CLIMATE CHANGES: ECONOMIC IMPACT AND IMPLICATION

Vesna Martin¹

The National Bank of Serbia, Belgrade, Serbia²

Abstract: Climate changes nowadays present a topic of huge importance taking into account its influence on conducting monetary and fiscal policy, achieving and improving financial stability, but also it is a concern for regulators and supervisors. In order to have an appropriate reaction, it is necessary to identify risk from climate changes in a timely manner. Three categories of climate-related risks can be identified: 1) physical risks which are associated with more frequent severe weather events and permanent changes in the environment, 2) transition risks that represent the policies and technological changes needed to achieve a greener economy and 3) liability risk which represents the impacts that could arise tomorrow if parties who have suffered loss or damage from the effects of climate change seek compensation from those they hold responsible. As a way to achieve satisfactory results in the fight against climate change risks, the financial institutions developed climate change risk management approaches, which include a variety of methods and instruments. The aim of this paper is the presentation of impact and implication regarding climate change regulations, identification of the risks and its management approaches, as well as economic cost and proposals for future action.

Keywords: climate changes, financial stability, regulations, green finance, sustainable development

INTRODUCTION

During the last global crisis, 2007/2008 entire financial and the real system had been learned many lessons, but the financial system is still in danger. This danger is represented in the risk of climate change, which is the next challenge for financial stability (Dafermos 2018, p. 1). The crisis of 2007/2008 was caused, among other things, by the lack of connection between the interests of bankers, savers, and investors and the risk that was not foreseen by regulators and shareholders. Financial and economic crises, which started in 2007 in the USA, had an influence on global central banks to implement non-standard monetary policy measures, which were ranging from liquidity and credit facilities to asset purchases and forward guidance (Martin, 2019, 35). Climate change is the result of the actions of nature that humans unnecessarily and aggressively causes. The number of paper which are dealing with climate changes issues is significant and still growing (see for instance Ruiz et al. 2020;

¹ martin0803@hotmail.com

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Hughes 2020; Ryley et al. 2020; Oka et al. 2020; Austin et al. 2020; Dougherty et al. 2020; Filho et al. 2020; Hewawasam& Matsui 2019; Ren et al. 2020; Tonmoy et al. 2020; Walsh et al. 2019; Alves et al. 2020).

Managing director of the International Monetary Fund (IMF) Kristalina Georgieva in her speech at the Petersburg Climate Dialogue XI in April 2020 point out that taking measures now to fight the climate crisis is not just a “nice-to-have.” It is a “must-have” if we are to leave a better world for our children (IMF). In this sense fight against climate change is not something that governments, central banks, and other financial institutions need to implement. It is more their obligation to have coordinated action in order to keep and improve financial stability, as one of the important precondition for healthy and prosperous economic development. Deprived of that on a global level there is always a risk from climate change and the cost of crisis remediation may be greater than the preventive action to combat the risk of climate change. Government policies, programs, and projects need to be flexible—meaning they are warranted on cost-benefit grounds across a range of climate scenarios, and that they can be adjusted as climate impacts materialize (Farid, 2016, p. 31). In addition to fiscal policy solutions, economic policy is also conducted by central banks in the form of monetary policy, which aims, among other things, is to stabilize the economy in the short term and maintain a low and stable rate of inflation (Olovsson, 2018, p. 3). Sound implementation of monetary policy requires a comprehensive and conservative consideration of all risks, including climate risks (Monnin, 2018, p.1). A central bank following strict inflation targeting would react to an extreme weather event by tightening monetary policy to stem the rise in inflation (McKibbin, 2017, p. 20). There is growing literature interest regarding the potential use of monetary policy in tackling climate change (see for instance Rozenberg et al., 2013; Campiglio, 2016; Monasterolo and Raberto, 2018)

The used methods of analysis are inductive and deductive analysis, method of analysis and synthesis, classification method, and comparison method. This paper is organized in the following order. In the first part, we are going to present regulation related to climate change, the second part is devoted to the identification of the risk from climate changes and the third part is focused on presentation climate change risk management approaches. The fourth part of the paper is dealing with climate change in Serbia, while the fifth and sixth parts are devoted to economic cost and future action of climate change. In conclusion, we are going to summarize the main points of this paper.

