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ABSTRACT

on the dissertation for the award of the degree of Doctor of Education and Science (in Economics) in the doctoral program "Finance, Money Circulation, Credit and Insurance" (Finance) on the topic:

**CURRENT CHALLENGES IN MANAGING
SYSTEMIC RISKS IN THE EU FINANCIAL SYSTEM
(GLOBAL AND REGIONAL ASPECTS)**

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I. GENERAL CHARACTERISTICS OF THE DISSERTATION

1. RELEVANCE OF THE STUDY

The relevance of the problem of systemic risk management in the financial system both at the EU and global level is determined by the occurrence of systemic events that are an integral part of the functioning of financial systems and global economies. Their consequences can be quite severe and lead to huge economic and financial losses, shocks and misallocation of income and resources across economies. The financial crises ¹of the past two decades, which have shaken both domestic and global economies, increasingly illustrate the importance of systemic risk. The Global Financial Crisis (GFC) 2007-09 revealed shortcomings in the regulation, measurement, monitoring and management of systemic risk in general. In fact, the GFC sparked a new interest in systemic risk, (Billio et al. , 2010). Broadly speaking, it refers to the risk that a systemic event may disrupt financial instability to the extent of causing a significant deterioration in economic growth and welfare. Considerable research effort has been devoted to systemic risks and their implications for economic activity over the past few years.

Although systemic crises are rare, they are crucial for long-term economic and social outcomes. Systemic risks accumulate gradually but manifest themselves suddenly, and are therefore mostly ignored in the day-to-day activities and policies of financial managers and policy makers. While it is difficult to accurately predict systemic events, it is possible, through consistent research, to improve the assessment of the vulnerability of financial institutions. Institutions that have established contingency protocols that have verified the likelihood of systemic risk have the ability to successfully address the crisis. The development aims to explore the key points of systemic risk management from both an academic and practitioner perspective.

¹ Zab. Financial systemic crises: the collapse of the price of Japanese equities in the 1990s, the Asian financial crisis in 1997, Russia's default in 1998 and the global financial crisis of 2007-09.

As the interconnectedness of financial markets has continued to increase in recent years, regulators, particularly in the banking sector, have become concerned that the simultaneous failure of some banks would lead to the collapse of the banking industry in a country or region (Lehar, A., 2005). The onset of the international financial crisis has led to stakeholders in the banking sector to anticipate the dangers that systemic risk may pose, understand how to measure it and how to mitigate the damage it causes.

The recent global financial crisis has led to in-depth discussions on reforming the regulation and supervision of financial institutions. In redesigning prudential standards to incorporate lessons from the recent turmoil, the Basel Committee of Supervisors was faced with two important questions among others: what kind of capital should banks hold to ensure that they can better withstand periods of economic and financial stress? And as the financial and economic crises facing the EU become more complex and larger, it is of utmost importance to effectively manage systemic risks, which justifies the relevance of this thesis.

2. OBJECT AND SUBJECT OF THE STUDY

On the basis of the relevance thus presented, *the subject of the thesis is defined as the systemic risks in the financial system of the European Union*. A critical review of the management of systemic risks in the functioning of the financial system in the EU and by extension in continental Europe is made.

*The **subject of** the study is the evolution of the management of systemic risks in the financial system of the European Union and the current challenges in terms of regulatory framework, policies, instruments and actual actions, as well as new developments that may be of systemic importance for the near future of the EU financial system.*

2. RESEARCH THESIS

The research *thesis* of the dissertation can be formulated as follows: the *implementation of macroprudential aspects of policy, regulation, supervision and instruments is a necessary condition for managing systemic risks in the modern EU financial system and for ensuring financial stability. Effective management of systemic risks should be based on close coordination between monetary, fiscal and macro-prudential policies, leading to financial stability with efficient use of monetary resources.*

3. OBJECTIVE OF THE DISSERTATION

On the basis of the object, subject and thesis defined in this way, the dissertation *aims to argue the importance of systemic risk management in the financial system of the European Union for ensuring financial stability and to analyse the contemporary challenges of managing this risk.*

The social arguments for managing systemic risk in the financial sphere are also important, as financial crises can have long-term consequences for human development and long-term detrimental effects on the psychological well-being of the population.

4. RESEARCH OBJECTIVES AND METHODOLOGY

Following the aim, object, subject and thesis thus formulated, the following **tasks** of the dissertation can be formulated:

- To analyse the theoretical basis of systemic risk and its measurement by reviewing the scientific literature.
- To analyse the main forms of systemic risk by presenting a more in-depth discussion and analysis of the financial network and contagion risk within the financial system; to present a contagion matrix and to offer an illustration of the financial interconnections in the EU financial system from a systemic risk perspective.

- To critically review, analyse and systematise the models and/or indicators applied to measure systemic risk.
- To explore the role of macroprudential policy as part of the policy of the ECB and the EU member states in the management of systemic risk - genesis, nature and tools for managing systemic risk in the financial sphere;
- Systematize the results of regulatory reforms and supervision in the EU to achieve long-term financial stability and benchmark methods for assessing systemic risks.
- To outline the specific features, factual issues and current main challenges for the management of systemic risks in the EU financial system, including the results of a study on the macroprudential policy of the BNB in the period 2009-2020 and the impact of shadow banking in the EU on systemic risks.

The **methods of** comparative analysis, induction and deduction, descriptive, historical, critical, inductive and deductive analysis; comparative analysis and statistical data analysis are used in the development.

5. SCOPE OF THE STUDY

The scope of the paper gives priority to the analysis of the implementation of systemic risk management policies and their outcomes ². In this paper, the focus is mainly on systemic risk management in banking, although the discussion is not generally limited to banks. It also includes insurance companies, but we focus on banking institutions given their key place and share in the overall EU financial system.

6. LITERARY BASIS OF THE STUDIED ISSUES

The dissertation is based on the reflections and observations of Bulgarian and foreign researchers in the field of risk management in the banking sphere, as well as macrofinance. The Bulgarian authors directly involved in the development are. A. Zahariev, S. Prodanov, B. S. Prodanov, A. Bozinov, V. B. Prozdanov, B. Milinov,

² Notes. Policy application considerations and implication.

J. V. Simeonov, S. Trifonova, G. Mikhailova, I. Mikhailov, T. Dimitrova, etc. Many foreign authors have also made significant contributions.

