

# The Reasons Behind Banking Crises and their Real Economy Impact – Achievements of the 2022 Nobel Laureates in Economics\*

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*In 2022, the Nobel Prize in economics was awarded jointly to Ben S. Bernanke, Douglas W. Diamond and Philip H. Dybvig, for their research on the financial system that shed light on the reasons for, and the consequences of, bank panics. Diamond and Dybvig showed that the banking system provides socially useful services through maturity transformation and delegated monitoring, and they also pointed out that maturity transformation made the banking system fundamentally vulnerable, which, if left unregulated, may experience bank panics. Bernanke demonstrated the macroeconomic significance of the banking system and analysed the negative macroeconomic impact of bank panics. Their research helped lay the foundations of a regulatory environment that fosters the efficient functioning of the financial system without bank panics.*

**Journal of Economic Literature (JEL) codes:** G01, G21, E44

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## 1. Introduction

The 2022 Prize in Economic Sciences in Memory of Alfred Nobel was awarded jointly to Ben S. Bernanke, Douglas W. Diamond and Philip H. Dybvig. It was awarded in recognition of their research on the financial system and the reasons behind financial crises and their macroeconomic consequences.

Bernanke earned his PhD at the *Massachusetts Institute of Technology* in 1979. He later became a professor at *Princeton University* before working as the governor of the *Federal Reserve* between 2006 and 2014. He is currently a distinguished senior fellow at the *Brookings Institution*. Diamond received his PhD at *Yale University* in 1980. He is now a professor at the *Booth School of Business* at the *University of*

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\* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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Chicago. Dybvig also obtained his PhD at Yale, in 1979 and is now a professor at the Olin School of Business at Washington University in Saint Louis.

Typical scientometric data of the Nobel laureates can be found in Table 1. As nowadays some people produce studies in rapid succession, by the hundreds, one may find the number of publications low, but the *h*-index, a measure of citations and scientific impact,<sup>1</sup> convincingly demonstrates that they are indeed influential researchers. According to the *ideas.repec.org* database, Bernanke is ranked 30th among economic researchers based on citations, and 92nd based on the *h*-index. Diamond is in the top 3 thousandths based on citations and the top 1.5 per cent based on the *h*-index. Dybvig is in the top 1 per cent based on citations and the top 3 per cent based on the *h*-index.

<b>Table 1</b>			
<b>Scientometric data of the 2022 Nobel laureates in economics</b>			
	<b>Ben S. Bernanke</b>	<b>Douglas W. Diamond</b>	<b>Philip H. Dybvig</b>
Publications	87	33	44
References	24,762	9,907	4,636
<i>h</i> -index	49	26	20

*Note: The number of publications reflects the number of journal publications and independent book chapters combined.*  
*Source: ideas.repec.org*

The popular science and scientific background documents published for the 2022 prize (*Royal Swedish Academy of Sciences 2022a; 2022b*) point out three groundbreaking pieces by the laureates: *Bernanke (1983)*, *Diamond and Dybvig (1983)* and *Diamond (1984)*. This paper describes these three studies and gives a brief overview of the further research inspired by them, along with the related economic policy implications.

## 2. Liquidity, maturity transformation and bank panics

### 2.1. The Diamond–Dybvig model

*Diamond and Dybvig (1983)* offer a theoretical analysis of the reasons behind, and the welfare impact of, banking crises. Their paper starts off by establishing the notion of liquidity. Liquidity is usually regarded as a financial concept, but since every financial instrument is ultimately based on claims on real income, it is important to clarify how liquidity relates to the real economy.

<sup>1</sup> For more on the *h*-index, or the Hirsch index, see *Hirsch (2005)*.

It is common knowledge that people with savings lock in a significant portion of their investments for the short term, even though long-term assets yield greater returns. This is because it is impossible to accurately predict the schedule of spending by households and firms, as there can always be unforeseen and urgent expenses (illness, accident, natural disaster, or on the contrary, a once-in-a-lifetime business opportunity, when time is of the essence), and that is why short-term, liquid assets are held that can be used to access the necessary amount of real income at any time.

On the other hand, there is a technological limit, insofar as efficient production requires investment projects that take a lot of time, for example the construction of a railway line or a semiconductor fabrication plant. Once such a project gets under way, it is only able to produce goods and real income after a long time. If investors need income urgently and at all costs before the completion of the project, most projects can be liquidated, but only at an enormous loss. This is, once again, due to technology: some of the parts and machinery in a half-complete plant can be used elsewhere, but much goes to waste.

The above feature of the real economy leads to a trade-off: efficient production and the associated high returns require investors to forego some of the income for a long time. Households, however, may very well need the income they have foregone. As the liquidation of long-term projects involves huge losses, it is better to secure the income needed to meet contingencies using assets that are ultimately backed by investments that can be realised quickly. However, such projects typically produce much lower income and thus lower returns. If too much is invested in short-term projects, little income is realised. If too much is invested in long-term projects, with some luck they can do well in the long run, but without luck investors could be in serious trouble, as they are unable to access the income necessary to address the problem.

