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Theory and Practice of Overcoming an Economic Crisis (on the Nobel Prize in Economics in 2022)

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ABSTRACT

The article analyzes the Nobel Prize winners in economics of the 2022's research results. The author explains the meaning of the terms which are necessary for the analysis: money multiplier, liquidity, mortgage, mortgage bonds. In addition, the psychological factor in the formation of critical situations in the banking sector is considered the way it was interpreted by the winners. The article analyzes the reasons which led to the lower position of the USSR's and modern Russia's money multiplier compared to the position of the multiplier of the countries with developed market economies including, first of all, the USA. The paper also discusses the role which the "real bills doctrine" played in the activity of the US Federal Reserve System and Ben Bernank personally. Ben Bernank's cautious line of behavior during the overcoming the 2008 crisis is described. The model of liquidity dynamics which belongs to the laureates and that is vividly discussed in the scientific community is considered in detail.

Keywords: global crisis; Chicago school of political economy; government intervention; banking functions; mortgage

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INTRODUCTION

The Nobel Prize in Economics in 2022 was awarded to the three US professors, which is hardly unusual. In recent times, economists from other countries have only received prizes in 2014 and 2009. The prize went to Ben Bernanke, Douglas Diamond and Philip Dybvig with the wording "they have significantly improved our understanding of the role of banks in the economy, especially during financial crises".

So, who are they?

Ben Shalom Bernanke comes from Georgia. His father, along with his brother, owned a small pharmaceutical firm. Perhaps a little insight into the psychology of the laureate can be gained with this touch: Ben Bernanke's grandfather did not gift but sold his sons a stake in the business he had created. He immigrated to the US from Boryspil (now Ukraine, then Austria-Hungary). The immigrant was 30 years old and started a new life from scratch, believing that his sons should be as good as he was. It was only natural, therefore, that as a teenager Ben earned his own money: as a construction worker, a waiter in a restaurant and a shop assistant.

Ben Bernanke received a very high-quality education: he studied at Harvard University for a BA in economics and at the Massachusetts Institute of Technology, where he was awarded a PhD in economics. In 1979, he defended his thesis on "Long-Term Liabilities, Dynamic Optimisation and the Business Cycle". Bernanke's thesis supervisor was Stanley Fischer, future Governor of the Bank of Israel, and his reviewers were Robert Solow[1] and Peter Diamond.[2]

After that he taught macroeconomics at leading US universities. He did not stay long anywhere, except for Princeton University, where he was the Dean of the Economics Department for 6 years. Ben Bernanke headed the US Federal Reserve (the Fed) from 2006 to 2014. He was named Man of the Year by Time magazine in 2009.

Douglas Warren Diamond — a distinguished Professor of Finance at the University of Chicago (Booth School of Business). He was born in the Chicago suburbs to a family of doctors.

In 1975 he received a Bachelor of Arts degree from the prestigious private Brown University (Providence, Rhode Island). He received his Master of Arts degree from Yale University in 1977 and his PhD in Economics — in 1980. Until 1986, he taught at the same Yale University, where he became a professor. He is now a professor at the University of Chicago.

In addition, as a visiting professor, Diamond has taught at Brown University and at Hong Kong University of Science and Technology. Overall, of the three laureates, he most closely resembles the typical American professor at a leading US university.

Philip Dybvig is another case in point. He received two bachelor's degrees (in mathematics and physics) from Indiana University. After that he studied first at the University of Pennsylvania and then at Yale University, where he received his PhD in economics in 1979. He then spent another year at Princeton University. A person who has studied at four universities in three different fields can already be considered extraordinary.

P. Dybvig began teaching at the University of Washington, then worked briefly in China, at the Southeastern University of Finance and Economics in Chengdu. At the time of the award, he was working at the University of Massachusetts.

In contrast to the standard portrayal of an American professor, **Philip Dybvig** is also a person who enjoys playing several instruments in the university's student ensemble, writes his own music compositions, and is interested in Chinese gymnastics and martial arts. He also has a wider range of interests than that of the average US university professor, who tends not

[1] Robert Merton Solow — Professor at the Massachusetts Institute of Technology, winner of the 1987 Nobel Prize "for fundamental research in the theory of economic growth".

[2] Peter Arthur Diamond — Professor at the Massachusetts Institute of Technology, winner of the 2010 Nobel Prize in Economics "for his research on markets with search distortions".

to focus on one or two research topics. Some of our economists would probably say to him: "He spreads himself thin!".

