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## SYSTEM RISK MANAGEMENT POLICY IN BANKING

### Abstract

*The goal of this article is to analyze the concept of system risk. The article reviews many definitions of system risk in various literatures. In addition, the article identifies factors that contribute to raising system risk, spreading infection, and provides a conceptual plan linking these phenomena. System risk can be defined as the risk that shock will result in such a significant materialization (eg macrofinancial) of imbalances that it expands on a scale that disrupts the functioning of the financial system and to the extent that negatively affects the real economy (eg economic growth). The draft of this plan aims to break down and clearly categorize the processes of accumulation, materialization and spread of system risk. This should facilitate its identification and subsequent mitigation by allocating appropriate preventive macroprudential measures.*

**Key words:** *system risk, banking, financial stability.*

**JEL classification:** *G24, G29.*

## ПОЛИТИКА УПРАВЉАЊА СИСТЕМСКИМ РИЗИКОМ У БАНКАРСТВУ

### Апстракт

*Циљ овог рада је анализа концепта системског ризика. Рад преиспитује мноштво дефиниција системског ризика у разним литературама. Поред тога, рад идентификује факторе који доприносе изградњи системског ризика, ширењу заразе и пружа концептуални план који повезује ове појаве. Системски ризик се може дефинисати као ризик да ће шок резултирати тако значајном материјализацијом (нпр. макрофинансијских) неравнотежа да би се проширио на скали која нарушава функционисање финансијског система и до мере која негативно утиче на реалну економију (нпр. економски раст). Нацрт овог плана има за циљ да сруши и јасно категоризује процесе накупљања,*

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*материјализације и ширења системског ризика. То би требало да олакша његову идентификацију и касније ублажавање додељивањем одговарајућих превентивних макропруденцијалних мера.*

**Кључне речи:** системски ризик, банкарство, финансијска стабилност.

## Introduction

Although system risk and pro-cyclicality were present before the outbreak of the global financial crisis, the magnitude of their negative effects has sharply increased researchers' interest in exploring their nature and ways to mitigate them. Despite the diversity of studies on this topic, this article attempts to structure different aspects of system risk and provides a concept for understanding it. The aim of the study is to analyze the concept of system risk in the context of the global financial crisis. The article analyzes the definitions of system risk as well as possible outcomes of materialization of system risk. System risk analysis includes factors that contribute to its accumulation, the spread of infection and provides a conceptual plan that connects these phenomena. The model can be used to distinguish between accumulation, materialization and spread of system risk. The main contributions of this paper include the identification and assessment of system risk and its management through macroprudential policy. Moreover, the article introduces a "way of thinking" about system risk that intends to clarify this phenomenon and facilitate analysis. The subject of the study does not include possible forms of quantification and measurement of the above-mentioned phenomena, but the following methods are used: literature review, comparative method and deductive method. The paper attempts to answer five research questions and presents a conceptual model of system risk. Research questions include:

- 1) How is system risk defined in the literature and central banks?
- 2) How is system risk identified and assessed?
- 3) What dimensions and phases of system risk exist?
- 4) What is macroprudential policy?
- 5) What are the tools to prevent and mitigate system risk?

## Theoretical backgrounds

Regarding the concept of financial stability and system risk, there is no consensus or unanimous decision-making. The materialization of system risk during the recent global financial crisis has shown that net financial security and financial institutions have significantly underestimated it (Ilic and Tasic 2021, 25). It turned out that system risk is much more than a group of certain types of risks that affect financial institutions. Although credit risk, liquidity risk, operational risk, etc. can be directly attributed to a particular institution, system risk can only be attributed indirectly. Before the financial crisis, these types of risks were usually considered separately. However, the interconnection, ie. correlation leads to unwanted and unexpected consequences when attached to system risk. System risk develops together with the development of financial markets, regulations and collective behavior of market participants, and this can be influenced by regulatory arbitrage (Miletić et al. 2021, 177).