If every individual seeks to solve the above issue in isolation from everyone else, it can have very negative consequences for society as a whole. Compared to autarky, social welfare is improved if there is a financial market where investments can be bought and sold. If, for example, some people invest all their savings in a single long-term project and they are not lucky, they do not need to liquidate the project, as they can sell it to someone who was lucky and does not need the income in the short run. Conversely, if some people are overly pessimistic and only invest their income in short-term projects, but it turns out that they can wait, they can sell their short-term investments and buy long-term ones. Diamond and Dybvig show that from the perspective of society the existence of financial institutions that collect and invest individuals' savings provides even better solutions than financial markets.

These institutions are referred to as banks from here on. Banks invest some of the income collected from individuals in long-term projects and some of it in short-term ones. But they allow individuals to access their “deposits” at the bank even before the long-term investments produce income. If banks know the expected share of the deposits that are withdrawn in the short run, it can be shown that a socially optimal equilibrium can be reached.

In this socially optimal equilibrium, banks make short-term investments with the exact share of deposits that they expect to be withdrawn, and only depositors that urgently need their deposits withdraw them, while the others wait until the long-term investments start producing income, and this extra income is distributed among them by the banks.

In the above equilibrium, banks perform maturity transformation: their liabilities are liquid (they can be withdrawn at any time), while many of their assets are invested for the long run. Banks clearly improve social welfare through this maturity transformation. In an autarky, individuals can only be guaranteed access to their income in the short run if everyone has short-term investments. However, this considerably reduces aggregate real income in the economy, as long-term investments provide a larger volume of production. Only the banking system can deliver a socially optimal investment portfolio while guaranteeing that investors can access their income if necessary.

This is basically the first important result of Diamond and Dybvig: they show the necessity of the banking system’s maturity transformation, and that it is a socially useful service that other institutions are unable to provide.

Although the results described above are not without merit, the authors’ paper is famous for their analysis of bank panics. They point out that the above socially optimal equilibrium is unfortunately not the only equilibrium. It is well established that, from a game theory perspective, an equilibrium must satisfy two conditions: (i) individuals behave optimally, taking their expectations as a given; and (ii) the expectations are identical to the actual outcome of the situation. In a socially optimal equilibrium, every individual expects that others only withdraw their deposits if necessary. Based on these predictions, the optimal behaviour for everyone is to leave their deposits in the bank until the maturity of long-term projects, if they do not face any trouble. Diamond and Dybvig show that the situation changes dramatically if individuals expect that everyone else will withdraw their deposits early.

If depositors expect that everyone else will withdraw their deposits in the short run, it would not be rational for them to leave their savings in the bank for long. This is because if everyone else withdraws their deposits, the bank would need to

give back much more deposits than the number of short-term projects it holds in its portfolio. In other words, the bank simply does not have enough income from short-term projects to satisfy depositors' demands. To do so, it needs to liquidate its long-term investments, but, as mentioned above, this results in heavy losses and does not generate enough income to satisfy all depositors, some of whom get their deposit, while others don't. Under such circumstances, if depositors keep their money in the bank for long, they will definitely not get it back.

In other words, the second important finding by Diamond and Dybvig is that there is a potential equilibrium where everyone expects all the other agents to withdraw their deposits early, in which case it becomes rational for individuals to withdraw their own deposit, making such expectations self-fulfilling. This equilibrium is referred to as a bank panic.<sup>2</sup>

It should be noted that the Diamond–Dybvig model has no fundamental uncertainty, meaning that the projects financed by the banks are risk-free. In other words, the panic is not caused by bad investments by the banks, but instead by the coordination of depositors for the wrong equilibrium.<sup>3</sup>

A bank panic is obviously suboptimal, as the liquidation of long-term investments reduces aggregate consumption well below the level of the socially optimal equilibrium. It is even lower than if the banking system invests all its liabilities in short-term projects. In other words, a bank panic causes severe macroeconomic damage, and it is not only the “internal affair” of bankers. It must be underlined that the possibility of a bank panic is due to the fact that banks perform maturity transformation: if banks' assets were liquid as well, if they only invested in short-term projects, it would not make sense to make a run on banks. But without maturity transformation the banking system would have no reason to exist, as it could only offer as much as autarky. The vulnerability of the banking system is due to the very fact that justifies its existence.

Of course, when an economic analysis points out that a market outcome is suboptimal, the question always arises as to whether there is some kind of policy intervention that would approximate a socially optimal outcome. Diamond and Dybvig also take a look at this, and their third most important finding is that the introduction of deposit insurance helps avoid the suboptimal equilibrium, i.e. the

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<sup>2</sup> Diamond and Dybvig use the term bank run. A bank panic occurs when the run spreads to other banks as well and the phenomenon becomes a systemic macroeconomic problem. Since the Diamond–Dybvig model uses one representative bank, there is no difference between a bank run and a bank panic. For the sake of simplicity, the term “bank panic” is used throughout the paper here.