THE MONEY AND CREDIT MULTIPLIER

Without an explanation of what "liquidity" means, it is difficult to tell what the achievements of the awardees are. The liquidity of goods and services — is the demand for them on the market (this also includes financial services). At a second level — is the liquidity of the companies that sell these goods or services. On a national economic scale, liquidity — is the intensity of monetary circulation. If the monetary and credit means in an economy are active, its liquidity can be considered high. If money is "hanging around" now and then, the liquidity of the economy is low. In fact, all definitions of the liquidity of the economy can be reduced to this explanation.

The next obligatory category for the presentation of the topic is the "monetary and credit multiplier". It shows the ratio of the amount of funds held by a commercial bank (deposits and central bank loans) to those loans that the bank extends to its customers. The multiplier effect is achieved by the fact that the amount of loans made by a commercial bank is always greater than the amount it has received from the central bank. The term "multiplier" was first used by British economist R. Kahn in 1931.[3]

In the US during the Great Depression (in 1929) the multiplier was eight. Before the crisis in 2008, it reached nine. Then the money multiplier started to decline and by 2014 it was only three.

In our country, loans issued have always exceeded the capacity of banks by 2.5–3 times, at most. The risk aversion of banks can be explained by the fact that in the absence of real owners, financial structures behave as part of the state apparatus, carrying out instructions and not taking the initiative to externally control the situation.

For advanced market economies, a low monetary and credit figure or indicator means an acute shortage of credit. But the economies of the Soviet Union and post-Soviet Russia have existed under such conditions. The reason for this resilience can be explained in different ways. In the USSR, national economic planning and determinable linkages between enterprises reduced the need for credit. In post-Soviet Russia, the shortage of credit has led to a drastic reduction in expenditure on science, production modernisation and new developments in science and technology, which has also reduced the need for credit funds.

In the 1990s, thanks to "wise" foreign advisers pointing out the threat of inflation, the multiplier got even lower, leading to a default crisis. The problem was that the impact on management and managers was intensified: at the top level the threat of inflation was exaggerated, while at the lower levels — the threat of a particular loan not being repaid was exaggerated.

The psychological unpreparedness of the participants for the risk mitigation system played a determining role in the formation of this total anxiety. This, in turn, was due to a lack of tradition and a lack of familiarity with the use of different forms of credit.

In the sphere of interest of the laureates is the doctrine of the real bills of exchange. The term itself was proposed in 1945 by Professor Lloyd Mintz of Chicago in a book on the history of banking [1]. Before that the doctrine was called the "theory of commercial credit in banking". The essence of the doctrine is that if credit is given against short-term (up to 90 days) securities, behind which are the goods not yet produced, but that are already in the process of production, then the money received on credit may well be used to produce and sell them. Then the volume of production in monetary terms would correspond to the amount of credit issued,

[3] It has since been used in the works on macroeconomics. In studies relating to microeconomics and on a bank-by-bank basis, the indicator takes into account deposits, depositors' funds. Sometimes the deposit-credit indicator — the ratio of deposits to loans issued — is used as a stand-alone indicator in the analysis.

and the interest on the credit would not cause an increase in prices. Accordingly, if the commercial bank lends by observing the doctrine of real bills of exchange, then the central bank can grant it preferential loans, and the monetary and credit system will be sustainable.

By its first name, the doctrine goes back to the famous John Law[4] and the classicist Adam Smith [2]. The latter believed that only land as a source of future agricultural production could be a reliable security for any credit.

The new life of the real bills of exchange doctrine began after an article by T. Sargent[5] and N. Wallace, published in the early 1980s. [3]. In it the doctrine of real bills of exchange was opposed to the quantitative theory of money.

Two lines of monetary policy derive from this divergence. In the quantitative theory of money, the real money is separated from credit (credit money). It therefore focuses policy on the regulation of the money supply in circulation. In the doctrine of real bills of exchange, the obstacles to mutual lending to private companies are removed as much as possible, and central bank actions are aimed at enhancing and making such intermediation more effective. The winners of the 2022 award have explicitly pursued a policy which is derived from the doctrine of real bills of exchange.

According to this doctrine the Fed should take into account the needs of the economy to raise or lower liquidity in order to ensure financial and economic stability. When business activity rises, the Fed should take into account the demand for credit by increasing bank liquidity, and when business activity falls,— it should do the opposite.