1. REGULATION REGARDING CLIMATE CHANGES

Climate change and the reaction of the public sector and society to them have led to the identification of new sources of financial risk to which regulatory and supervisory bodies are paying more attention. In this order, numerous regulations had been implemented as a way to prevent significant damage which can come from climate change risks materialization. As in the financial world, climate change thus constitutes a systemic risk against which specific ex-ante and ex-post monetary policies and financial regulations should be deployed (Aglietta & Espagne, 2016, p.3). According to D'Orazio & Popoyan (2018, p. 6) considering the negative externalities deriving from climate-related financial risks, regulatory authorities can suggest measures that could allow banks to increase long term lending, without harming the financial system's stability.

In 2017 European Commission adopted Guidelines on non-financial reporting (2017/C 215/01), with the aim to help companies disclose high quality, relevant, useful, consistent, and more comparable non-financial (environmental, social and governance-related) information. In November 2019 European Parliament and European Council adopted Regulations on sustainability-related disclosures in the financial services sector (EU Regulation 2019/2088) and Regulations on EU Climate Transition Benchmarks, EU Paris-aligned Benchmarks and sustainability-related disclosures for benchmarks (EU Regulation 2019/2089). The aim of these two regulations is to increase transparency for all participants in the financial market and financial advisors regarding the integration of sustainability risk into their processes and provision of methodologies for EU climate criteria.

EU Technical Expert Group (TEG) on Sustainable Finance in the period from July 2018 till June 2019 developed the Taxonomy Technical Report (Figure 1) in relation to the development of an EU classification system for environmentally sustainable economic activities.

This document has six parts (Taxonomy Technical Report, 2019, p. 2):

(A) *Explanation of the taxonomy approach* – this part explains the role and importance of sustainable finance in Europe from a policy and investment perspective and the rationale for the development of an EU Taxonomy.

(B) *Methodology* - this part explains the methodologies for developing technical screening criteria for climate change mitigation objectives, adaptation objectives, and 'do no significant harm' to other environmental objectives in the legislative proposal.

(C) *Taxonomy user and use case analysis* - this section provides practical guidance to potential users of the taxonomy, including case studies.

(D) *Economic impacts of the taxonomy* - this section provides the TEG's analysis of the likely economic impacts of establishing an EU taxonomy.

(E) *Next steps for the taxonomy* - this section elaborates on unresolved issues and potential ways forward for the taxonomy and the technical work of the platform on sustainable finance.

(F) *Full list of technical screening criteria* - this annex sets out the sector- and economic activity-specific technical screening criteria and rationale for the TEG's analysis.

Figure 1.: Timeline for taxonomy development

Source: Taxonomy Technical Report, EU Technical Expert Group

Mutual Taxonomy Technical Report of the EU is important because represent a tool that can enable capital markets to identify and respond to investment opportunities that contribute to environmental policy objectives.

In August 2018, European Insurance and Occupational Pensions Authority (EIOPA) received a request from the European Commission for an opinion on sustainability within Solvency II, with a particular focus on aspects relating to climate change mitigation. For that reason, in September 2019 EIOPA published a report „Opinion on Sustainability within Solvency II”. It concluded that Solvency II is already well equipped to reflect sustainability risk factors and urged (re)insurers to implement measures addressing climate change-related risks. In the area of financial stability EIOPA is engaged in the preparation of a sensitivity analysis exercise for climate-related risks to take place in 2020, also is

dedicated to make analysis on climate-related risks in its financial stability reports and to enhance supervisory stress testing methodology to incorporate climate-related risks.

On April 2019 European Securities and Markets Authority (ESMA) published „ESMA’s technical advice to the European Commission on integrating sustainability risks and factors in the UCITS Directive and AIFMD”. ESMA has recommended changes to the requirements for the integration of EU investment fund sustainability risks in their internal processes and controls.

Few regulatory bodies published an action plans setting out their medium-term program of work to address risks related to climate change. In order to set an EU strategy on sustainable finance and a plan for future work across the financial system European Banking Authority (EBA) in December 2019 published „EBA Action Plan on Sustainable Finance”. In this document, EBA stress out two goals regarding the plan on sustainable finance: (1) improving the current regulatory framework for institutions to foster their operations in a sustainable manner and to improve their risk management and (2) providing supervisors with adequate tools to understand, monitor and assess environmental, social, and governance (ESG) risks in their supervisory practices. Besides the EBA Action Plan on Sustainable Finance, in 2019 EIOPA revealed „Sustainable Finance” ensuring that insurers and pension funds operate in a sustainable manner, and in February 2020 ESMA published its Strategy on Sustainable Finance. The key priorities for ESMA include transparency obligations, risk analysis on green bonds, ESG investing, the convergence of national supervisory practices on ESG factors, taxonomy, and supervision.