<sup>3</sup> From a game theory perspective, the depositors in the Diamond–Dybvig model are playing a simultaneous game, taking decisions at the same time, without observing the actions taken by others. This was not true in the case of classic bank panics, as depositors literally made a run on banks and they could quite clearly observe each other's actions. However, modern bank panics often play out over the computer, and the decisions are taken simultaneously. Later research extended the Diamond–Dybvig model to sequential decisions.

bank panic. With deposit insurance, depositors always get their deposit back, so the expectation that everyone else will withdraw their deposit does not become self-fulfilling, because in such a scenario individuals do not have an incentive to withdraw their own deposit.<sup>4</sup> This eliminates bank panics as an equilibrium.

Those who have managed to follow this quite abstract discussion might ask why these results are important at all? Bank panics are well known from economic history, for example in the 19th century bank panics occurred in the USA almost every decade, and it is also well known that they were stopped by the introduction of deposit insurance in the 1933 Glass–Steagall Act. What does the analysis by Diamond and Dybvig add to this then?

It can be argued that these results are important because they clearly show that banks' basic features include their vulnerability, as bank panics occur due to one of their main functions, maturity transformation. Diamond and Dybvig demonstrated that bank panics are not necessarily caused by inexplicable and irrational behaviour, they are not necessarily related to the quality of banks' management, as they can happen with completely calm and rational depositors and entirely prudent financial management.

However, this has crucial implications from a regulatory perspective: if the banking system is not regulated from a liquidity perspective, bank panics will always be a possibility. It is well known that, for example, an industry needs to be regulated if it is a natural monopoly. By contrast, if a monopoly can be broken up, and competition can be enforced in the given industry, no regulation is necessary. Diamond and Dybvig proved that this does not hold true for the banking system. No matter how efficient banks are, and whether there is competition in the banking sector or not, bank panics can occur. It has also been shown that the welfare costs of bank panics are high (this is covered in more detail during the discussion of Bernanke's work), so from a social perspective it is definitely important to eliminate the possibility of bank runs, and this is only attainable if the banking system is regulated, for example through deposit insurance,<sup>5</sup> as this is a special industry where the *laissez-faire* approach does not work.

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<sup>4</sup> Of course, in practice, deposit insurance does have an upper limit, as depositors only get back their deposits up to a certain amount. However, in most cases this is above the size of the deposits, making it suitable for preventing bank runs.

<sup>5</sup> Another possible regulatory step for preventing bank panics is the temporarily suspension of convertibility. If the bank can credibly make depositors believe that it will suspend payments in the event of mass withdrawals, then enough deposits will remain in the bank that the profitable long-term investments do not need to be liquidated and those who do not take out their deposit (because they cannot do so due to the suspension) will be guaranteed a high payment, a higher one than if they withdraw their deposit quickly. If the depositors understand this, those who are not subject to a liquidity shock will keep their money in the bank, thereby preventing a bank panic. This as a self-regulatory instrument was often used by banks in the 19th century, see the historical overview by *Gorton (2012)*. The wave of bank panics that began in 1929 came to a halt when President Roosevelt ordered a one-week bank holiday on 5 March 1933.

Another important finding of the paper by Diamond and Dybvig is derived from the fact that their discussion was highly abstract. The results apply to all institutions that collect and invest funds and perform maturity transformation, regardless of whether in reality such institutions are officially referred to as banks or not. This is all the more important as there is a so-called “shadow banking system” in the modern financial system, and many institutions satisfy the above criteria, even though they are not officially banks. Diamond and Dybvig showed that if an institution engaged in financial intermediation and performed maturity transformation, it is vulnerable, and it needs to be regulated, irrespective of whether it is considered a bank or not in a legal sense.

## 2.2. Related research

The key takeaway from the above is that maturity transformation in itself can lead to bank runs, regardless of the prudent financial management of a given bank. Of course, this does not contradict the fact that if banks incur losses, whether because of flawed financial management or sheer bad luck, they are more likely to experience a bank panic. This claim is not simply an intuitive conjecture, but a fact confirmed by empirical research. For example, *Gorton (1988)* demonstrated that in the USA almost every recession was followed by a bank run in the second half of the 19th century and the early 20th century, because the recession increased the share of non-performing firms and thus also bank losses. This conclusion was confirmed by *Calomiris and Gorton (1991)* in their comprehensive empirical research. *Davison and Ramirez (2014)* looked at US banks in the 1920s and found that weaker economic fundamentals increased the likelihood of bank runs. They also concluded that in 40 per cent of the cases the panic was not fundamental, but rather a result of the poor coordination of expectations. *De Graeve and Karas (2014)* used Russian data from between 2002 and 2007 to analyse the extent to which fundamentals and expectations contributed to mass deposit withdrawals. They list arguments for both explanations, but their results attest that self-fulfilling panic has a greater effect than the decisions explained by the fundamentals.