Previous comparative definitions of system risk emphasize a wide range of system risk characteristics. Based on a review of the literature and a case study, it is pointed out that in the most common type of system risk, moral hazard plays a key role in destroying the motivation of financial institutions. System risk arises from excessively risky activities of an individual or group, aggressive type of organizational culture (striving for short-term profit), collective failure of management in the bank (or throughout the financial system), leading to inertia and inability to respond to changes in economic circumstances and high exposure to banks. risk (symmetric shock) as a whole. A review of the literature on system risk concludes that, despite extensive research on the subject, there is still no consensus on the definition of system risk. As in the case of financial stability, there are many definitions of system risk, but they are still difficult to operationalize. Nevertheless, operationalization would be most useful from the perspective of conducting macroprudential supervision with the goal of preventing system risk. The lack of consensus in the literature and the complex nature of system risk imply the need for different measures and principles for measuring them. The concept of system risk lies in the “infection effect” and the negative impact on the real economy.

Based on a comparison of various definitions of system risk, the following conclusions can be drawn (Monfred & Akin, 2017):

- It is often emphasized that system risk refers to a large part of the financial system or a significant number of financial institutions and is considered to disrupt the financial system and its functions, such as financial intermediation. On the other hand, only a small proportion of researchers consider the loss of self-confidence as a characteristic of system risk and its evolving nature;
- A key element of system risk is the transmission of disturbances (shocks) between interconnected elements of the system, which in conclusion may have a negative impact on the real economy;
- Definitions of system risk began to appear in the literature in the mid-1990s, but their creation clearly intensified after the outbreak of the global financial crisis;
- Before the crisis, definitions placed more emphasis on the effect of infection and the large scale of this phenomenon. However, after the outbreak of the crisis, in addition to the significant scale of the phenomenon, more attention was paid to the disturbances in the functions of the financial system. This results in a negative impact on the real economy, which was rarely emphasized before the crisis.

Central banks rarely propose definitions of system risk. The research points out that central banks often focus on elaborating definitions of financial (in)stability, and not on definitions of financial crisis and system risk. Although the study was conducted in 2003, these conclusions are still valid. When central banks define system risk, they seem to be quite narrowly defined, ie. there is a threat to the entire financial system (Czech National Bank, Bank of Canada, Riksbank - Swedish Central Bank) or inability to meet obligations in the payment system, which leads to its reduction (Bank of Luxembourg, Bank of Greece) (Peković et al., 2020). Analyzing the definitions of system risk, it is emphasized that regardless of the differences in definitions, it remains indisputable that the occurrence of risks in the financial system causes huge risks to financial stability. This causes serious disruptions, including financial crises, to spread to other entities, markets and countries.

## Dimensions of system risk

System risk varies considerably and encompasses a wide range of characteristics. This means that financial instruments, institutions, markets, market infrastructure or a segment of the financial system can be a source of system risk. It is not easy to determine whether the scope of events will be system, because in turbulent periods the assessment of the degree of impact on other parts of the system may be subject to dynamic changes and the assessment could be subject to underestimation of bias. System risk may have its source in or outside the financial system or may arise from the interconnectedness of certain financial institutions and financial markets and their exposure to the real economy.

However, the classification of a given phenomenon as a system risk cannot depend on whether it is endogenous to the financial system or whether it has an impact on the real economy. This influence is probably always present due to the disruption of the functions of the financial system. Therefore, it is important to quantify the impact of system risk as the degree of impairment of financial system functions (Ilić & Tasić, 2021). System risk can also be endogenous, ie. the result of the collective behavior of financial institutions, or exogenous if its source is outside the financial system, e.g. imbalances in the real economy. System risk includes the risk to the proper functioning of the system as well as the risk that the system creates. Of course, these two risks can overlap, and shock within a system that amplifies the system can lead to automatic destruction of large components of the system and even the entire system, or even to a real economy that incorporates the system from which the shock originates (Ivanova & Ristić, 2020, 15 ). Based on the defined concepts, it can be concluded that system risk can be distributed in a matrix showing the relationship between shock (scale of negative impact on the financial system as a whole) and range (volume) of impact (understood as a combination of system importance). shock to the system).

System risk is often described in the literature in two dimensions (Đorđević & Mitić 2020, 27):

- Cross-sectional dimension, understood as the allocation of system risk in the financial system at a given time. It includes risks to financial stability, ie. instability of individual institutions resulting from concentrations of their risk exposure or sources of financing, size, structure and level of concentration of the financial system and the relationship (direct and indirect) between financial institutions;
- Time (cyclical) dimension, understood as the accumulation of system risk over time. This includes risks that do not arise directly from the activities of one institution, but from collective behavior, which leads to increased instability in the financial sector and the real economy, materialization and procyclicality.