According to quantitative money theory, it is not the Fed but the US Treasury[6] that should increase the mass of money in circulation when business activity increases and reduce it when activity shrinks.

The main advantage of the regulation of monetary and credit circulation in an American-type economy is the ability to use two methods. The first — is the reserve currency, the function of which in the US is performed by treasury bonds. If the economy is in deficit, the government buys treasury bonds and if it has a surplus, it sells them. The second method — is loans when the monetary and credit multiplier is high.

Now let us get back to the doctrine of real bills, but already in the context of the actions of one of the laureates. Ben Bernanke, who has just taken up his duties at the Fed, referred to the doctrine at the ECB European Central Bank conference in Germany in 2006. [4]. In doing so, he described the risks that the Fed would assess in determining an appropriate level of interest rates. He, as someone who had carefully studied the history of the Great Depression of the 1930s, had a quite instructive negative example. In his speech B. Bernanke mentioned it with reference to an article [5]. In 2019, the authors of that article, Thomas Humphrey[7] and Richard Timberlake,[8] elaborated in their book on the accusations of stimulating the 2008 crisis to a specific person [6].

The book identifies Adolf Miller,[9] a member of the Board of Governors of the Fed at the time, as the main culprit of the Great Depression. His adherence to the real-bill doctrine (or promissory

[4] John Law (1671–1729) — Scottish economist, in 1705 published a treatise "Considerations on cash and trade". In 1716 he founded a private general bank (Banque Generale) in Paris, which began issuing paper money (banknotes). They could be converted into silver coins at any time by presenting them to the bank. In 1718. The General Bank was nationalised and became the Royal Bank. John Law's reputation was damaged by his subsequent venture with the so-called Mississippi Company, which represented one of the first financial bubbles in history.

[5] Winner of the 2011 Nobel Prize in Economics.

[6] Let me remind you of the difference: The Fed is made up of 12 reserve banks (private), while the Treasury is the main government body regulating money circulation.

[7] Thomas McGillivray Humphrey — is a senior economist at the Federal Reserve Bank (Richmond) and editor of the bank's magazine The Economic Quarterly.

[8] Richard Henry Timberlake (1922–2020) — was a professor at the University of Georgia. Famous for his review of US Supreme Court monetary decisions.

[9] Adolf Caspar Miller (1866–1953) — Professor at the University of California, Berkeley, one of the first Fed governors (1914–1936).

notes) led him to write a letter and send it to all the Fed member banks. It suggested that loans should only be made against real projects. Each bank was required to prove that it had never made or intended to make "speculative" loans, in particular to play the stock market, if it wanted financial support from the FRS. It was also recommended to report evidence of "direct pressure" on the bank by borrowers, as well as forced "direct pressure" by the bank on potential borrowers. All agreements between the bank and the borrower should be reached by mutual agreement. Such a wish would be understandable if it were not coming from a member of the Board of Governors of the Federal Reserve System.

The heads of most of the banks that received the "direct pressure" letter decided not to report to A. Miller (thinking that what if the investigation unearths or reveals something?) and refused to apply for financial support from the Fed, having decided that they too would not engage in lending, including to private banks — not members of the Fed. As a result, without the support of the Fed and its members, the monetary and credit supply shrank by a third in a short period of time, leading to the bankruptcy of 9,000 banks. The Great Depression was inevitable.

From this both the authors of the book and Ben Bernanke followed them in concluding that the doctrine of real bills of exchange is "metastable". It can lead the economy to either massive non-repayment of credit or massive non-issuance of credit. The most important achievement of Ben Bernanke, in my opinion, is that he did not commit a rash act like Alfred Miller did, but the fact that he was managing the Fed during the events of 2008 very carefully, knowing full well that the 'chasm' was both to the right and to the left.

But it is not just Alfred Miller,— long before him, the British financier Henry Thornton[10] had criticised the doctrine of real bills, noting that actions under it link the money supply not to real output but to the ratio of price to that output. The result of it is a positive feedback loop: when interest is set below the rate of return, it accelerates inflation.

