficit of reserve currencies in crisis conditions. It is important to explore possible ways of providing emergency liquidity to needy economies. The objects of study are the channels for spreading stress in financial markets, the policy of exchange rates in major world economies.

At the same time, the category "global imbalance" usually characterizes only one of the non-equilibrium states of the world economy. This state - significant surpluses and deficits in the balance of payments of countries (Freund 2018 and World Bank national accounts data 2017).

The graph of Fig.5a) is constructed based on these data.



Source: PIIE Peterson Institute for International Economics; author's calculation.

FIGURE 5. CHANGE OF PARAMETERS IN TIME:

a) - currency imbalances, b) – the probability of the crisis

The regression equation has the form:

(6) $$\sum B_i = -1{,}535t^2 + 2{,}399t - 0{,}100,$$

where $\sum B_i$ - currency imbalances.

The substitution of expressions (2), (3), (4), (5) and (6) into the formula (1) yields the following result:

(7) $$\mu = k_2 E_\Sigma/[(E_0-E_d-k_1 \sum B_i+Q)/2 E_\Sigma]=$$

$$=2(0{,}992t + 0{,}173)^2/(-0{,}876t^3+0{,}6t^2-1{,}497t+0{,}218)$$

Calculations using formula (7) make it possible to construct the graph shown in Fig.5b).

Analysis of the type of graph Fig.5b) indicates the presence of a singularity. If to estimate her influence, then, probably, it is necessary to be regarded an initial increase in a probability of a crisis as a manifestation of the crisis itself. Another branch of the graphic, starting with a value of 0.2 on the x-axis, possibly reflecting the economic recovery after the crisis. The area shown in blue represents a zone of chaos in the economy and social sphere and it is desirable to minimize it.

The choice of the scale for recalculation of relative time into absolute time can be substantiated by the following provisions. It is proposed to select 2000 year as the beginning of the scale. The vast majority of data on the current state of the economies of the key countries begin with this milestone. Accordingly, since 2000, the authors have calculated the main dependencies given in this paper.

The end of the scale is based on such a widespread planning horizon as 2030. For example, in the analysis of the motive powers of the future development of the world's major economic actors, the experts of PricewaterhouseCoopers (2018) used this date.

Next, the obtained dependence should be extrapolated to the subsequent time interval. It is assumed that the obtained dependencies will retain their form in the future. Then the new sequence can start to be counted out from 2018.

When selecting the specified time interval 2018-2030 recalculation taking into account the relative value for the singularity of 0.18 gives a preliminary date of the crisis. This is the end of 2020 - the beginning of 2021.

6. Discussion

The study of the dependencies in this work was carried out in the first approximation, many factors second-order factors were not taken into account. For example, the contribution which gives the cost of gemstones and minerals wasn't considered. However, it is much smaller than the level of the quantities under consideration, and in this approximation, it can be ignored. In addition, a number of approximations and the data used to obtain them need to be clarified.

Nevertheless, the result obtained is stable enough, which allows it to be used for forecasting the crisis.

7. Conclusion

When discussing the results of the consideration in this article, one must take into account the peculiarities of the representation of formula (1) in a specific form. As a whole, the formula (1) is very sensitive to the kind of its components.

In the variant of formula (7) the expression contains the singularity point, which corresponds to the crisis point.

Thus, the hypothesis is confirmed.

8. Recommendations

Recommendations on the results of this work follow from the formula (1). This means that to reduce the probability of a crisis, the numerator must be reduced and the denominator must be increased. However, trends are steady and it is difficult to change them. Therefore, the countries of the world should adopt the joint action plan, formalized in some Agreement. under the crisis, only in this way can achieve acceptable results. The plan may contain, for example, measures to increase the value of real estate, increase the extraction of precious metals and limit the turnover of "criminal" money.

This plan should reflect the fully agreed national action programs. The individual efforts of individual countries will not lead to meaningful results in improving world economic stability.

Such an approach would, if not to abolish, then at least minimize the impact of the crisis.

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