*Table 1: Dimensions of system risk*

	<b>Cross-sectional dimension</b>	<b>Time dimension</b>
<b>The aim of the analysis</b>	Shock transmission mechanism	Accumulation of macrofinancial imbalances
<b>Access</b>	At a given time	At given period
<b>The main area of analysis</b>	The size of the financial system, its structure and the degree of interconnectedness	Procyclicality

<b>The role of macroeconomic factors</b>	Exogenous	Endogenous
<b>Objective of macroprudential measures</b>	Increased resilience of the financial system to shocks	Reducing the rate of accumulation of imbalances and mitigating their impact
<b>Examples of risk sources</b>	Interrelationships and similarities in risk exposures of financial institutions leading to exposures of symmetrical shock, excessive concentration	Relationships between the financial system and the real economy

These dimensions of system risk are closely related. For example, increasing the level of concentration of the financial system (cross-sectional dimension) leads to the creation of SIFIs and thus forces them to take excessive risks over time (time dimension) as a result of increased moral hazard. In addition, over-lending during development encourages an increase in risk (time dimension), which can lead to the accumulation of banking risk exposures and their concentration in certain market segments (cross-sectional dimensions) at the micro level (eg real estate market). At the macro level, pro-cyclicality can lead to the development of new, more complex interrelationships within the financial system and between the financial system and the real economy (Munitlak-Ivanović 2017, 1473). At the same time, the results of the analysis from each perspective may differ, ie. during the development of profitability and growth of banks' capital, their resilience to shocks strengthens (cross-sectional dimension - reduction of system risk), and at the same time - imbalances accumulate through excessive lending and simultaneous increase in property prices (time dimension - increase in system risk).

When analyzing system risk, it seems crucial to distinguish between current and future (in)stability of the financial system. Financial institutions largely take into consider the current instability and base their actions on this assessment, but the accumulation of future imbalances is difficult to take into consider. They tend to "overreact" in recessions and reduce losses. This leads to procyclicality. It is crucial that the central bank or some other macroprudential body analyzes system risk in the current and future dimensions. However, there is the question of objectivity in system risk assessment, as the macroprudential authority will assess a phenomenon that it may significantly influence, so it may be biased in its assessment. It seems that a collegial body acting as a macroprudential body may be less susceptible to assessing bias than a single macroprudential body (eg a central bank or a supervisory body). Distinguishing the time and dimensions of the system risk cross-section determines which macroprudential tools are suitable for preventing system risk in certain dimensions. In a broad sense, time-varying risks motivate tools that affect the balance sheets of financial institutions or affect the terms of financial transactions, while tools that affect market structures are closer to intersection or structural risk. In the case of the time dimension, the tools should be anti-cyclical. On the one hand, they should reduce excessive risk-taking during accumulation, and on the other hand, reduce the extent of unbundling during a recession. The tool should also aim to strengthen the financial system's resilience to shocks, reducing the potential for contagion, e.g. improving financial market infrastructure.

## System risk identification and assessment

The two main tasks of macroprudential policy are to prevent system risk and, if prevention fails, to mitigate its impact (Krstić et al., 2019). From the perspective of prevention, the main task of financial stability analysis is the timely identification of marginal contribution in the current financial environment of accumulating system risk. This contribution, which can be called the risk of future financial instability, contributes to the accumulation of system risk in the phase of increasing leverage in the areas of cheap loans and over-optimistic expectations regarding future income and property prices (Cvetković et al., 2021). At some point, economic agents will radically revise that, repeat the interpretation of your expectations as a result of certain information or a certain event and change will occur. Aspects of the crisis will begin to become apparent and there will be a phase of materialization of the risk accumulated in the previous phase in the form of financial stability. Banks will review their opinions on credit, market and liquidity risk in their balance sheets, increase credit margins or credit differences and tighten their lending conditions. After that, the process of separation will begin, during which the system risk will gradually disappear.