MORTGAGE, MORTGAGE CERTIFICATE (ENCUMBRANCE), MORTGAGE BOND

The next step in explaining the achievements of the laureates requires defining several concepts related to mortgage lending. If you buy something with a mortgage (a flat or a house), the bank will require you to pledge the object of the mortgage in addition to the mortgage payments in order to prevent possible default on the loan. The document (paper or electronic) that certifies the bank's right to take possession of the flat or house in a critical case is called a "zakladnaya" (encumbrance) in Russian. The term derives from the obsolete word "zaklad" (pledge or bet) referring to the phrase "bitsa ob zaklad" (to bet anything), i.e., to dispute a pre-agreed amount or an object.[11] If we stick to the Russian tradition, we are dealing with a bet. The borrower says: "I'll build it", and the bank offers to bet: "I bet you won't build it". The encumbrance shows that this bet has been made. It is convenient in many ways, above all when the betting rights are assigned. Once the mortgage is registered, the bank becomes the legal owner of the encumbrance and the rights recorded therein.

The next two steps turn mortgage certificates (encumbrances) into securities (mortgage bonds). The first step is to allow multiple mortgage certificates to be bundled together into one package, which is known as a "pool". The second step is to depersonalise the rights of the holder of a mortgage certificates' pool — the rights are no longer linked to a specific flat or house, but to all of the obligations of mortgage borrowers. Mortgage bonds become part of the bank's assets, allowing the bank to increase its lending.

[10] Henry Thornton (1760–1815) — British economist, member of the British Parliament, evangelist, actively fought against slavery in Africa.

[11] The word "bitsa" (fight) in this passage means that the dispute was originally resolved by fist fighting.

THE PSYCHOLOGY OF THE FINANCIAL CRISIS

Nobel Prize laureates of 2022 attached extreme importance to the psychology of financial market participants.

Two articles by Nobel laureates B. Holmstrom and J. Tyrol, published in the late 1990s, played a major role here. [7]. They discussed the possible effects of high mutual indebtedness given the different projections and the problems of psychological perception of events during the financial crises. The theme raised by them was continued in the works of the laureates of the 2022 Prize. Especially it concerns the mechanism of formation of anxiety, which is translated into panic on the financial markets.

The English expression *bank runs* is difficult to translate into Russian. It refers to a mass withdrawal by depositors of their money from banks (the Russian literal translation as "bank raid" is highly inaccurate). It is a situation where customers find out that the bank is insolvent, and the bank has to stop lending to many projects in order to meet its obligations to them and begins to sell its assets urgently.

On the other hand, government agencies can do something to reduce panic moods. Government deposit insurance, according to the laureates, can reinforce the belief that deposits are sure to be returned. But insurance is not the only way to achieve this. D. Diamond and Ph. Dybvig proposed what was later practically realised by B. Bernanke: The Fed could buy assets of banks, and it would increase the confidence of banks themselves, not just the depositors. But this model had the same result as in case with the state insurance.

Thanks to the Diamond-Dybvig (DD) model, global economic science has gained several concepts that have facilitated the study of an uncertain future. Chief among them is — "aggregate uncertainty". It is composed of several components. Suppose there are three market participants: a depositor, a bank, and a borrower, and each has a different uncertainty about the future. When one of them makes a decision, he overcomes his own uncertainty. But for the other two, to their own uncertainty of the future the uncertainty of which decision that market participant has settled on — is added. Aggregate market uncertainty with aggregate personal uncertainty.

This category then spread from the DD model to a large area of economic research in which justifications for tax cuts or financial support are provided.

"HELICOPTER BEN" AS THE LEGEND AND OTHER SUBTLETIES OF THE FED'S FIGHT AGAINST THE CRISIS

Let us now address a term that is attracted to the theme of the 2022 prize completely undeservingly — "helicopter money". It is commonly referred to as the money that is poured into a country's economy for the sake of increasing the money supply. This money is handed out not for the results of one's performance, but as part of the state's concern for its citizens: benefits for the disabled, large families, labour veterans, scholarships for university students and high school students, financial aid for victims of natural disasters, the homeless, etc.

Ben Bernanke was doing a very different thing: the Nobel Committee noted in its rationale that "the bank does not create money out of thin air, but from the long-term investment projects that it lends out to finance". In a special explanation, the Swedish Academy of Sciences noted that he analysed the Great Depression of the 1930s and proved that the crisis became so deep and prolonged precisely because of the collapse of the banks.

Ben Bernanke increased the transparency of the Fed's decisions by holding quarterly press conferences to explain the decisions of the Federal Open Market Committee (part of the Fed) and to actively prepare public opinion for future monetary policy measures. He assumed that any crisis is always in some way associated with a loss of faith in a prosperous future.