2. IDENTIFYING RISKS FROM CLIMATE CHANGES

Climate change is no longer a future threat, some of its effects are already being felt. Rising temperatures are increasing the frequency of devastating weather events as hurricanes, fires, floods, droughts, extreme heat, and extreme cold. In addition to their direct impact on the population, these effects bring about substantial economic costs. Although the worst predicted impacts of climate change are still far away in the future, some financial risks associated with climate change and climate change mitigation efforts are most imminent (<https://econofact.org/>).

Climate change is seen as a source of financial instability via two channels. The first channel is the increase in the frequency and intensity of climate-related hazards or physical risks. An example of the realization of physical risk in the banking sector can be expressed through the

inability to repay contractual obligations and credit losses that arise on that basis, which is especially evident in sectors exposed to climate change (for example, tourism). Furthermore, physical risk can be realized through damage to the infrastructure network, which disrupts the normal functioning of the entire economy. The second channel is the change in asset prices that could result from a rapid transition towards a low-carbon economy, or transition risks (ESRB, 2020, p. 12). So far, most studies have concentrated on the implications of transition risks (see, e.g. Johnson, 2012; Battiston et al., 2017; Stolbova et al., 2018; Trinks et al., 2018). In order to achieve a low carbon economy, governments should stimulate the transfer to the application of industries based on the elimination of harmful gas emissions, but also through a change in tax policy that will discourage the use of dirty technologies. To avoid physical damages and the associated financial instability, a transition to a carbon-free economy is ultimately necessary (Campiglio et al., 2018, p. 2). Former Bank of England Governor Mark Carney adds third channel of climate change influence on financial stability – liability risk. Liability risk represents the impacts that could arise tomorrow if parties who have suffered loss or damage from the effects of climate change seek compensation from those they hold responsible. Such claims could come decades in the future, but have the potential to hit carbon extractors and emitters – and, if they have liability cover, their insurers – the hardest (Speech by Mr. Mark Carney, 2015, p.6). Bank of England was among the first central banks which took action against climate change. The Bank's response has two core elements. First, engaging with firms that face current climate-related risks, such as segments of the insurance industry. Second, enhancing the resilience of the UK financial system by supporting an orderly market transition (Scott, 2017, p. 98).

Climate changes put challenges into the entire financial system. Financial institutions will need to reorganize/re-design their Risk Management Framework (RMF) in order for a climate-risk approach to be followed, in accordance with the existing risk assessment methodology. Starting from the review of the existing risk approach, banks should be able to understand the used risk analysis framework, including the identification of portfolio segmentation and risk segmentation and categorization (<https://www2.deloitte.com/>). A reduction in collateral values and a weakening of household and corporate balance sheets in turn could increase the loss-given-default (LGD) and the probability of default (PD) of loans, thus could adversely affect the banking system (Batten et al., 2016, p. 10). Also, banks could alter their lending conditions for green and brown sectors with implications on firms' performance and economic growth, particularly in the green sector (Dunz, 2018, p.6). Delis et al.

(2020, p. 5-6) had proved that “green banks” (i.e., those participating in the United Nations Environment Program Finance Initiative) put higher loan pricing to fossil fuel firms when climate policy risk increases.

There is the looming possibility of climate-related damages impacting the productive structure of the global economy, with potential deep impacts on the insurance system, but also the economy more widely (Matikainen et al., 2017, p. 6). For insurers and reinsurers, physical risks are important on the asset side, but risks also arise from the liability side as insurance policies generate claims with a higher frequency and severity than originally expected. There is evidence that losses from natural disasters are already increasing. As a result, insurance is likely to become more expensive or even unavailable in at-risk areas of the world (IMFa). The influence on climate change is significant on institutional investors as well (for instance see Ritchie& Dowlatabadi, 2014). Climate changes may reduce long-term returns on investments for pension funds (Dietz et al., 2016, p. 678). From an investor’s perspective, there is a risk with respect to both climate change and the timing of climate mitigation policies (Andersson et al., 2016, p. 1). Hong et al. (2019, p. 3) expressed worries about the extent to which stock markets efficiently price climate change risks. Such risks include energy corporations’ exposure to carbon assets, which might be affected by future carbon prices or taxes.