7. APPLICABILITY OF THE STUDY RESULTS

The theoretical considerations and conclusions developed in the thesis, as well as the statistical results of the study, aim to support the notion that the implementation of macroprudential aspects of policy, regulation, supervision and instruments is a necessary condition for managing systemic risks in the modern EU financial system and for ensuring financial stability. The author maintains that the long-term outcomes of systemic risk management depend mainly on the preparedness of the financial system to deal with it. The magnitude of shocks to a financial system will be significantly weaker if managers of financial institutions are well prepared to manage systemic crises.

Financial crisis escalation is often the result of poor decisions due to a lack of crisis management protocol, and the financial industry's track record on crisis protocol is poor.

The in-depth analysis of the EU macroprudential policy, including Bulgaria's, points out how a proper and timely implementation of a system of macroprudential tools in the banking system could lead to an improved outcome in systemic risk management. The results of these analyses and discussion could motivate a change in macroprudential policy and regulation, in the insurance system and in the shadow banking system in order to effectively and timely manage systemic risk to reduce vulnerabilities in the financial system.

It analyses the adequacy of countercyclical capital buffers and provisions, systemic risk buffer, sectoral capital requirements, measures to limit liquidity and currency mismatches, and caps on loan-to-value (LTV) and debt-to-income (DTI) ratios applied over the last ten years. According to the analysis carried out, the use of these buffers and measures was found to be associated with a number of problems, but overall, thanks to their implementation and what was done by central banks in the EU, banks in Europe entered the global economic crisis triggered by COVID-19

well prepared and managed to ensure adequate credit activity at levels that were healthy for the economy and banks, controlling the accumulation of risks in the financial system and mitigating shocks.

As a result of the comparative analysis carried out and the problems noted in the application of methods and indicators for measuring systemic risk and financial stress in Europe and worldwide, it is confirmed that the development of a unified composite index for measuring financial system stress and systemic risk will prove challenging, as a complete unified analytical framework with well-defined and quantifiable indicators for its proper functioning has not yet been developed (Mencía and Saurina, 2016). Most indices constructed to measure financial stress and systemic risk differ either in the number of market segments included, the variables to be used in each market segment, or the frequency of data or methodologies. Here comes the role and place of regulators and supervisors as an important factor in the application of macroprudential policy.

Last, but not least, the literature and information sources used in the dissertation, the econometric models developed and adapted, the research and knowledge representation approaches learned and mastered are extremely useful for the author in his work as an economist and improve his competencies and performance.

II. STRUCTURE OF THE DISSERTATION

The dissertation has a total length of 240 standard pages, structured in three chapters as follows:

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ABBREVIATIONS USED

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DECLARATION OF ORIGINALITY OF THE THESIS

III. SYNTHESIZED STATEMENT OF THE THESIS

Introduction

The introduction presents the relevance of the problem developed in the dissertation, the importance of the topic and the motivation for the study of systemic risk in the EU financial system. The object, the subject, the main goal, the objectives, the research thesis, the research questions posed by the author, the set of research methods used as well as the limiting conditions are defined.

CHAPTER ONE. THEORETICAL AND APPLICABLE ASPECTS OF SYSTEMIC RISKS IN THE EU FINANCIAL SYSTEM WITH A HISTORICAL REVIEW OF THE PERIOD AFTER THE GLOBAL FINANCIAL CRISIS 2008-09.

Chapter One is theoretical and applied. It is 68 standard pages and is structured in six paragraphs within which the main aspects of the philosophy of systemic risk are explored.

The first **paragraph** of the first chapter analyses the essence of the main concepts such as systemic event, systemic risk, financial stability, macroprudential policy, etc. , reviewing literature and practice on these concepts. Systemic risk can be defined as the risk associated with the collapse or failure of a financial institution or an entire economy. The most important characteristic of systemic risk is that risk spreads from unhealthy institutions to relatively healthier institutions through a transmission mechanism.

Following the global financial crisis of 2007-2009, the vulnerability of the global economy to the distress of individual major banks and other financial institutions has led to a shift in the focus of international regulatory approaches from microprudential to macroprudential regulation. Microprudential regulation is mainly concerned with the solvency risk of individual institutions arising from their individual exposures to the underlying market risk, i.e. systemic risk. The

contribution of institutions to crises, i.e. systemic risk, is central to macroprudential regulation. Following this change, a number of banks and insurers have been designated as systemically important by the Financial Stability Board (FSB) and the International Association of Insurance Supervisors (IAIS). These Systemically Important Financial Institutions (SIFIs) are subject to closer monitoring and regulation and are a key integral part of the money flow cycle in the national and global economy.

In the **second paragraph**, the concept of systemic risk is reviewed and a review of multiple definitions of systemic risk in the literature is presented. The aim is to introduce a 'way of thinking' about systemic risk that explains the phenomenon and facilitates analysis, and to select an appropriate set of actions to mitigate systemic risk. Definitions are provided for a group of key terms used in the thesis, with the key term being the definition of systemic risk, perceived as the risk of a systemic event occurring. The institutional interpretation suggests that systemic risk is the risk of disruption to the provision of financial services caused by a deterioration in the health of all or parts of the financial system with serious negative consequences for the real sector (IMF, FSB, and BIS, 2009). Negative disruptions can manifest themselves in (1) falling asset prices and increased volatility (Bordo and Schwartz, 2000; Illing and Liu, 2003); (2) exchange rate depreciation or loss of official foreign exchange reserves (Eichengreen, Rose, and Wyplosz, 1996); (3) widespread defaults and defaults by borrowers, lenders, and market participants (Breuer, 2004; Claessens and Kose, 2014); and (4) rising interest rates or constraints in credit supply.

Paragraph three covers forms of systemic risk. Academic research recognizes three main "forms" of systemic risk: risk from "contagion," risk from macro shocks causing simultaneous problems, and risk from imbalances that have accumulated over time. These three forms of risk can occur independently of each other or in combination with each other. The first form occurs when the failure of one bank triggers the failure of another bank, even though the second bank initially

appeared solvent. Some of the most frequently cited authors dealing with contagion, such as Kaminsky and Reinhart, (2000); Allen and Gale, (2000); Forbes and Rigobon, (2002); Bae et al. (2003); Bekaert et al. (2005), are discussed in the discussion, and a matrix of contagion is also presented. The second form of systemic risk refers to a widespread exogenous shock that adversely affects a number of intermediaries and/or markets simultaneously in the same way, with banks being vulnerable to sudden economic downturns. The third manifestation of systemic risk is a form of the endogenous build-up of imbalances in financial systems over time, as in the case of credit booms. Interbank markets have been the main source of systemic risk in the last two financial crises. The academic literature has paid particular attention to the dangers of unsecured interbank markets in times of instability since the mid-1990s. One channel for contagion is through physical exposures between banks in these markets.