Due to the above empirical results, the theoretical research on bank panics shifted from the original approach by Diamond and Dybvig, focusing mainly on the relationship between bank panics and the fundamentals of banks. It can be argued that this avenue of research complemented rather than discredited Diamond and Dybvig’s original results, namely that in the context of maturity transformation a bank run may occur if depositors’ expectations change for the worse. However, they originally did not inspect the motives behind the expectations. Later research, for example *Allen and Gale (1998)*, *Chari and Jagannathan (1988)*, or *Goldstein*

and *Pauzner (2005)*, showed how the change in expectations was related to banks' assumed or actual financial position.<sup>6</sup>

Readers may nevertheless wonder whether the topicality of examining bank panics might perhaps have diminished, because for example the 2007–2008 financial crisis played out in an entirely different institutional setting than classic banking crises, as it happened in the shadow banking system based on securitisation.<sup>7</sup> But as shown by *Gorton (2010a; 2010b; 2012)*, although many technological and institutional factors changed between the early 20th century and 2007, the factors relevant from the perspective of financial crises have remained unchanged.<sup>8</sup>

Although the panic of 2007–2008 was mainly outside the retail deposit market and occurred on the money markets, the repo market and the markets for other short-term instruments, the key to understanding the events back then is the concept of maturity transformation. Similar to a classic bank panic, the panic was started by negative economic news, in particular the bursting of the mortgage market bubble. But the panic itself was due to the fact that the institutions in the shadow banking system financed their long-term instruments, such as mortgages, through short-term loans. In other words, the shadow banking system performed a significant maturity transformation, but in contrast to the traditional banking system protected by deposit insurance, it was basically unregulated.

As noted above, one of the virtues of the analysis by Diamond and Dybvig is that general conclusions can be drawn from it due to its abstract nature. The main message that maturity transformation is socially useful but, without an appropriate regulatory environment, it inherently entails the potential for a financial panic, applies just as much to 2007–2008 as to the 19th century. The problem was that the regulatory lessons from the Diamond–Dybvig model were not applied to the shadow banking system.

Of course, the research inspired by Diamond and Dybvig also has a strand that analyses bank panics in the actual modern institutional environment, such as *Rochet and Vives (2004)* or *Brunnermeier (2009)*. The latter's model examines the financial panic in the shadow banking system in 2007–2008: when financial markets refused to renew the short-term loans of some (shadow) banks that nevertheless had to obtain money, they had to sell their assets at fire sale prices. Other banks also ran into trouble as a result of falling asset prices, resulting in more fire sales. This created a self-reinforcing loop, which ultimately led to a systemic crisis.

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<sup>6</sup> For a detailed overview on this topic, see *Freixas and Rochet (1997)*, *Rochet (2008)*, as well as *Allen and Gale (2010)*.

<sup>7</sup> Although Northern Rock exhibited elements of a classic banking crisis, too. See *Shin (2009)*.

<sup>8</sup> For a review of *Gorton (2012)*, see *Világi (2016)*.

Another interesting field of research is analysing depositor behaviour using laboratory experiments. For more on this, see *Kiss et al. (2015)* and *Kiss (2018)*.

### 3. Delegated monitoring

The aim of the Diamond–Dybvig model discussed above is to examine the role of liquidity from the perspective of the banking system, and so the authors completely disregarded the issue of solvency, and the returns of the potential investments in their model are risk-free. Nevertheless, the banking system has a well-known role in managing risks. *Diamond (1984)* inspects this aspect of the operation of banking systems.

The starting point of the analysis is the issue of how the form of financial contracts depends on the information of the parties. If investors seek to finance a project with an uncertain outcome, a share-type contract could be optimal when the project manager and the investor have symmetric information. In such cases, investors take a share of the project's profits, depending on the outcome. In the case of large information asymmetry, however, for example when the investor cannot observe the income flows of the project and only obtains information through the reports of the manager, a share-type contract is unfavourable for the investor, as the manager has an incentive to report low profits. Therefore, a debt contract should be signed.

The essence of debt contracts is that the manager always pays a predetermined and fixed amount to the investor. Should it fail to do so, it goes bankrupt. The investor is then entitled to liquidate the project and compensate itself from the income received. Debt contracts are incentive compatible, i.e. the manager has an incentive to report the truth, but their disadvantage is that liquidation during bankruptcy proceedings is costly, and both parties would be better off if it could be avoided.

In theory, a debt contract is not necessary if the investor can monitor the manager by allocating some resources for this. In practice, however, close monitoring is often quite costly. This is especially problematic if the investors are much smaller than the project. One only needs to think of households as investors and a large corporation as the project. The cost of monitoring would be so high that households could not afford it.

Diamond realised that this problem can be resolved if the monitoring is performed by a financial intermediary. The financial intermediary, say a bank, collects small investors' savings to finance and at the same time monitor the project. This allows the cost of monitoring to be distributed, and households can afford that. This is what the author refers to as delegated monitoring.