Success in achieving financial stability is largely a function of the government's ability to identify and properly assess the sources and development of system risk during the financial cycle. When it comes to the two main tasks of macroprudential policy - prevention and mitigation - the competent authorities must focus at the time of accumulation on assessing the risk of future financial instability and during the crisis on assessing the scale of the problem of risk materialization (Ha et al., 2019). The primary goal must be preventive action against the growth of system risk in the phase of spreading risk, when the conditions for future financial instability are created. During this phase, macroprudential analysis must focus primarily on identifying latent risks that arise in the balance sheets of financial intermediaries and their clients. Analytical attention must also be paid to the quality of cash flows, because financial institutions with structural problems in their balance sheets (eg poor balance sheet liquidity or excessively long maturity transformations) are naturally far more prone to cash flow problems. When identifying hidden risks, it is important to understand that current indicators based on current levels of financial variables provide information on the degree of materialization of system risk, but not on the likelihood of financial stability in the future. In achieving their goals, however, the authorities need to focus on a number of forward-looking indicators that provide information on the possibilities of future materialization of system risk as a result of current financial imbalances. This mainly refers to indicators based on the assessment of deviations of factors that determine the degree of leverage from their normal or equilibrium values. For example, deviations of the ratio of loans in the private sector to GDP or the ratio of real estate prices and revenues from their long-term movements would seem to be relatively reliable indicators (Mihajlović et al. 2020, 9). Such indicators send a signal several years in advance about financial imbalances in the balance sheets of financial institutions and the potential for creating dangerous frauds.

Thanks to the paradox of financial stability, current indicators can also be used to identify the accumulation of system risk. Where the values of current indicators (non-performing loan rates, default rates or provisioning rates) are significantly "better" than their usual values or their historical assets, this can be considered an indicator of a growing risk of financial instability (Kvrđić et al., 2021). Such indicators can be considered as complementary indicators that look to the future and that are applicable primarily for determining the position

in the financial system or assessing the probability of change in the financial system. When assessing system risk during the accumulation phase, authorities must first reach a general consensus on the normal or sustainable values of the relevant indicators, and then continuously assess whether deviations of actual values from normal levels become critical. In the phase of accumulating system risk, this process will not be easy. It is quite difficult to timely distinguish between normal system fluctuations and long-term trends from a dangerous financial system (Radić, 2021, 71).

Preventive macroprudential tools are usually not activated until a consensus is reached that the critical values of individual indicators or a combination of indicators have a strong informative content. These indicators of the temporal dimension of system risk will also need to be used in assessing when the effects of pre-materialization cease to operate in a systemic manner, so anti-crisis measures and policy support may be lifted (Bakić, 2020). If prevention is not effective enough and a system risk materialization phase occurs, the focus of macrofinancial policy must shift to mitigating the impact of the crisis. The beginning of this phase is usually quite easy to identify, since the crisis is usually visible due to the sharp deterioration of market variables. At this stage, the most important thing is to assess the ability of the financial system to withstand new risks. Financial system resilience stress tests are a suitable analytical tool for performing this task. Using such tests, supervisors should be able to assess whether the financial sector will withstand the adverse effects associated with the materialization of risk at a given level of capital and liquidity. In addition to stress tests, the above current indicators can be used to assess the extent of financial stress.

### **Macroprudential policy**

The main, though not only, element of financial stability is macroprudential policy. The primary feature of macroprudential policy is that, unlike traditional microprudential regulation and supervision (focused on the resilience of individual financial institutions to mostly exogenous events), it focuses on the stability of the system as a whole. It primarily monitors endogenous processes in which financial institutions may find themselves in a situation of systemic instability through joint behavior and interaction. The only “real” instruments of macroprudential policy are those that are explicitly focused on the financial system as a whole and on the endogenous processes that take place in it. Other measures that can be used to some extent to support financial stability and may have macroprudential aspects include microprudential regulatory and supervisory instruments and monetary, fiscal and fiscal policy tools. The goal of macroprudential policy is to prevent the formation and spread of system risk in the financial system and thus reduce the likelihood of a financial crisis with large real losses of production for the entire economy. By repressing the channels of formation and spreading of system risk, macroprudential policy should primarily act preventively against signs of financial instability in the future, and secondly at least mitigate their effects if prevention fails.

An important condition for the efficient and effective implementation of macroprudential policy is the operationalization of that policy. In constructing such a policy, the competent authorities should gradually move towards a similar sophisticated operational framework (Lukić & Gajić, 2019, 331).