For the same reason, Ben Bernanke believed that people should never be warned about a crisis. Such warnings can themselves be a factor in the crisis, an activator of future panic. But another Nobel laureate, Paul Krugman, often published such warnings in the open press. Those were totally different styles of behaviour!

What was their common position? It was that mismanagement of banks does not in itself cause undesirable crisis manifestations. Therefore, nobody cares whether there is a warning or not. No matter how hard the management of a particular bank tries to change the situation, it cannot stop or reverse the processes associated with social (mass) psychology [8]. The same observation can be applied to the Fed: the banks belonging to it are not able to reduce the anxiety of the masses if the anxiety has already developed.

The Nobel Committee made special mention of Bernanke's work "The non-monetary effects of the financial crisis that grew into the Great Depression", written 40 years ago [9]. Before that it was thought that it could have been prevented by printing (issuing) more money. Bernanke, however, showed that the severity of the Great Depression was due to the banks' reduced ability to lend to the economy, and that this negative effect could not be offset by money emission. In 2010 he explained to the US Congress that the Fed as "lender of last resort" was providing the banking system with short-term liquidity. Under his supervision the Fed launched a programme of securities purchases from banks which allowed them to continue lending at low (acceptable) rates.

The article, which B. Bernanke published after he left the Fed, contains a fundamental analysis of the role of the central bank, the function of which in the U.S. is performed by the Fed. And here we encounter a tradition that allows us to write the name of Ben Bernanke not only in the history of crises, but also in the history of economic thought.

THE FED IN THE GENERAL RANKS

When the Nobel Committee included Ben Bernanke in the group of 2022 laureates, an exaggeration of the Fed's role in overcoming the 2008 crisis and mitigating its effects was imminent. However, the Fed was only part of the many structures involved in designing and implementing the crisis response.

A much more important role was played by the US Treasury. However, this is only a suspicion. The fact is that the Fed conducted some of its operations in secret, never disclosing the list of those who receive financial assistance. In April 2009, B. Bernanke made a speech saying that disclosure of the names of borrowers "may lead participants to believe that the market has weakened". Bloomberg News Agency sued the Fed for two years, demanding the disclosure of the names, but the US Supreme Court rejected the claim. Nevertheless, Congress voted for a partial audit of the Fed's actions from late 2007 to mid-2010, which showed that the Fed had increased lending to US and foreign banks by $ 16 trillion.

Until now nobody knows the full extent of the actions taken by the Fed from 2007 to 2010. Particularly, it is not known what role the Fed played in the artificial devaluation of the USD as part of the fight against the US crisis. This measure has been condemned worldwide (especially by China, the main US debt holder) because it has reduced US foreign debt. The Fed was undoubtedly involved, but it is unlikely to have been able to implement it in isolation from the executive and legislative branches. Russian commentators have interpreted this action as a personal decision by Ben Bernanke [10]. It is now very interesting to re-read this.

The support of the top 10 banks through the Fed was just one of many measures to address the crisis. The US Treasury implemented the bank salvation programme — Troubled Asset Relief Program (TARP), which bought back toxic assets from 700 banks and other credit institutions. The TARP programme was overseen

by the US Treasury Department's Financial Stability Oversight Council (FSOC), which included Ben Bernanke as one of its heads [11].

The programme, originally set to run until 2014, had a budget of $ 700bn, but this was later reduced to $ 475bn. Part of this money was then returned to the state in the form of dividends on the shares of the rescued banks.

Under the Emergency Economic Stabilisation Act (EESA) of 2008, the Treasury bought doubtful assets for shares, either for the right to repurchase them at a fixed price (equity warrants) or (for non-public companies) for the right to repay senior debt securities. Only preference shares, i.e. non-voting shares, were purchased in order to prevent companies from being taken over by the state. In addition, restrictions were imposed on participation in TARP in order to prevent bank executives from enriching themselves unduly at the expense of state support. One of the objectives of TARP was to encourage banks to channel funds into circulation — to lend to consumers and businesses — rather than to accumulate them as insurance against future losses. Loan defaults were to lead to re-lending, replacing existing loans with others on new terms.

Thus, along with the actions of the Fed led by B. Bernanke, the anti-crisis measures of 2008 were carried out within the framework of the TARP program and relatively independent actions of the U.S. Treasury.