But of course one might ask who monitors the banks? If the banks are large enough to monitor the corporations, monitoring the banks themselves is once again out of reach for households. However, Diamond shows that it makes sense for small investors to enter into a debt contract with the bank, in this case, there is no need to monitor the bank, and small investors are better off sign a contract with the bank than investing directly in the project.

As banks and investors sign a debt contract, bankruptcies might occur, which is a very costly process, so all affected parties are interested in minimising the probability of default. Diamond points out that this can be achieved by banks diversifying their portfolio and not investing in a single large project but financing many smaller ones instead.

Using this model, Diamond demonstrates that banks are socially useful not only because they provide the necessary liquidity to economic agents through maturity transformation but also because they reduce the social cost of financial contracts through delegated monitoring. The author also provides an explanation for the empirical findings that banks diversify their investments and most of their liabilities are debts. In connection with all of this, it is worth reading *Diamond's (1996)* paper, which explains the above results in an intuitive, non-technical way.

#### **4. The macroeconomic significance of financial intermediation**

Out of the three Nobel laureates, Ben Bernanke is the best known, as he was the governor of the Fed during the financial crisis of 2007–2008 and made efforts to reduce the damage caused by the crisis as much as possible. Even before that, he had had an important scientific research career, and of course that is what earned him the Nobel Prize.

Interestingly, the ground-breaking article by *Bernanke (1983)* was published at the same time as Diamond and Dybvig's work with a similar impact. Today's readers may be surprised to know that Bernanke was the first to prove with scientific rigour that the banking system and bank panics contributed significantly to the Great Depression of 1929.

Before him there had been two main views on this issue. According to the first, the problems of the banking system were a consequence of the real economy crisis rather than its cause. The most influential advocate of the other view was another Nobel laureate, Milton Friedman, who claimed that the dramatic decline in banking did contribute to the crisis, but only by contracting money supply.

Bernanke claims that Friedman's explanation is valid, but not sufficient. Providing a transaction instrument, money, to economic agents in the form of liquid

deposits is only one of the activities performed by the banking system. Financial and investment markets experience considerable information asymmetry, which would make such markets highly inefficient in the absence of financial intermediary institutions that use their special knowledge and technology to provide services that mitigate the losses from this information asymmetry, for example through the delegated monitoring analysed by Diamond. If activity in the banking system diminishes substantially for some reason, economic actors do not have adequate access to these services, which entails major real economy losses.

To be clear, Bernanke does not claim that real economy developments fail to affect the banking system. As discussed above, bank runs are typically triggered by a recession in the real economy. However, bank panics significantly magnify the initial problem in the real economy, and banking declines so much due to the panic that it causes much greater damage in the real economy than the initial recession that started the whole process.

Bank panics significantly reduced the loans extended by the banking system. On the one hand, some banks went bankrupt due to mass withdrawals of deposits and even those that remained standing had their funds reduced. On the other hand, banks' liquidity risk skyrocketed, and they reduced their maturity transformation by increasing the share of their liquid assets and offloading loans from their portfolio. Due to the deepening recession and deflation, the collateral behind the loans also lost value, while the real burden on debtors increased and they found it increasingly difficult to make payments. This raised lending risk considerably. On account of the greater credit risk, loans were not extended to the riskiest customers, while others only obtained more expensive loans than before. This further deepened the recession, which further increased the risk of bank panics and credit risk, which in turn led to further falls in bank lending, thereby creating a negative self-reinforcing process.

But the real significance of Bernanke's 1983 article is that it was able to provide empirical evidence for the above. Bernanke first examined whether monetary effects explained the evolution of real output between 1919 and 1941, as hypothesised by Friedman. For this, he regressed output to the measure of monetary and inflationary surprise (assuming, based on Robert Lucas, that the change in the quantity of money and the portion of inflation/deflation that can be forecast have no real economy impact), and he obtained statistically and economically significant results. According to the simulations performed based on the estimates, however, monetary effects capture no more than half of the total decline of output during the period of the Great Depression between 1930 and 1933. He then complemented the estimated regressions with variables that measured the non-monetary impact of the banking system. These included (real) deposits of failing banks and the liabilities of failing businesses. The signs of the estimated coefficients of the new

variables in the complemented regressions were economically meaningful and significant. Furthermore, the new variables reduced the mean squared simulation error by about 50 per cent. This offered empirical evidence that the banking system contributed to the extremely deep recession, not only through the monetary aggregate but also through the contraction in lending.

Most of Bernanke's scientific work concerned the real economy impact of the financial system, but it was not limited to the 1929–1933 crisis. He was just as much interested in the macroeconomic role of lending and the banking system under normal circumstances as well as their role in the transmission of monetary policy. This area of research can be labelled as the examination of the credit channel of monetary policy, a comprehensive overview of which is given in *Bernanke and Gertler (1995)*.