The goal of macroprudential policy is the system risk, which has two main dimensions. The cross-sectional dimension reflects the existence and distribution of system risk at any point in time. The source of this dimension is mutual and related exposures among financial institutions. Such institutions may underestimate the potential impact of their own activities on the risk of the financial network as a whole, thus creating negative externalities for other parts of the system. Another dimension of system risk is the time dimension, which reflects the creation of system risk over time. The source of this dimension is pro-cyclical behavior of financial institutions, which contributes to the formation of unbalanced financial movements, which sometimes fall out of the control of the institutions themselves or their regulators. System risk of this type is manifested primarily by correlated exposure to the same macroeconomic factors in all financial institutions (Tasić et al., 2021, 49).

The main transitional goal of preventive instruments used in the phase of accumulation of the time component of system risk is to increase the resilience of the financial system by creating reserves that are then used in the period of materialization of this risk (Novales & Chamizo, 2019). Sufficient protective capital and an adequate level of reserves increase the ability to absorb unexpected and expected losses, while stable balance sheet liquidity increases the ability to absorb source shocks. The secondary goal is to reduce the amplitude of the financial system by curbing credit growth and preventing excessively long maturity transformations. Experience with the use of macroprudential tools in some countries shows that their individual impact on the financial system is limited. However, a combination of macroprudential tools and applied microprudential instruments (eg those that create additional capital requirements for risk exposure) could help eliminate expected surpluses over the financial cycle (Božović, 2019). They could also contribute to improving risk management in individual institutions, including risks associated with the cyclical increase in the transformation of maturity in bank financing and the tendency of banks to rely on short-term market financing at the time of easy access to liquidity.

A comparison of certain aspects of the operational framework of monetary and macroprudential policy reveals that the framework of macroprudential policy will always be associated with a higher degree of uncertainty and a lower level of accuracy than the monetary policy framework. This is due to the multidimensionality of the goal of financial stability, mainly the longer length of the financial cycle than the monetary cycle and the more complex transfer from macroprudential tools to changes in the behavior of financial institutions and their clients. Therefore, macroprudential policy may have a longer and changing response horizon (Berber et al., 2022). Years can pass from the moment when the financial system becomes vulnerable to the moment of the outbreak of the financial crisis. Then, however, the conditions suddenly change and the adjustment process is extremely nonlinear (a sharp transition from good to bad times). However, these factors do not necessarily preclude macroprudential policy, because when analyzing financial stability it is better to be approximately accurate than accurately incorrect.

## **Tools for prevention and mitigation of system risk**

Once system risk has been identified, authorities can use appropriate tools to prevent or mitigate it. Two phases of development and two dimensions of system risk may require the use of different tools or a combination of the same. In the phase of materialization of system risk,



the priorities of macroprudential policy will be to prevent escalation (spread) of elements of instability, reduce the likelihood of panic adjustment by financial institutions and their clients in response to revision of expectations and mitigate the negative effects of significantly worse conditions (Krstić et al. 2020, 105). . Countercyclical reserves created in good times can be considered the most important macroprudential tool for this phase. However, in a systemic crisis, a range of monetary policy instruments and regulatory and supervisory measures may become macroprudential in nature. At the specific level, macroprudential policy at this stage will operate through built-in stabilizers (release of reserves and use of automatic central bank funds) or crisis management tools (government guarantees for banking assets and poor asset transfer and balance programs). Active communication with financial markets and the public will also be important, including the publication of stress test results, in order to reduce the level of uncertainty about the stability of the financial system. Communication is a very important tool even in the phase of accumulating system risk.

There is currently no full consensus on which tools can be considered macroprudential policy tools. Since the full range of measures can have macroprudential aspects, a wide range of financial stability measures is usually included in the macroprudential tool. However, it is more appropriate to divide this broad category into macroprudential tools, microprudential tools applied in a macroprudential way and other means of financial stability. Real macroprudential tools are those that can be applied in the form of rules and can therefore take the form of embedded stabilizers (countercyclical capital reserves, leverage ratio through the financial system, surcharge for capital or liquidity for size, complexity and release of capital, maturity transformation limits, etc.). They should automatically limit the pro-cyclicality of the financial system or the risky behavior of individual institutions (Tešić et al. 2021, 33).