To appreciate the role of the Fed and personally Ben Bernanke in the dramatic fight against the crisis in 2008 "live" you can see a feature film "Too big to fail", released in 2011. The plot is as close to the actual events as possible. The Russian version was released 6 years later and is called "Too cool to not succeed" (literal Russian translation). In the foreground of the film is the US Treasury Secretary Henry Paulson and Treasury Chief Timothy Geithner. Ben Bernanke is portrayed in the film in a third role as a "grey cardinal" theorist. This may well have been the case in real life.

CRISES AND CYCLES. "THE CHICAGO SCHOOL'S 'U-TURN'.

Ben Bernanke made a fundamentally important contribution to the study of banking history. He focused all of his attention on the formation of central banking [12]. The idea that cycles should be taken into account in the activities of the Fed was also presented in a book by Milton Friedman and Anne Schwartz [13], although in a slightly different context, which seems more important than any results that can be awarded by a single Nobel Prize.

Many Nobel prize-winning economists have discussed the problems of state intervention in the economy. How permissible is it and is it permissible at all?

For the first time in the writings of Nobel laureates this problem has been completely put aside and not discussed at all. Moreover, the studies of the 2022 laureates showed that the economy could not survive without state intervention. They themselves worked at the 'cutting edge' or even forefront of such intervention.

In Russian economic science, as a Soviet legacy, the notion of the laws of social development and the patterns of economic development persists. The 2022 Prize shows that the extremes are converging. The laureates have proved with their research that state intervention which does not take into account the regularities of development, and in particular the cycles in the economy, leads only to a worsening of the situation. They have also confirmed another thesis: if state intervention takes into account the regularities of economic development, then it proves to be useful [14].

It is considered good form and style (and not only in Russia) to criticise the Chicago School. But, to be fair, it should be noted that it was in the framework of the Chicago School that in the 1960s a new approach to the study of industrial organisation was proposed. The Chicago school researchers made an analysis of how the presence of big companies in the market restricts

competition and how they use their profits. It was shown that in many particular cases it was used to promote competition and support small firms. The Chicago School's study of industrial organisation was a transition from direct cost-benefit matching to a modern approach.

The 2022 prize showed something different, namely that the Chicago School is not liberal at all and that its representatives are not market-oriented at all.

Ben Bernanke's work, written 10 years before the crisis, very clearly linked the theory of economic cycles, the permissibility and necessity of government intervention with this theory [15].

After re-reading M. Friedman and A. Schwartz's "Monetary History of the United States",— a kind of bible of the Chicago School, the author believes that this school provides no defence of the free market and restrictions on government intervention in the economy. It is also incongruous to associate this school with both the liberal reforms introduced in Chile, the United States (Reagan), Britain (Margaret Thatcher) and the reforms in the former Soviet Union and Eastern Europe. The school was probably only flawed in the negative income tax and other elements of social welfare [16]. But now, because of attracting public attention of the Nobel Committee to theoretical works and practical actions of followers of Milton Friedman, another thing became obvious: while reading the appropriate works it seems that Friedman and the laureates of 2022 following him seem to be persuading state officials: "Ok, once we cannot do without you, then at least do it wisely".

"The 'U-turn' of the Chicago School is not a change in the positions of its proponents, but a new understanding of its place in the history of economic thought. The process is not yet complete and will continue, especially since the intervention was not direct, but through the Fed. But this indirect action was closely linked to other measures taken by the legislative and executive branches of the government.

MODEL DD (DIAMOND-DYBVIG)

In 1983 there appeared an article by the two laureates describing a model for the formation of liquidity generated by banks [17].

The model was constructed under three assumptions that substantially limit its direct practical application:

1. Long-term investments generate more income than short-term investments.

2. The need for money among depositors is random and individual, and each one is different.

3. information on the money needs of the individual depositor is known only to him and is not publicly available.

The model is based on the division of investors (in this case, depositors) into two categories: the so-called "runners" and the "riders" ("impatient" and "patient"). The former often withdraw money from the account and rush to buy something, while the latter quietly count the interest accrued and hope to increase the deposit or, having saved the necessary amount, make a large purchase. The authors of the DD model assume that the main role of banks is to increase liquidity in the economy. On the one hand, if one does not have the money to buy something, one can take out a loan. On the other hand, bank deposits are more liquid than investments in securities, real estate, or intellectual property.

Both buyers and investors are interested in having money at their fingertips because of the usual market uncertainty: what if an opportunity arises to buy or sell something? And those who are saving for an expensive purchase are less likely to withdraw their money in the near future than those who need it for current needs.