Paragraph four covers an analysis of approaches to assessing systemic risk, with an emphasis on the need to assess the specific characteristics of the systemic event at hand. Authorities and institutions may pay attention to:

- the specific events that lead to a crisis;
- an assessment of whether the systemic event is idiosyncratic or systemic, i.e. whether it affects an isolated part of the financial system or affects different elements of the financial system simultaneously;
- assessing the level of resilience of the financial system and the state of the real economy.

Subsequently, the initial **impact of the systemic event that led to the crisis on financial institutions, financial infrastructure, financial markets and the real economy must** be analysed. This is the framework underlying systemic risk analysis. In carrying out the actual assessment, it is important to take into account the **effectiveness of risk mitigation measures already in place**, (e.g. capital buffers, hedging against adverse developments in financial markets and insurance policies). After assessing the initial impact, the next step is to assess the adverse

causes by assessing the expected direction and intensity of contagion effects, which is the contagion matrix.

A systematic summary of the difference between micro- and macro-approaches to assess the systemic risk environment is presented in **paragraph four**. The microprudential approach is problematic because ensuring the soundness of an individual financial institution is not sufficient to ensure that the financial system as a whole remains sound. Another criticism of this approach is that if regulators do not take into account the collective behavior of institutions in response to a shock (or to regulatory requirements) and its possible impact on the financial system and the economy, they may fail to minimize the likelihood of distress to the system as a whole and the associated systemic risk (Crockett 2000; Borio 2003, Kashyap and Stein 2004).

When comparing micro and macro approaches to assessing the systemic risk environment - for example, the financial condition of banking institutions - the following key differences can be identified:

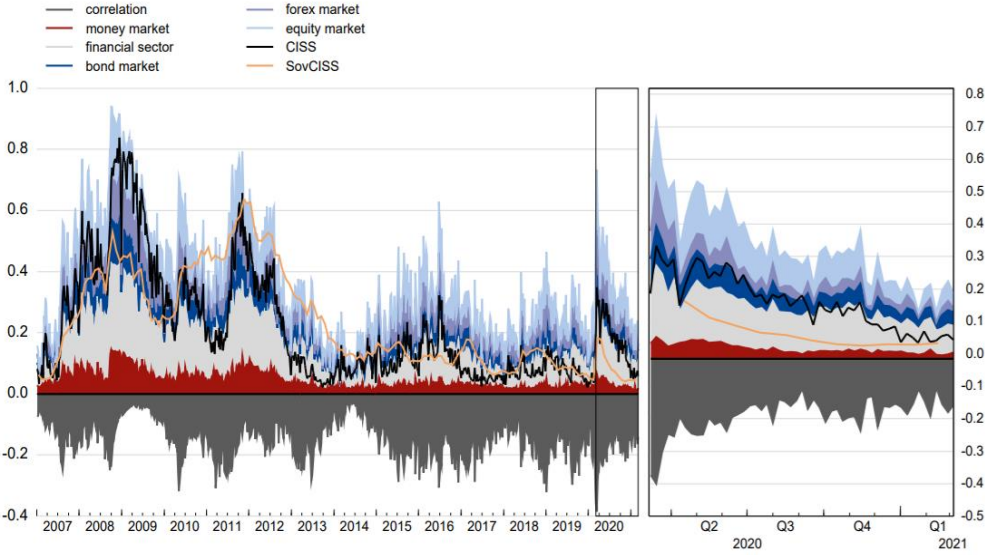
- while the aim of the macro approach is to limit the likelihood of widespread distress in the financial system and avoid significant losses in real output, the focus of the micro approach is on reducing the probability of failure of individual institutions and protecting customers.
- The micro approach measures endogenous risk, while the macro approach measures systemic risk of the financial system as a whole and risk is viewed as dependent on collective action.
- The macro approach assesses the soundness of the entire financial system and uses risk management tools, including the Financial Soundness Indicators methodology (IMF (2009)); financial soundness indicators; measures of capital adequacy, asset quality, governance assessment and liquidity position.

The recent global financial crisis of 2008-2009 highlights the importance of systemic risk and the failure of microprudential regulation to contain it. Logically, therefore, in a 2008 statement, US Federal Reserve Chairman Ben Bernanke called for expanding the "field of view" of regulators and supervisors to include systemic risk (Bernanke 2008).

In **paragraph five**, an in-depth analysis of known measures of systemic risk is presented, where systemic risk can be analysed either in a temporal dimension or in a structural (cross-sectional) dimension. First, the temporal dimension relates to the accumulation of risks over time and the procyclical build-up of financial vulnerability. Second, the structural (or cross-sectional) dimension of systemic risk focuses on how a particular shock in the financial sector can spread and become systemic. The measurement of systemic risk through composite indicators of systemic risk or financial stress is discussed in more detail. An example is the ESRB composite euro area-wide systemic stress indicator CISS, for the period 2007 to August 2021. There is a broad coverage of both the onset of the global financial crisis and its transformation into the current situation triggered by COVID - 19. Overall, the indicator shows a gradual increase in the level of financial stress, which culminated in 2008-09 and was caused by the collapse of Lehman Brothers in September 2008 and the series of serious consequences for the global economy and the EU financial system.

In the meantime, the European Central Bank and the European Commission have undertaken a broad system of monetary and fiscal policy measures aimed at stabilising systemic risk and reducing market uncertainty (expressed in a reduction of the ECB's main refinancing rate, the acceptance of more financial assets as collateral for emergency funding, a covered bond programme). These policies led to a reduction in the level of financial stress and we observed a relatively low and stable level in 2010, but this did not last long as the debt crisis in Greece led to a new outbreak of financial stress, followed by a new spike in the index, following the need for financial assistance and austerity measures for Ireland (2010) and Portugal in

early 2011. Financial stress remained high until the end of 2012. This is followed by a period of stabilisation of elevated systemic risk, namely 2013-2019, with a subsequent increase due to economic and financial vulnerabilities driven by Covid-19.



Source: ESRB Risk dashboard (Sep.2021)

Figure A1: ESRB composite indicator of systemic stress
 (Last observation: 3 September 2021)

Paragraph six focuses on the role of the interbank market in the propagation of financial crisis or instability. Interconnections between banks could have an impact on the entire financial system and, moreover, on the state of the entire economy. The pattern of interbank linkages could affect the way in which a crisis spreads through the system. Theoretical studies often apply network theory to the banking system and in particular focus on the completeness and connectivity of the interbank matrix. Some of the authors who examine the importance and structure of interbank market and relationships include Allen and Gale, Freixas, Parigi and Rochet, Furfine, Degryse and Nguyen, Upper and Worms, and others.

