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SIMULATION OF THE CONTROL ACTIONS OF THE BANKING SYSTEM TO THE FUNCTIONING OF THE ECONOMY. DYNAMICS AND CORRECTION OF CRISIS SITUATIONS

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The problem of predicting the crisis in the economy and banking system continues to be relevant. Many works are devoted to this issue, to the development of recipes of the exits from crises, but each new crisis is a ascertaining of the fact that the "de facto" the offered advices and tips are not sufficiently effective in practical terms.

The main reasons could be as follows.

1. Insufficient mathematization of the problem. The fuzzy, from a mathematical point of view, the formulation of the problem. As a consequence - the ambiguity and an illegibility of in the definition of: rational are the proposed solutions and recommendations or not.
2. Task settings change over time and the development of society, banking and economic systems. Lack of a clear mathematical formulation of the task leads to the fact that the dynamic correction of the formulation of the task, which is necessary in view of the occurred changes, with the adjustment by time the restrictions and parameters, is impossible.
3. Decision-making process overly, and often unnecessarily, depends on the human factor. Acceptance of administrative decisions in the conditions of astronomical multifactor of the task, even when Chairman of the management structure is congeniality person, requires a greater emphasis on computing (computer&mathematical) choice of control actions. This issue was raised by the example of Fed and the "spilling over" effect, as noted in some articles. Especially considering away mixed assessment of the degree of optimality adopted, decisions (for example, a specific ex-chairman of the Fed's) on the part of a number of his colleagues, including those of experts, whose work has been appreciated the Nobel Prize.

Overcoming difficulties relating to the reasons mentioned above requires the formation of a mathematical model describing the dynamics of the financial and economic systems (FES) in form which is the standard for the computational mathematics. Formation of the total (global - taking into account the above) mathematical model (FM-model) FES is a task of the highest possible complexity. However, the conceptual basis of this model may be uniquely identified, even considering the fact that the PM-model must continuously adjusted in accordance with the occurring changes in the global FES. In aggregate, FES can be represented as an object with a variable structure, consisting of micro- and macro-clusters. All clusters are functioning on the boundary of the bifurcation - the boundary layer, following the terminology of Tikhonov

systems. Between themselves the clusters are connected by the banking system, which regulates the flow of funds. Structurally, in this case FES can be regarded as a some system of closed capacities - entities of system - united by a common ring, which is a physical environments of transfer of single "nourishing resource" - the analogy with the "single circulatory system" of a biological object. The subjects of the system (businesses and households) use resources of a single ring. "Nourishing resource" associate with a fluid having a fixed (quasi fixed) the volume and the circulating in a closed space, having, in addition to the main stream, which is common to all elements of the system, the branches with the release and return of "nourishing resource" to the main stream.

The most appropriate mathematical apparatus to describe systems (objects), taking into account the above factors are mathematical formalism of Tikhonov and kvazi-Tikhonov systems.

Is natural that the complete model of the object is non-linear. Analysis and calculation of non-linear models of high and extra-high dimensionality is a separate task. And management of the dynamics of this model will require a solution not one a highly complex task, but a number of solutions of complex and highly complex tasks. However, the conversion of a non-linear model to the quasi-stationary form and linearization models simplify analysis. In this case, we will have to deal with matrices of high and extra dimensionality and evaluation of the dynamics of the processes in the linearization intervals will require knowledge of the eigenvalues of these matrices. New numerical algorithm, providing a solution the problem of determining the eigenvalues of matrix of high and extra-high dimensionality is algorithm based on the known theorem [1]. In the context of this work the link conceptually corresponds to the statement that the formation and solution of the problem "technocratic management and regulation of the global PES" at the present stage become real, given the combination of the following factors:

- a high level of development of modern methods of computational mathematics and systems analysis (operations research);
- achieved the computing power of supercomputing clusters;
- the current level of information and communication technologies and digitalization of the world, providing the ability to collect and store statistics and the formation of the necessary data bases (knowledge bases, data warehouses).

With the further development of this approach, more in-depth detalization of the generated mathematical models, the use of this mathematical apparatus of systems analysis and operations research allows you to make a clear conclusion that it is not the collapse of the individual businesses, business-clusters, sub-sectors of the economy may be the cause of global financial and economic crises, but the behavior of the banking system. Incorrect, inappropriate to the achievement of the objective management of the banking system is the main cause of crises.

During the beginning of the crisis dynamics of individual fragments of FES can be described by one of the catastrophe of Tom, when the process acquires avalanche character - "falling off a cliff" with a negative angle of reverse recovery on the dynamic path. A limited number of allowable parameters $k = 4$ considered in the appropriate models of catastrophe theory limits the application of Thom's theorem to the study of FES models.

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