It is generally acknowledged that in the presence of sticky prices, monetary policy can influence real interest rates, thereby affecting households' saving and investment decisions as well as companies' investment decisions. However, empirical evidence suggests that the real economy response to monetary policy shocks is difficult to attribute solely to the interest rate channel. For example, experience has shown that much of the negative impact of monetary policy tightening on investments can only be felt when the real interest rate starts to fall again after the tightening. This leads one to conclude that monetary policy also affects the real economy in ways other than the interest rate channel.

The credit channel, referring to the impact of monetary policy through lending, can be divided into two parts: the balance sheet channel and the bank lending channel. Information asymmetry is once again key in the operation of both.

The balance sheet channel is the result of the fact that due to the information asymmetry between lenders and debtors, the larger the proportion of the loan relative to equity (leverage), the greater the risk premium paid on corporate loans. In the event of monetary tightening and an interest rate increase, since companies' revenue falls and interest expenses increase, their net worth declines (or grows less than before), which entails a rise in the risk premium, an even greater interest burden and a further contraction in net worth. These factors reduce investments more than the interest rate channel, and their impact is much longer. The bank lending channel functions similarly. Banks and borrowers are also in information asymmetry, so banks cannot increase their leverage to an unlimited extent, either due to regulatory requirements or their own risk management considerations. In times of monetary tightening, banks' equity and leverage both fall, which exacerbates the negative effects of tightening. *Bernanke and Blinder (1988)* and *Bernanke et al. (1999)* analyse the operation of the credit channel using formal models.

At the end of the 1990s, Bernanke's research turned towards the problems of inflation targeting, and partly because of this he served as the governor of the Federal Reserve between 2006 and 2014. This part of his work is not discussed in the present paper but is mentioned briefly in the Closing remarks.

## 5. Reception of the awards

Since scientific performance cannot be measured as exactly as the 100-metre dash, the award of the Nobel Prize always stirs up debate. The 2022 Prize in economics did so too, perhaps more than usual. This may be because, while the 2021 Prize, for example, rewarded methodological developments that were mainly of interest to the profession, the research area that received the Prize now, the operation of the banking system, directly influences the life of a wider audience.

The most superficial critiques of the award process claim that basically trivial, generally known results were recognised. It can be argued that there is a basic misunderstanding here. Natural sciences often discover new things whose existence was not even suspected before. One such example is the discovery of penicillin. But economics does not produce results of this nature. Everyone even moderately well-versed in economic history knows that bank runs occurred as early as the 19th century. Diamond and Dybvig obviously did not discover the existence of bank panics, but instead *provided a very important interpretation*, with major economic policy implications. By this logic, the value of Thomas Sargent's research on hyperinflations (2011 Nobel Prize) could also be called into question, because everyone knows that there were periods of hyperinflation in history.

A more substantiated criticism was levelled by *Tooze (2022)*, who claimed that if the analysis of financial crises merits a prize, Hyman Minsky or Charles P. Kindleberger would have deserved it much more, but as they were not mainstream researchers they were ignored in their lives. Without taking a position on whether Minsky and Kindleberger would have deserved a prize, based on *Krugman (2022)* it has to be underlined that the work of those two researchers and the current Nobel laureates is difficult to compare as they focused on *different* aspects of financial crises. According to the hypothesis of Minsky and Kindleberger, financial crises are the end points of financial cycles driven by the irrational mood swings of economic actors. On the other hand, *Diamond and Dybvig showed which specific features of the financial system make bank panics possible and how, while Bernanke examined the macroeconomic effects of bank panics.*

The most radical criticism was voiced by *Bofinger and Haas (2022)*. They believe that the Diamond–Dybvig model is fundamentally misguided. They base this on an approach that is a minority view within economics: they call into question whether banks perform financial intermediation, and they argue that all models of the

financial system that only contain real variables are flawed. A detailed analysis of this view is outside the scope of this paper,<sup>9</sup> but this criticism misses the point because *Diamond and Rajan (2006)* later expanded the original Diamond–Dybvig model to include money and monetary policy. Their results somewhat nuanced the message of the original model but did not contradict it.

## 6. Closing remarks

The ground-breaking studies by Bernanke, Diamond and Dybvig were published in 1983, and while they later became part of the advanced finance and macroeconomics curriculum, their significance has long been unrecognised by the majority of the profession. The importance of their message was made conclusively clear by the 2007–2008 crisis.

Now there is a consensus among economists that, along with the traditional banking system, the shadow banking system must also be regulated from a liquidity perspective. Even the crisis of 2007–2008 could probably have been avoided if such regulations had been in place back then. This was the most important lesson from the work of Diamond and Dybvig from an economic policy perspective.

It is a huge and lucky coincidence that Ben Bernanke happened to be the governor of the Federal Reserve at the time when the 2007 Great Recession hit, as he was the man who had spent most of his career highlighting the severe macroeconomic consequences of systemic financial crises. Armed with this knowledge, he was one of the best placed to use unprecedented monetary policy instruments to mitigate the macroeconomic consequences of the financial crisis,<sup>10</sup> which he finally did successfully, because however deep the recession after 2008 was, it did not even come close to the Great Depression of the 1930s.