In addition, owners of property in the form of securities always feel the probable risk of a significant reduction in the value of what they hold. The ratios of the numbers of these categories of depositors determine the current liquidity of the bank. In order to relate the model to reality, it is necessary to know the quantitative composition of the

different categories of depositors and the amount of their deposits at the bank. Initially this problem was solved very simply — if there is a demand deposit, its holder belongs to the category of "impatient" or "runners" — but then it became a problem of mathematical statistics: for the sake of approximation of the model to reality it was necessary to develop the methods of estimating the share of each category of depositors on the actual basis, i.e. on accumulated statistics. Specialists are still grappling with this problem [18].

The DD model is agent-oriented, as it maps the behaviour of the bank's clients from different categories. The time in the model is discrete — it is divided into three periods "0", "1" and "2".

During the "0" period, agents make deposits. For simplicity, the deposit equals 1. That is, everyone's income is equal to –1. During this period, all agents are of the same type. In period "1" agents either receive nothing (type A) or take back their contribution (type B), i.e., they choose between "0" and "1". In period "2" agents either receive income (interest) of R amount (type AC) or leave the deposit as it is, i.e., receive 0 (type AD).

There should be many agents, ideally a continuum. Then, the share of types at period repetition becomes divisible, and Nash equilibrium conditions are calculated in the model, depending on the distribution of agents by type [19].

"Bank" in the DD model differs markedly from a real bank not only in that it is more like a mutual (investment, share or unit investment) fund, but also in the instant fulfilment of its obligations. In the model, demand deposits are arranged in a special way [20]. Under the terms of the model, depositors in this category are treated as residual claimants, i.e., the money is given to them last, even if there is no panic. In addition, the model bank does not invest in securities. Instead, each deposit is a hybrid of money and securities. The bank's refusal to act independently in the stock market — is a significant simplification of reality by tying these transactions directly to depositors.

The authors of the DD model argue that this move is legitimate because there are many so-called "capitalists" among the depositors, who manage their own contributions. Separating them from "passive" depositors would complicate the model dramatically.

A separate part of the model is deposit insurance, and state insurance is excluded because this exogenous parameter cannot be predicted. This also distances the DD model from reality. For the state deposit insurance to work in the model, we need to know what the state intervention in period "1" is, which would increase the share of "patient" depositors.

There are two ways. The first — is to ignore state insurance. The second is to introduce compulsory insurance as a certain tax on deposits. This is what has been implemented in subsequent versions of the DD model. Such a "tax" leads to a redistribution of income between the "patient" and the "impatient" in the period "1".

The authors of the DD model themselves pointed out that insurance might be no better than no insurance at all. This conclusion could be explained by the fact that the model included the assumption of insurance as the only way for investors to escape risk. They pointed out that this assumption ignores the well-known problem of moral hazard (participant bad faith and dishonesty) that confronts any attempt to make the financial system safer.

In addition to introducing uncertainty, such behaviour drastically reduces the effectiveness of deposit insurance. Each country has its own idea of what counts as depositor misconduct. In Russia, for example, in 2015–2016, the Supreme Court of the Russian Federation defined it as "regularly occurring large transactions with an ambiguous or unobvious economic sense" [21].

Attempts to incorporate depositor probable bad faith or dishonest behaviour into the DD model have been made by many researchers

[22], but so far these attempts are limited to recommendations. And without this it only sketches the direction of modelling but is not quite suitable for predicting massive deposit withdrawals.

In a broader context, the DD model is actually "dedicated" not only to bank deposits, but also to the role of investments in an environment where liquidity enhancement technology is used. It shows that insurance does little to increase liquidity and that the investment portfolio of a credit institution can be considered identical to the savings of someone in an autarkic environment i.e., economic self-sufficiency

The DD model does not analyse the impact of panic and bank runs on banks' behaviour. However, it does not assume that by investing money in a bank one does not expect a panic and a mass withdrawal of deposits to occur in which one would have to participate.

It follows from the model that if the probability of a mass withdrawal becomes high, the optimal contracts can prevent it. In turn, the banks react to the same situation by changing the composition of their investments [23]. It is true, though, that some conventionality of such conclusions has been noted earlier due to the assumptions of the model.

CONCLUSIONS

The eminent psychologist Kurt Lewin once said: "Nothing is more practical than good theory". This phrase undoubtedly applies to the work of the awardees of the 2022 Nobel Prize in Economics.

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