In addition to true macroprudential tools, various microprudential regulatory and supervisory tools can be used for macroprudential purposes. If these tools are not applied to individual institutions, but to all institutions in the system, they can be considered macroprudential instruments (increased risk weightings for certain types of loans, increased reserves for loan losses depending on the default period, increased security requirements, rules for reference rates for home loans, monetary policy tools: interest rates, minimum reserve rates and marginal reserve rates for selected sources of liabilities and interventions in the foreign exchange market). Measures of this kind, along with monetary policy instruments, fiscal policy instruments, and tax measures, have been applied in the past in many countries in an effort to slow credit surplus growth (Tran et al., 2016). Many of these tools can also be used in symmetrically opposite ways in the system risk materialization phase to preserve access to credit for the private sector, as well as in times of significantly increased risk perceptions. True macroprudential tools in the form of built-in stabilizers, the introduction of which is currently the subject of international debate, are more focused on the time component of system risk. The first set of such tools is aimed at capitalizing banks that should face the obligation to create countercyclical capital surcharges above and above the macroprudentially obtained minimum capital adequacy ratio to reflect the degree of system risk change over the system. According to the agreed version of Basel III, which will be implemented in the coming years, in good times, when a certain total level of credit in the economy is exceeded, banks will have to start creating capital reserves that can be used to absorb the negative effects of future financial instability (Ikka et al., 2019). The second set of proposals is aimed at securing provisions during the cycle in order to better accept the expected loss from the loan portfolio and to allow banks to create hedging committees to cover credit

risk. Macroprudential tools of the embedded stabilizer type, but oriented towards the cross-sectional dimension, include, for example, capital surcharges set for individual institutions. Basel III also includes requirements for compliance with the liquidity ratio, which are also focused mainly on the cross-sectional dimension (the requirement for a specific ratio of stable balance sheet liquidity sources or coverage of potential outflows with highly liquid assets). The requirement for reserves between the value of collateral and the amount borrowed by the institution can also be considered as an instrument that encourages the creation of conditions for liquidity risk. Reserves should enable the absorption of even a large decline in the value of insurance as a result of the crisis in property markets. The possibility of configuring liquidity risk management tools to have an anti-cyclical effect is also discussed.

When tools oriented to the cross-sectional system risk dimension are used, the transition objective in the preventive phase should include the risks that individual financial institutions, markets and instruments may create for the system as a whole. In order to limit this dimension of risk, related to the interconnectedness, size or significance within the system, it is first necessary to assess the contribution of individual institutions, markets and instruments to system risk, and then reduce or limit this contribution (Dang & Nguyen, 2022). This should result in less likely collapse of large, complex or overly related institutions as a result of credit, market or liquidity risks, greater resilience of institutions, markets and instruments to pollution within the system and associated overall loss of confidence in the financial system. The macro-prudential tools of the embedded stabilizer type currently under consideration include, for example, systemic surcharges in the form of additional capital or liquidity requirements set for individual institutions taking into account their contribution to system risk due to their size, complexity and interconnectedness. Several methods for estimating the marginal contribution to system risk can be used to determine the size of a systemic additive. The chosen practical method should reflect the specifics of the financial sector of a particular country. The purpose of applying systemic compensation as a macroprudential policy tool is to inform a particular financial institution about the government's assessment of its systemic importance or excessive interconnectedness and to encourage a change in structure.

### **Systemic risk management in Halkbank a.d. Belgrade**

Halkbank a.d., Belgrade, previously known as Čačanska banka, has been operating continuously since July 1, 1956, since when it changed its name and organizational form several times in the course of its work and development. The bank is registered in the Republic of Serbia for payment transactions and credit and deposit operations in the country and abroad and operates in accordance with the Law on Banks. In accordance with the Law on Banks and the Decision of the National Bank of Serbia on risk management, Halkbank's systemic risk management strategy is based on a conservative approach, which implies a restrictive assumption of all risks to which it is exposed or may be exposed in its operations. The risk management strategy contains:

- definitions of risks to which the bank is exposed or may be exposed,
- long-term goals determined by the business policy and risk appetite in accordance with these goals,
- basic principles of risk taking and management,

- the basic principles of the process of internal assessment of the bank's capital adequacy,
- definition, criteria and basic principles for bad asset management.