## References

- Allen, F. – Gale, D. (1998): *Optimal Financial Crises*. *Journal of Finance*, 53(4): 1245–1284. <https://doi.org/10.1111/0022-1082.00052>
- Allen, F. – Gale, D. (2007): *Understanding Financial Crises*. Oxford University Press.
- Bernanke, B.S. (1983): *Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression*. *American Economic Review* 73(3): 257–276.

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<sup>9</sup> For an analysis and criticism of the view calling into question the financial intermediation of banks, see *Világi and Vonnák (2022)*.

<sup>10</sup> For more on this period, see *Bernanke (2013)*, or its review by *Plajner (2016)*.

- Bernanke, B.S. (2013): *The Federal Reserve and the Financial Crisis – Lectures by Ben Bernanke*, Princeton University Press, Princeton, New Jersey. <https://doi.org/10.1515/9781400847167>
- Bernanke, B.S. – Blinder, A. (1988): *Credit, Money, and Aggregate Demand*. *American Economic Review*, 78(2): 435–439.
- Bernanke, B.S. – Gertler, M. (1995): *Inside the Black Box: The Credit Channel of Monetary Policy Transmission*. *Journal of Economic Perspectives*, 9(4): 27–48. <https://doi.org/10.1257/jep.9.4.27>
- Bernanke, B.S. – Gertler, M. – Gilchrist, S. (1999): *The Financial Accelerator in a Quantitative Business Cycle Framework*. In: Taylor, J.B. – Woodford, M. (eds.): *Handbook of Macroeconomics*, Volume 1, Elsevier. [https://doi.org/10.1016/S1574-0048\(99\)10034-X](https://doi.org/10.1016/S1574-0048(99)10034-X)
- Bofinger, P. – Haas, T. (2022): *A Nobel Award for the Wrong Model*. Institute for New Economic Thinking, 18 October. <https://www.ineteconomics.org/perspectives/blog/a-nobel-award-for-the-wrong-model>
- Brunnermeier, M.K. (2009): *Deciphering the Liquidity and Credit Crunch 2007–2008*. *Journal of Economic Perspectives*, 23(1): 77–100. <https://doi.org/10.1257/jep.23.1.77>
- Calomiris, C. – Gorton, G. (1991): *The Origins of Banking Panics, Models, Facts and Bank Regulation*. In: Hubbard, R. (ed.): *Financial Markets and Financial Crises*, Chicago University Press.
- Chari, V.V. – Jagannathan, R. (1988): *Banking Panics, Information and Rational Expectations Equilibrium*. *Journal of Finance*, 43(3): 749–761. <https://doi.org/10.1111/j.1540-6261.1988.tb04606.x>
- Davison, L.K. – Ramirez, C.D. (2014): *Local banking panics of the 1920s: Identification and determinants*. *Journal of Monetary Economics*, 66(September): 164–177. <https://doi.org/10.1016/j.jmoneco.2014.05.001>
- De Graeve, F. – Karas, A. (2014): *Evaluating theories of bank runs with heterogeneity restrictions*. *Journal of the European Economic Association*, 12(4): 969–996. <https://doi.org/10.1111/jeea.12080>
- Diamond, D.W. (1984): *Financial Intermediation and Delegated Monitoring*. *Review of Economic Studies*, 51(3): 393–414. <https://doi.org/10.2307/2297430>
- Diamond, D.W. (1996): *Financial Intermediation as Delegated Monitoring: A Simple Example*. *Federal Reserve Bank of Richmond Economic Quarterly*, 82(3): 51–65.
- Diamond, D.W. – Dybvig, P.H. (1983): *Bank Runs, Deposit Insurance, and Liquidity*. *Journal of Political Economy* 91(3): 401–419. <https://doi.org/10.1086/261155>