CHAPTER TWO. METHODOLOGICAL AND APPLIED ASPECTS OF SYSTEMIC RISK MANAGEMENT IN THE EU FINANCIAL SYSTEM

Chapter 2 provides an in-depth reflection on the aspects and issues of systemic risk regulation and management in the EU financial system. The reflections are structured in relevant paragraphs.

The **first paragraph** is devoted to an overview of the failures of financial regulation and supervision prior to the 2008-09 GFC, which can be summarised most succinctly in three aspects: the shortcomings of financial regulation and supervision, which was ill-equipped to anticipate the concentrations of risk and perverse incentives behind the boom in financial innovation; the failure of monetary policy to address the build-up of systemic risks in the financial system and the housing bubble; and the weak global architecture, where a fragmented surveillance system This paragraph also examines the reforms in financial market regulation in the EU that have taken place since the 2007-08 financial crisis, with over 40 more systemically important legislative proposals since then, most of which have been adopted and enacted. Only some of the more important reforms and measures are analysed here. An important element in strengthening the EU's financial institutional framework is the creation of the Banking Union, designed for euro area Member States where the euro is the currency. An analysis is made of the objectives of the union and its four complementary pillars, namely the Single Supervisory Mechanism (SSM), which aims to have the supervision of banks move to a supranational level; the second pillar is the creation of a single resolution mechanism to coordinate the application of resolution tools and reflects an organisational structure similar to that of the SSM; The third element of the Banking Union concerns the establishment of a single harmonised bank deposit guarantee scheme (EDIS); The fourth element of the Banking Union, which ensures consistency of supervisory practices within the Banking Union, is a single rulebook and a single supervisory manual.

Another important EU financial sector reform is the adoption of a new framework for the resolution of credit institutions (banks) and investment firms. The aim here is to provide a harmonised legal basis across the EU for the resolution of these types of financial institutions in the event of resolution measures being put in place where necessary and to avoid, where possible, insolvency proceedings, especially if they are systemically important, being allowed to fail. The legal framework is Directive 2014/59/EU establishing a framework for the recovery and resolution of credit institutions and investment firms.

An overview is given of the macro-prudential requirements in place in each country's national legislation. For example, with the introduction of Basel III in Europe (CRD IV/CRR), a specific 'systemic risk buffer' is proposed. However, there is still limited evidence on how successful capital requirements have been in reducing systemic risk. At the heart of these reforms are efforts to strengthen the regulatory framework for banks' capital buffers. Thus, Basel III increased the minimum Tier 1 capital requirement from 4% to 6%, which also provoked a significant scope for additional capital buffers. Increased buffer requirements have made banks significantly more stable when considering regulatory measures of bank capitalisation. This leads policymakers to conclude that the financial system is significantly more resilient to asset value fluctuations today compared to the pre-crisis period (Yellen, 2018).

A review of bank stress tests is conducted, confirming the conclusion that banks are increasingly applying stress tests and using the results to outline strategic and business decisions. Understanding the capabilities of stress tests, their limitations and the impact of model uncertainty on stress test results are critical. Most banks in Europe now have MRM departments and employ risk analysts and a risk manager to develop and maintain their risk models.

The second paragraph of Chapter Two of the thesis examines and analyses the changes in the EU architecture for financial supervision and regulation since the

2008-09 GFC , as well as the ECB's growing role in managing systemic risks in the euro area.

In line with the recommendations of the High Level Group chaired by Jacques de Larosière, a European System of Financial Supervision (ESFS) was established on 1 January 2011. This system is organised around two inseparable and complementary pillars, the micro-prudential and the macro-prudential approach. The chart below presents the institutional structure of the ESFS and the core functions of the different actors. The ESFS is an integrated network of national and EU supervisors that delegates day-to-day supervisory responsibilities at national level. The main reason for the creation of the ESAs is to ensure closer cooperation and better information exchange between national supervisors, to facilitate the adoption across the EU of cross-border issues and to advance consistent interpretation (De Haan, et al, 2015).

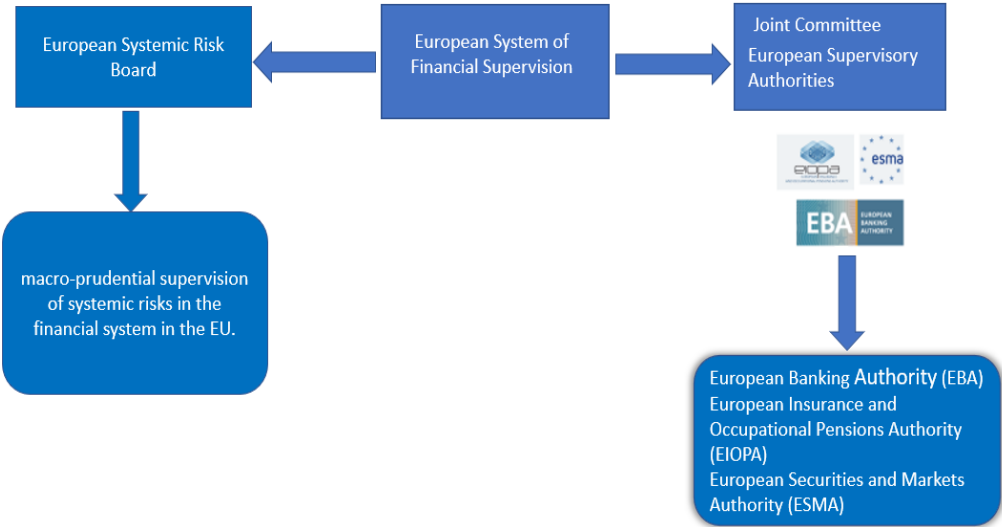


Figure A2. The **institutional structure of the ESFS and core functions**

Source: adapted from ESRC database

With regard to the ECB, it is recognised that, since its establishment in January 1999, the Bank has had responsibilities for the conduct of euro area monetary policy and has exercised its supervisory responsibility with due regard to

the principle of proportionality. The ESCB consists of the ECB and the national central banks (NCBs) of all EU Member States, whether or not they have adopted the euro. The European Central Bank is responsible for the prudential supervision of credit institutions in the euro area and in participating non-euro area Member States. Its responsibility is under the Single Supervisory Mechanism, with the involvement of national competent authorities. This paragraph also discusses the main objectives and channels of influence of the ECB's monetary policy, emphasising that monetary policy should take into account financial conditions as part of the economic environment and that in the transmission mechanism of monetary policy, asset prices play an important role, as they can affect aggregate demand and inflation. However, monetary policy cannot set specific targets for financial asset prices. The central bank acts as a lender of last resort and can thus help maintain financial stability. **The joint use of three different instruments, namely monetary policy with fiscal and macroprudential policy, leads to the prevention and reduction of financial risks.**