On the basis of the achieved business results and the goals defined by the Halkbank five-year strategy, a business policy is drawn up annually, in which the goals for the following calendar year are determined. In order to more efficiently achieve the objectives of the strategy, policy and procedure, Halkbank prescribes the way of organizing the risk management process, the way and methodology for identifying, measuring, or assessing, mitigating and monitoring risks and the principles of the functioning of the internal control system. The following management bodies and organizational units are responsible for eliminating deficiencies in risk management policies and the internal control system and reviewing and implementing risk management policies and procedures: management board, executive board, audit committee, asset and liability management committee, credit committee, service for risk management, the internal audit service and the service for monitoring business compliance and preventing money laundering.

In accordance with its strategic goals, the Bank's Business Policy and Strategy determined the appetite for risk taking, as well as target indicators and their tolerance in the risk management process, the achievement of which is reported by the Risk Management Service to the Asset and Liability Management Committee and the Executive Committee. The Executive Board, at least once during the business quarter, reports to the Management Board on the achievement of the set target indicators in the risk management process, through the Business Report. Halkbank has identified the following most significant risks to which it is exposed: credit risk, interest rate risk, liquidity risk, market risk, operational risk, reputational risk, concentration risk, environmental and social risk, country risk and strategic risk.

Halkbank has established a comprehensive and reliable risk management system, which is included in all business activities and which ensures that the bank's risk profile is always in accordance with the established risk appetite. The risk management system is proportionate to the nature, scope and complexity of the bank's operations, i.e. its risk profile. The risk management system enables the bank to manage the risks it is exposed to or may be exposed to based on its business activities and is considered comprehensive and reliable. The risk management system is included in all business activities, considering that Halkbank makes every business decision by which it assumes risks, taking into account the previous assessment of the employees responsible for risk management. The risk management system includes:

- strategy and policies for risk management, as well as procedures for identifying and measuring, that is, risk assessment and risk management;
- appropriate organizational structure of the bank;
- an effective and efficient process of managing all risks to which the bank is exposed or may be exposed in its operations;
- an adequate system of internal controls;
- appropriate information system and reporting system;
- framework and frequency of stress tests, including procedures in case of unfavorable results of the stress tests themselves;
- an adequate process of internal assessment of capital adequacy.

In accordance with the current Law on Banks, current decisions of the National Bank of Serbia that regulates the area of risk management, as well as the Statute, Halkbank has established a comprehensive and reliable risk management system that is fully integrated into all the bank's business activities and that ensures that its risk profile be consistent with her risk appetite. The risk profile is articulated through the Risk Appetite Framework (Table 2) adopted by the Bank's Board of Directors.

Table 2 - Risk appetite framework of Halkbank a.d. Belgrade

Description of indicators	Indicator values	
	Limit	Realization on 31.12.2018.
Capital adequacy indicator	Minimum greater than or equal to 19.00%	27,82%
Indicator of adequacy of basic capital	Minimum greater than or equal to 15.00%	27,81%
Indicator of the adequacy of the basic share capital	Minimum greater than or equal to 13.00%	24,60%
Liquidity indicator	Minimum 1,10	1,69
A narrower indicator of liquidity	Minimum 0,80	1,42
Liquid asset coverage indicator	Minimum 105%	259,27%
Aggregate indicator of total exposures in relation to the Bank's capital	Maximum 300%	89.69%
The foreign exchange risk ratio is the ratio of the total open foreign exchange position in all individual currencies to the Bank's total capital defined by the current NBS Decision on the adequacy of the bank's capital	Maximum 18%	0.63%
The total interest rate risk ratio is the ratio of all weighted interest rate gaps in all time intervals and the Bank's total capital defined by the current NBS Decision on the adequacy of the bank's capital	In the range from -20% to +20%	1.01%
Coverage of NPLs by value adjustments	Minimum 35%	47,97%
NPL rate in relation to the Bank's portfolio	Maximum 10%	6,42%
Penal measures ie. legally imposed fines to the Bank, which represents the ratio of the amount of punitive measures and the total gross income of the Bank at the level of the calendar year.	Maximum up to 0.1% of the bank's gross income on an annual basis	0%