- Diamond, D.W. – Rajan, R.G. (2006): *Money in a Theory of Banking*. American Economic Review, 96(1): 30–53. <https://doi.org/10.1257/000282806776157759>
- Freixas, X. – Rochet, J.-Ch. (1997): *Microeconomics of Banking*. MIT Press.
- Goldstein, I. – Pauzner, A. (2005): *Demand-Deposit Contracts and the Probability of Bank Runs*. Journal of Finance, 60(3): 1293–1327. <https://doi.org/10.1111/j.1540-6261.2005.00762.x>
- Gorton, G. (1988): *Banking Panics and Business Cycles*, Oxford Economic Papers. 40(4): 751–781. <https://doi.org/10.1093/oxfordjournals.oep.a041885>
- Gorton, G.B. (2010a): *Slapped by the Invisible Hand: The Panic of 2007*. Oxford University Press.
- Gorton, G.B. (2010b): *Slapped in the Face by the Invisible Hand: Banking and the Panic of 2007*. Paper prepared for the Federal Reserve Bank of Atlanta’s conference, May 11–13, 2009. <https://doi.org/10.2139/ssrn.1401882>
- Gorton, G.B. (2012): *Misunderstanding Financial Crises – Why We Don’t See Them Coming*. Oxford University Press.
- Hirsch, J.E. (2005): *An index to quantify an individual’s scientific research output*. Proceedings of the National Academy of Sciences of the United States of America, 102(46):16569–16572. <https://doi.org/10.1073/pnas.0507655102>
- Kiss, H.J. (2018): *Depositors’ Behaviour in Times of Mass Deposit Withdrawals*. Financial and Economic Review, 17(4): 95–111. <https://doi.org/10.25201/FER.17.4.95111>
- Kiss, H.J. – Rodriguez-Lara, I. – Rosa-García, A. (2015): *Kognitív képességek és stratégiai bizonytalanság egy bankrohamkísérletben (Cognitive abilities and strategic uncertainty in a bank-run experiment)*. Közgazdasági Szemle (Economic Review), 62(October): 1030–1047. <https://doi.org/10.18414/KSZ.2015.10.1030>
- Krugman, P. (2022): *The simple economics of panic: The 2022 Nobel Prize in perspective*. VOXEU, 26 October. <https://cepr.org/voxeu/columns/simple-economics-panic-2022-nobel-prize-perspective>
- Plajner, Á. (2016): *The Fed and the Financial Crisis*. Financial and Economic Review, 16(1): 179–181. <https://en-hitelintezetiszemle.mnb.hu/letoltes/adam-plajner.pdf>
- Rochet, J.-Ch. (2008): *Why Are There So Many Banking Crises? – The Politics and Policy of Bank Regulation*. Princeton University Press. <https://doi.org/10.1515/9781400828319>
- Rochet, J.-Ch. – Vives, X. (2004): *Coordination Failures and the Lender of Last Resort: Was Bagehot Right After All?* Journal of the European Economic Association, 2(6): 1116–1147. <https://doi.org/10.1162/1542476042813850>

- Royal Swedish Academy of Sciences (2022a): *The Laureates Explained the Central Role of Banks in Financial Crises*. <https://www.nobelprize.org/uploads/2022/10/popular-economicsciencesprize2022.pdf>
- Royal Swedish Academy of Sciences (2022b): *Financial Intermediation and the Economy*. <https://www.nobelprize.org/uploads/2022/10/advanced-economicsciencesprize2022.pdf>
- Shin, H.S. (2009): *Reflections on Northern Rock: The Bank Run that Heralded the Global Financial Crisis*. *Journal of Economic Perspectives*, 23(1): 101–119. <https://doi.org/10.1257/jep.23.1.101>
- Tooze, A. (2022): *Kindleberger, Mehrling and that Nobel Prize*. Chartbook, 14 October. <https://adamtooze.substack.com/p/chartbook-160-kindleberger-mehrling>
- Világi, B. (2016): *Systemic financial crises*. *Financial and Economic Review*, 15(4): 167–170. <https://en-hitelintezetiszemle.mnb.hu/letoltes/balazs-vilagi.pdf>
- Világi, B. – Vonnák, B. (2022): *A Simple Framework for Analyzing the Macroeconomic Effects of Inside Money*. Working Paper, 2022/3, Magyar Nemzeti Bank. <https://www.mnb.hu/letoltes/mnb-wp-2022-3-final-1.pdf>

#### **Essays of the Series on the Work of Nobel Laureates in Economics**

- Kóczy, Á.L. – Kiss, H. J. (2017): *Hart and Holmström's Contributions to Contract Theory*. *Financial and Economic Review*, 16(1): 162–174. <https://en-hitelintezetiszemle.mnb.hu/letoltes/laszlo-a-koczy-hubert-janos-kiss.pdf>
- Neszveda, G. (2018): *The Contribution of Thaler to Behavioural Economics*. *Financial and Economic Review*, 17(1): 153–167. <https://doi.org/10.25201/FER.17.1.153167>
- Meyer, D. (2019): *Optimising Nobel Prize Laureates*. *Financial and Economic Review*, 18(1): 125–141. <https://doi.org/10.33893/FER.18.1.125141>
- Major, K. (2020): *Studying Poverty in Economics – The Work of the 2019 Nobel Prize Laureates*. *Financial and Economic Review*, 19(1): 119–131. <https://doi.org/10.33893/FER.19.1.119131>
- Biró, P. – Magyarkuti, Gy. (2021): *The Work of Milgrom and Wilson in the Theory and Practical Application of Auctions*. *Financial and Economic Review*, 20(1): 127–151. <https://doi.org/10.33893/FER.20.1.127151>
- Hermann, Z. – Horváth, H. – Lindner, A. (2022): *Answering Causal Questions Using Observational Data – Achievements of the 2021 Nobel Laureates in Economics*. *Financial and Economic Review*, 21(1): 141–163. <https://doi.org/10.33893/FER.21.1.141>