It sets out the legal framework for all prudential requirements for credit institutions ("banks") and investment firms in relation to capital, liquidity and credit risk set out in the Capital Requirements Regulation 2014 and the Capital Requirements Directive - CRD IV. The definition of capital and capital requirements under Basel III is examined in depth, and it could be argued that the most visible reform at the international level is the new Basel III rules (BCBS (2011)), which include higher capital requirements with a countercyclical component and a framework for liquidity regulation, expressed mostly in:

- **Liquidity requirements** - Under Basel III, in a crisis, financial institutions should maintain, for a period of 30 days, liquid assets of at least 25% of outflows to cover them.
- **Capital Requirements Directive.** It has been transposed into the national laws of EU Member States and sets out rules on capital buffers, prudential

supervision, corporate governance, bankers' remuneration and bonuses and prudential supervision.

- **Capital buffers** - all banks are required to maintain a precautionary capital buffer and a countercyclical capital buffer to be able to absorb losses in the event of a crisis, with a capital requirement for banks of 4.5% of CET 1.
- **Systemic risk buffer - Member States** have the right to require banks to have a systemic risk buffer of 1% to 3% for all exposures and up to 5% for their own and third country exposures.
- **Global Systemically Important Institutions buffer** - this becomes mandatory for all banks that are designated by the competent authority as "global systemically important institutions" (G-SIIs). It is intended to avoid the possible consequences of a bank failure.
- **Bankers' bonuses** - a cap is imposed on the amount of the bankers' bonus, which is 1:1 relative to the variable remuneration, so the amount be less than or equal to the fixed remuneration.

One criticism among academics is that the goal is that rather than imposing one-size-fits-all rules, regulators should understand how information and incentives work at the local level and seek to use them to develop the financial sector. Avoiding costly approaches to regulation that are open to innovative ways to stimulate access to finance should be priorities for all, but especially for lower-income countries. In short, banking regulators should avoid the strategy of controlling the entire financial sector and stick to what is or functions as a bank.

Macroprudential policy could play a key role in ensuring system-wide stability by increasing the resilience of the financial system by containing the financial cycle through targeted prudential tools.

The **third paragraph** also examines the effectiveness of macroprudential tools and highlights the preventive role of macroprudential policy in limiting the possibility and impact of financial crises, concluding that the macroprudential

policy mix should be chosen to address both the temporal and cross-sectional dimensions of systemic risk. Regulatory reforms aim to achieve financial stability, and this can be done in two ways: first, by reducing the likelihood of financial systemic crises and, second, by reducing the costs borne by the rest of the economy in situations of financial system shocks.

The use of capital regulation tools for financial institutions, liquidity requirements, leverage requirements, transparency concentration limits and stress tests can reduce the likelihood of financial crises. The tools used to counter systemic risk-the macroprudential tools used-are two main groups: structural tools and cyclical tools. Structural ones are used to add resilience to the financial system over the economic cycle. They can include capital requirements under the Basel III Accord, minimum liquidity requirements, resolution plans and centralised clearing institutions for derivatives markets. Cyclical instruments are designed to mitigate systemic risk that may be created within the cycle.

The question arises, how to limit the risks and how to prevent another financial crisis? A global regulatory reform initiative is being pushed forward to improve the resilience of financial institutions by limiting their risk-taking and incorporating prudential standards for financial regulation. The reform uses an increase in the risk weights of certain assets in the trading book and introduces internationally harmonised liquidity standards. The aim here is to increase transparency and accountability; and reform international financial institutions through international collaborations. The Financial Stability Board, as an international organisation with autonomy and capacity, is the coordinator for the implementation of reform activities. Prudential standards would not provide an adequate regulatory response to the crisis without the support of an impartial supervisor to monitor compliance and regulate the underestimation of risk during market expansion.

The **fourth paragraph analyses** the implementation of macroprudential capital instruments in EU Member States, distinguishing the different approaches of the responsible macroprudential authorities in these countries. In an economic boom,

lending increases freely due to an increase in bank capital. This leads to persistence in output and asset prices. This encourages banks to increase their leverage and lend more, leading to a level of lending to borrowing that makes the bank vulnerable to negative shocks. These patterns show how internal (endogenous) systemic risks emerge and propagate through the business cycle. Ways to address these emerging risks include the use of macroprudential tools such as countercyclical capital buffers, capital conservation buffers and stress testing.

For example, countercyclical capital buffers regulate credit growth by increasing risk-based capital requirements to prevent systemic risk. Capital conservation buffers help to increase a bank's capital above the required minimum in good times and thus ensure that losses are covered in times of crisis so that, when covering losses in bad times, their capital adequacy ratio remains above the required minimum. **Capital buffers, maintained in addition to** the capital requirements under Regulation (EU) No 575/2013, ensure that banks have sufficient capital accumulated to cover potential losses in adverse periods. In this regard, the BNB has issued Regulation No 8 on capital buffers for banks. In Bulgaria, an attempt has been made to apply the approaches adopted at EU level for the application of the significant institutions buffer and the countercyclical buffer in order to point out potential problems and opportunities for modification of the standard methodology.

Table A1.

Current levels of applicable capital buffers

Capital buffers applicable in Bulgaria	Buffer level	Entry into force	Scope	Note
Capital conservation buffer	2.5%	13.05.2014	All banks	Art. 3, Regulation No. 8 of BNB
				Applicable to general risk exposures.
Systemic risk buffer	3%	31.12.2014	All banks	Art. 12, Regulation No. 8 of BNB
				Applicable to risk exposures in the Republic of Bulgaria, cumulative to other buffers.

Countercyclical capital buffer applicable to credit risk exposures in the Republic of Bulgaria	0%	01.01.2016	All banks	Art. 5, para. 3 and 4, Regulation No. 8 of BNB
	0.5%	01.10.2019		The institution-specific countercyclical capital buffer shall be calculated in the manner provided for in Article 6(1). 3 of BNB Regulation No 8 and the published applicable levels in EU countries.
Buffer for another systemically important institution	0.125% to 0.5%	01.01.2018	Eight banks	Art. 9 and 11, Regulation No. 8 of BNB
	0.25% to 0.75%	01.01.2019		Applicable to total risk exposures of banks identified as systemically important. Cumulative to other buffers.

Source.