Source: <https://www.halkbank.rs/upload/documents/fin/Izvestaj%20o%20objavljivanju%20podataka%20i%20informacija%20banke%20za%202018.pdf>

The establishment of a risk management system is based on the principle that risks are managed, not that risks are avoided. Halkbank has the continuous task of taking on only those risks that it can adequately and timely assess, control and manage. Accordingly, the bank's long-term goal in risk management is to minimize the negative effects on the financial

result and capital due to exposure to risks. Halkbank manages the identified risks through a clearly defined risk management process that includes regular and timely identification, measurement, i.e. assessment, risk monitoring, mitigation measures and reporting on the risks it is exposed to, or could be exposed to in its operations. In order to control or limit the taking of credit risk, Halkbank has defined exposure limits. In this sense, the Bank regularly monitors and communicates the achievement of those limits and, if necessary, implements corrective measures to keep the indicators within the prescribed limits.

## Conclusion

It is often emphasized in the literature that system risk refers to a significant part of the financial system or to a certain number of financial institutions and disrupts the functioning of the financial system, e.g. financial intermediation. Before the crisis, greater emphasis was placed on contagion and on a large scale of phenomena, while after the outbreak of the crisis, more attention was paid to limiting the capacity of the financial system, which has a negative impact on the real economy. Central banks often focus on providing definitions of financial (in)stability, rather than on the financial crisis and system risk, which is narrowly perceived as a threat to the entire financial system or related to the impaired functioning of the payment system. System risk is characterized by its evolving and multidimensional nature and can be endogenous or exogenous. It can spread by contagion not only among financial institutions, but also between the financial system and the real economy. System risk may be the result of the accumulation of macrofinancial imbalances and the existence of SIFI (systemically important financial institutions), the functioning of which results in negative results for a financial system whose stability is a public good. The cross-sectional dimension and the time dimension of system risk (related to procyclicality) can be distinguished. Many structural features of the financial system can increase its exposure to system risk. The way of thinking about system risk also has far-reaching implications for policy. It is important that the central bank analyzes the financial system in order to assess the accumulation of system risk, identify its potential sources and then use macroprudential tools to mitigate them. Difficulties in unambiguously defining system risk and lack of adequate data are the two main obstacles to the development of methods and tools for systems risk analysis. Also, communicating the results of system risk identification can be challenging, so it does not trigger a self-reinforcement mechanism that leads to a worsening of the identified risks, but their mitigation. However, it should be borne in mind that the systemic materialization of risk enables the elimination of inefficient institutions. As long as this does not destabilize the entire financial system, weak institutions should be resilient or allowed to fail. Possible forms of regulation aimed at reducing system risk consist of the introduction of liquidity requirements, increased capital requirements, structural unbundling in the banking sector and the imposition of larger capital reserves for SIFI.

As for macroprudential policy, in the future it should act primarily against signs of financial instability, and secondly to mitigate their effects if prevention fails. These two main tasks reflect the two phases of the evolution of system risk - its accumulation and subsequent potential materialization. Building a sophisticated operational framework that connects the individual dimensions and stages of system risk development with appropriate indicators and instruments will be an important condition for the efficient and effective implementation of

macroprudential policy. In carrying out the two main tasks mentioned above, macroprudential authorities must focus on forward-looking indicators and at the same time take into account the potentially high degree of discontinuity in the evolution of system risk. To this end, they must use certain sets of indicators and tools that reflect the different times and phases of system risk. During the financial cycle, it will be necessary to capture the moment of accumulation of system risk, identify the point where the tolerance for system risk is exceeded and send the signal needed by macroprudential tools to activate. If prevention fails, using a different set of indicators should determine the point at which the event of financial instability should be declared, assess the potential extent and severity of the crisis, and recommend appropriate anti-crisis tools. Within macroprudential policy, the operational framework must still be the driving mechanism for the use of tools in the risk-taking and manifestation phase. This mechanism should be relatively complex and at the same time flexible. Combining a rigorous analytical approach and high doses of assessment will be crucial in implementing such a policy. Although the priority should be to use the rules and tools of the built-in stabilizer type, it will be necessary to leave a lot of room for discretion to the macroprudential authority.

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