As a result of the analysis carried out on the different ways in which the authorities in charge at national level determine the level of ACB, it is evident that they always combine quantitative indicators and qualitative judgement, using the principle of guided judgement.

The application of macro-prudential tools is based on quantitative methods to assess the relevant systemic risk, without being able to fully capture all aspects of financial stability risks and to meet the comparability requirements to mitigate systemic risk. It is also confirmed that the only appropriate choice for the EU is to strike a balance between the judgement of competent authorities taking into account the national specificities of the financial system by using a single assessment and calibration approach ensuring comparability and equity.

The **fifth paragraph** focuses on identifying the implications of a bank's adaptation to the new Basel III regulatory standards, which are being introduced with staggered phases and transition periods. The assumption is that banks anticipate the necessary improvements in capitalisation levels and changes in the structure of their balance sheets in order to effectively comply with the Basel III capital standards accompanying liquidity requirements. The main results suggest that small U.S. banks are strengthening their financial stability and loss-absorbing capacity as they expand both their commercial, retail, and other lending activities. However, large

U.S. banks strengthen their leverage ratios only when making riskier, illiquid commercial loans. Leverage ratios have had a significant and negative impact on the growth of retail and other bank lending for large European banks in the context of deleveraging and the 'credit crunch' in Europe during the post-2008 financial crisis. Bank stress tests are also based on Basel 3. Banks themselves increasingly apply stress tests and use the results to make strategic and business decisions. Understanding the capabilities of stress test models, their limitations and the impact of uncertainty on stress test results are critical. The increasing reliance on models, regulatory challenges and resources will drive banks to create a model risk management organization that is both more efficient and value-oriented, and it should incorporate stress testing models.

CHAPTER THREE. CONTEMPORARY CHALLENGES TO THE MANAGEMENT OF SYSTEMIC RISKS IN THE EU FINANCIAL SYSTEM

The **first paragraph** of Chapter 3 discusses measures to mitigate systemic risk in the EU financial system, presenting current issues in systemic risk management. The Basel Committee on Banking Supervision (BCBS) recommends future financial regulation for systemically important financial institutions (SIFIs). The Basel III framework recognises SIFIs, in particular global and national systemically important banks (G-SIBs and D-SIBs), and recommends increased capital requirements for them, the so-called "SIFI surcharges". Institutions are thus expected to change their market behaviour and internalise the externalities of the contagion. Instead of using quantitative models to measure systemic importance, the BCBS proposes a metrics-based approach that incorporates the size of banks, their interconnectedness, interchangeability, their global (inter-jurisdictional) activity and their complexity. A number of authors advocate different tax schemes to manage systemic risk, while others support regulation because of the inherent difficulties in

measuring systemic risk. Taxation schemes and related measures of systemic risk are typically based on the concept of the systemic importance of financial institutions that should be subject to a Pigouvian tax. In Leduc et al. (2017) discusses an alternative mechanism to reduce systemic risk through the use of credit default swaps (CDS).

The external assessment of the ECB's actions confirms the objectivity of the eight areas of deficiencies highlighted in a number of banks that raise concerns for the regulator:

- Early warning systems that lack detail, where indicators are mostly retrospective, thresholds are often not well calibrated and regular back-testing of indicators and triggers is not done as often as needed. Policies are observed that provide excessive discretion in addressing breaches, leading to inconsistencies in credit assessment, management and treatment.
- It has been observed that a significant number of banks do not always include in their policies clear and detailed criteria for effectively identifying financial distress. A significant number of banks do not include all relevant regulatory criteria in their policies, ignore built-in forbearance and/or breach of contract clauses in their loan portfolios, or do not monitor and enforce the good policies they have in place.
- We find that there are banks that have not collected updated information in a structured way or have not adopted additional payment probability triggers that would allow for pandemic specifics. Others do not account for additional support measures provided by governments that may mask the actual risk. In some cases, UTP triggers are removed or ignored. There are also cases of some structural problems, such as the lack of sector-specific indicators for UTP or of appropriate methodologies for assessing payment capacity.
- There are grounds for concern about whether banks consistently assign loans to Stage 2 when there is evidence of a significant increase in credit risk. In some cases, stage 1 debtors are re-priced to reflect the higher risk, but the

transfer to stage 2 is delayed. Delayed recognition of stage 2 exposures may result in inadequate coverage in terms of provisioning. Even in the presence of provisioning overlays, delayed management responses to deterioration in individual loans can lead to a build-up of NPLs.

- Some banks are found to use biased approaches that artificially stabilise provisions, for example by using a limited number of scenarios to forecast future losses that are not regularly updated with relevant macroeconomic data and that do not reflect the full range of uncertainty. Other banks have adjusted the triggers to reduce the number of transfers in stages. And sometimes these lists are not adequately adjusted to capture significant increases in credit risk.
- It also found that a number of banks lacked robust governance and high-quality risk management frameworks necessary to properly assess overlays. We observe that some banks do not have a formalized process, lack rationale for decisions, do not have independent internal validation or adequate escalation and supervisory board involvement.
- It is observed that banks do not comply with the ECB's NPL guidelines on the frequent monitoring and updating of collateral valuations where warranted and that there is no clear link between their market risk reviews and effective collateral revaluations.
- There are some inadequate practices in the way banks incorporate the potential impact of COVID-19 into their strategic and business planning, which could impact their preparations for an increase in the number of problem debtors. For example, there have been instances where scenarios are too optimistic and updates are not frequent enough.

Paragraph two covers the effectiveness of capital regulation. In general, there has been a global trend towards increasing minimum regulatory capital requirements /higher levels of regulatory capital actually held/ in order to make the banking system more resilient. The average level of regulatory capital held by banks

was higher at end-2016 than at end-2010. This is particularly the case in OECD high-income countries, where capital holdings increased from an average of 14.6% of risk-weighted assets (RWAs) in 2010 to 18.7% of RWAs in 2016.

The **third paragraph** focuses on the analysis of the COVID-19 pandemic as a possible source of systemic risk and financial instability in the EU and globally, as well as examining the scope of macroprudential policy and measures used by the ECB and the EU Member States in the context of the COVID-19 crisis. The overall macro environment, with the global pandemic COVID - 19 having a clear impact since March 2020, continues to be of concern and there is an environment with an elevated level of risk to EU financial stability, reflected in a slowdown in global economic growth and weaker trade and investment performance due to rising international market tensions. Thus, the revised global growth figures for 2019 point, not surprisingly, to a 2.6 per cent decline.

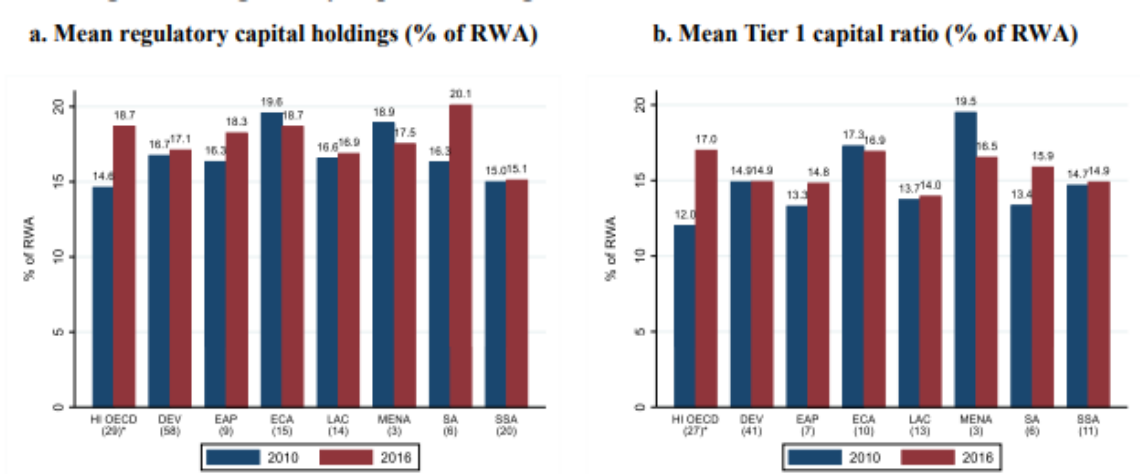


Figure A3. Lagged values of capital adequacy ratios (2010; 2016)

In the first half of 2020, the European economy is practically entering a sudden recession, marked by a deep contraction in output. This has led to restrictive measures being taken by a number of countries on a global scale (such as the voluntary closure of large sectors of the state economy) and, as a result, a sharp and widespread decline in global economic activity.

Since the beginning of the COVID-19 crisis, the use of macroprudential cyclical regulators has enabled banks to leverage the resilience achieved over the past few years, with most actions aimed at easing their capital requirements. They currently have significant capital and liquidity buffers and mortgage lending to households is limited and under control in many countries.

To tackle the impact of the COVID-19 pandemic on the financial sector, European and national authorities have acted swiftly. Several macro-prudential authorities in the euro area (including central banks and banking supervisors) introduced reductions in capital requirements, including the countercyclical capital buffer (CCyB) and other macro-prudential buffers. These measures, amounting to more than €20 billion of core Tier 1 capital held by euro area banks, facilitate the absorption of credit losses and support lending to the economy (Zahariev, et al., 2020a).

Paragraph four analyses the shadow banking system, which has almost doubled in size in the euro area over the past 10 years. This growth has arisen mainly for three reasons, namely: first, its close links with regulated banks; second, the supply of liquidity by investment funds has become critical to many markets but is procyclical; and third, rising synthetic leverage is reinforcing the procyclicality of both market prices and liquidity conditions.

The existing literature on the shadow banking system has identified several factors behind its boom in the last decade. Older studies emphasize the fact that stricter reserve and other regulatory requirements encourage the use of alternatives to traditional bank lending (Bernanke and Lown, 1991; Duca, 1992). However, Edwards and Mishkin (1995) also mention changes in information costs.

Within the EU, the European Commission (EC) published the first official note on shadow banking in the form of a Green Paper (see EC, 2012). The European Systemic Risk Board (ESRB) has published since 2016 a "Monitoring Shadow Banking" where it sets out its perception on the activities of the entity. The document presents measures of shadow banking, the first broad measures based on the

subjective approach used by the ESRB and the second narrow measures related to the FSB's economic function 22. The shortcomings of the broad measures are avoided when the bank and non-banks hold large portfolios of equities and these assets do not meet the economic functions of the FSB and should be removed from the balance sheet.

CONCLUSION

In the conclusion of the dissertation the results of the theoretical and applied research on the management of systemic risks in the EU financial system and the current challenges and problems related to it are presented. The realization of the set goals and objectives is reflected, which is used to argue the thesis of the dissertation. The concluding remarks focus on:

- Continuous monitoring and assessment of systemic risks in the EU financial system is highly imperative. The recent economic and financial crisis, which started in 2007-2008, further highlights the need for better systemic risk management. There are preconditions that supported the manifestation of a significant systemic event in 2008-09, one of the main ones being the desire of European leaders to continue to maintain strict regulation and supervision of financial institutions in the EU in order to ensure financial stability.

- The need for continuous development of the science and practice of systemic risk management. Systemic risk has proven to be much more than the composition of individual types of risk (credit risk, liquidity risk, operational risk, etc.) affecting individual financial institutions. Systemic risk has evolved with the development of financial markets, regulations and the collective behaviour of market participants and can be triggered by regulatory arbitrage Pawel (2014).

- The development of macro-prudential instruments and policies is proving to be an essential part of the financial stability and reform project related to the regulation and supervision of the EU financial system and the completion of the

Economic and Monetary Union, and it is also directly relevant to the management of systemic risk in the EU.

- Over the past ten years, important lessons have been learned to tackle the "too big to fail" problem. Several advances have been made by regulators around the world to improve the microprudential regulation of banks as well as the macroprudential regulation of the financial system as a whole. Other proposals, such as reducing the size of large banks, have not been implemented so far, as this would require determining an optimal bank size. This task may become an interesting issue for further research alongside the ongoing analysis of the determinants of the contribution of large financial institutions to systemic risk if future analyses confirm the results discussed in our sample and if the recently introduced regulatory measures fail to serve their intended purpose.

The theoretical, methodological and especially the analytical part of the dissertation research confirms the research thesis that by using macroprudential policy, regulation, supervision and macroprudential tools, effective management of systemic risks in the modern EU financial system can be achieved and also contribute to ensuring financial stability.

IV. GUIDELINES FOR FUTURE RESEARCH WORK ON THE TOPIC

With the above mentioned main research directions included in the scope of the dissertation, the problematics on the issue of systemic risk management is not exhausted. The topic continues to be relevant and the following directions for future research work on the issue can be indicated:

1. Study on the management of systemic risks in insurance and the implementation of macroprudential policy and measures.
2. Expanding the scope of systemic risk measurement for Bulgaria.
3. Incorporate more groups and types of models in a comparative analysis so that the problem of contagion in the transmission of shocks across banking systems is more fully explored.

V. STATEMENT OF CONTRIBUTIONS TO THE DISSERTATION

The dissertation highlights the following contributions of scientific and applied nature:

First. Systematise and analyse a wide range of academic and practical research on the nature, assessment, measurement, regulation and monitoring of systemic risks in the euro area and globally, contributing to building a multifaceted theoretical foundation to clarify the nature and importance of effectively managing excessive systemic risks and strengthening the early warning function of the current toolkit.

Second. The theoretical and methodological framework of Basel III with its components is critically presented and the important role of bank stress tests and regulatory policy in maintaining financial stability and managing systemic risks is highlighted. Through a deductive approach, an authorial interpretation of the current challenges of Basel III implementation is provided including the impact on the profitability of the banking sector due to conservative measures and standards, the complexity of information disclosure and reporting and last but not least data quality.

Third. The effectiveness and adequacy of the composite indicators and empirical methods used to measure systemic risks by both the ECB and other central banks in the countries of the Euro Union have been analysed, and according to the analysis, the use of these tools is associated with a number of challenges, and the use of predictive variables would improve their adequacy in measuring and reporting systemic risk.

Fourth. A comprehensive, systematic and comparative analysis of the implementation of macroprudential instruments in the EU and Bulgaria has been carried out. Based on this, the necessity and the role of macroprudential mechanisms in the banking sphere are clarified, and it is confirmed that macroprudential instruments introduced in the EU are effective, but are highly

dependent on the assessment of systemic risk/significance, which sometimes causes difficulties in their comparability. Numerous arguments are given to support the conclusion that the construction of an internationally comparable assessment based on uniform quantitative indicators is not possible, which is why the role of regulators and supervisors remains a key ongoing factor in the application of macroprudential policy and calls for a focus of resources in this area.

Fifth. Based on the analysis of macro-prudential policies conducted within the EU and globally, the most important challenges for the ECB and other central banks to ensure financial stability in times of widespread crises such as the COVID-19 crisis are outlined, key of which are: to write a protocol for crisis response; to strengthen the accountability of the ECB to the European Parliament and the accountability of local national banks to the ECB with the possibility of a stronger sanctioning function for the bank and the country lagging behind in implementation

Sixth. Revealing problematic aspects/weaknesses in the analytical, normative, analytical and applied aspects of systemic risk management in the EU financial system, important recommendations on the subject are made, namely (i) a deeper knowledge of the effects of macroprudential policy and its interaction with monetary policy, which would lead to a more effective application of macroprudential policy instruments. (ii) a more forward-looking analysis of systemic risk based on forecasts rather than only on an analysis of current and historical data, and to ensure early detection of risks and timely activation of macroprudential policies, the analysis should be more forward-looking; and (iii) provide a better formulation/definition of systemic risk, based on a thorough analysis of vulnerabilities in the EU financial system and in other countries, and the approach should continue to be flexible and pragmatic, taking into account the importance of country-specific circumstances and uneven data availability for adequate decision-making.

VI. DECLARATION OF ORIGINALITY AND RELIABILITY OF THE DISSERTATION

The dissertation in the volume of 230 pages under the title: '*Current Challenges for the Management of Systemic Risks in the EU Financial System (Global and Regional Aspects)*' is authentic and represents the author's own scientific production. It uses the author's own ideas, texts and visualisation through graphs, charts, tables and formulae, and complies with all the requirements of the Copyright and Related Rights Act by properly citing and referencing other authors' thought and data, including:

1. The results achieved and contributions made in this dissertation are original and have not been borrowed from studies and publications in which the author has not participated.
2. The information provided by the author in the form of copies of documents and publications, personally compiled reports, etc. corresponds to the objective truth.
3. Scientific results that have been obtained, described and/or published by other authors are duly and extensively cited in the bibliography.

30 October, 2021

Doc: Mariana Moneva Daou

VII. LIST OF PUBLICATIONS OF THE DOCTORAL CANDIDATE

During the PhD the author has participated in five conferences and round tables with presentations and papers:

STUDIES PUBLISHED IN UNREFERRED SCIENTIFIC REVIEWS OR PUBLISHED IN EDITED COLLECTIVE VOLUMES (1 pc.)

Daou, M. (2019). Macroprudential policy and measures used by EU Member States to support economies in the COVID-19 context. *Annual Doctoral Research Almanac 2020, Issue XIII, Book 16 - Studies and Articles*. (pp. 187 - 210). Available at: <https://almanahnid.uni-svishtov.bg/title.asp?title=2645>

PAPERS PUBLISHED IN UNREFERRED SCIENTIFIC REVIEWS OR PUBLISHED IN EDITED COLLECTIVE VOLUMES (4 pcs.)

Daou, M. (2020). *Central Banks in achieving financial stability*. e-Online International Scientific-Practical Conference, December 11, 2020, ASEM, Chişinău, Moldova: "Economic security in the context of sustainable development". <https://www.researchgate.net/publication/349324496>

Daou, M. (2021). Financial technology (FinTech) and its application and impact in logistics. Scientific conference on "Logistics and public systems", organized by the National Military University "Vasil Levski". 25-27 February 2021, Proceedings, (pp. 1046-1056) Electronic edition, National Military University "V. Levski", ed. B. Tarnovo, ISSN 2738-8042 <https://www.researchgate.net/publication/351658180>

Dauo, M. (2021) . Policies taken by the EC and the ECB to preserve financial stability in the COVID - 19 crisis. Twenty-fifth Student Research Conference on Global and Regional Dimensions of International Economic Relations (Proceedings), (pp. 65-73) 14-16 May 2021, D. A. Tsenov Academy of Economics, ISSN 2738-8573 <https://dlib.uni-svishtov.bg/handle/10610/4478>

Dauo, M. (2021). Unconventional monetary policy tools of the ECB during the COVID - 19 pandemic. Final International Scientific Conference on Innovative Unconventional Monetary Policies of Leading Central Banks and their Effects for Developed and Developing Countries with a Focus on Bulgaria (Proceedings) 9 - 10 October 2021. University of National and World Economy and Scientific Research Fund at the Ministry of Education and Science (in press).

**VIII. REFERENCE FOR COMPLIANCE WITH THE NATIONAL REQUIREMENTS
UNDER THE REGULATIONS FOR THE APPLICATION OF THE LAW FOR THE
DEVELOPMENT OF ACADEMIC STAFF IN THE REPUBLIC OF BULGARIA**

National requirement in number of points: **30**

Number of studies indexed in NACID: 1 pc.

Number of points from articles indexed in NACID: **15,00**

Number of reports indexed in NACID: 4 pcs.

Points scored by the author through scientific reports: **40,00**

Total points: **55,00 > 30,00**