In order to fight jointly against implications of climate change, central banks and supervisors established Network of Central Banks and Supervisors for Greening the Financial System (NGFS) at the Paris “One Planet Summit” in December 2017. The Network’s purpose is to help to strengthen the global response required to meet the goals of the Paris agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development (<https://www.ngfs.net/>). The membership in NGFS is on a voluntary basis and as of May 20th, 2020, the NGFS consists of 66 members and 12 observers. The aim of this network is to define and promote the best practices that will be applied within the members of the network, but also outside it, as well as to conduct analytical work to promote green finance.

3. CLIMATE CHANGE RISK MANAGEMENT APPROACHES

According to the American Meteorological Society, climate change risk management approaches generally can be represented into four broad categories:

- 1) *mitigation* - efforts to reduce greenhouse gas emissions;

2) *adaptation* - increasing society's capacity to cope with changes in climate;

3) *geoengineering or climate engineering* – the additional, deliberate manipulation of the earth system that is intended to counteract at least some of the impacts of greenhouse gas emissions; and

4) *knowledge-based expansion* - efforts to learn and understand more about the climate system, which can help support proactive risk management.

Kunreuther et al. (2012, p. 5) point out that uncertainty should be incorporated in climate risk management. These authors emphasize that the challenge in evaluating alternative strategies for addressing climate change issues is that many risk assessments and climate impact studies provide ranges of outcomes, but with relatively little information on probability distributions. Truly understanding climate-related disaster risk (Figure 2), and the management of that risk, can inform effective action on climate adaptation and the loss and damage mechanism. Climate-related disaster risk management is a central focus of the mechanism and has been fundamental for climate policy and science (Mechler et al., 2014, p. 235). In the face of climate risk, according to Roncoroni et al., (2019, p. 5) there are two main policy scenarios. Either the transition to a low carbon economy occurs or it does not.

Figure 2.: Layered disaster risk management

Source: Mechler et al., *Managing unnatural disaster risk from climate extremes*, *Nature Climate Change*, Vol 4, April 2014

One way to measure climate change risk is through using the stress tests. According to the BIS publication „The green swan“ the De

Nederlandsche Bank (DNB) was the first to define scenarios for conducting stress tests based on climate change. The policy shock consists in the abrupt implementation of a \$100 carbon tax, and the technology shock in the rapid development of renewable energy, which leaves fossil-fuel dependent technologies obsolete, resulting in capital stock write-offs. These scenarios then measure macroeconomic impacts on GDP, consumer prices, stock prices, and interest rates through the industry-standard classification system used in the European Union (NiGEM). The central bank then assesses the vulnerability of each sector to transition risks, based on the embodied CO₂ emissions of 56 industries, weighted by their contribution to GDP. In the last step, the central bank calculates financial losses for institutions using traditional top-down approaches to stress testing. Climate stress test results show that a loss of up to 11% of assets for insurance companies and up to 3% for banks would be realized, potentially leading to a reduction of about 4 percentage points compared to Common Equity Tier 1 (CET1) of Dutch banks. The results of climate change stress tests had shown that the materialization of climate change risk may jeopardize the financial stability of the banks by decreasing CET1.

4. THE ECONOMIC COST OF CLIMATE CHANGES

According to the Economist Intelligence Unit (EIU), global economy will be 3 percent smaller by 2050 due to lack of climate resilience. Africa is the least resilient region to the impact of climate change (4.7% smaller), followed by Latin America (3.8%), the Middle East (3.7%), Eastern Europe (3%) and the Asia-Pacific (2.6%). North America (1.1% smaller) and Western Europe (1.7%) display the most resilience and are likely to see the least impact economically because both regions are richer and more prepared to tackle climate change from an institutional standpoint.

International Energy Agency revealed that global energy-related CO₂ emissions flattened in 2019 at around 33 gigatonnes (Gt), following two years of increases (*Graph 1*). This resulted mainly from a sharp decline in CO₂ emissions from the power sector in advanced economies, thanks to the expanding role of renewable sources (mainly wind and solar photovoltaic system), fuel switching from coal to natural gas, and higher nuclear power output.

By the late 21st century, the poorest third of counties are projected to experience damages between 2 and 20% of county income (90% chance) under business-as-usual emissions (Hsiang et al., 2017, p. 1362). Tol (2017, p. 5) summarized results of 27 published estimates of the total

economic impact of climate change (measured in terms of welfare-equivalent income loss), released in the period 1979-2013, and concluded that a global mean temperature increase of 2.5°C would make the average person feel as if she had lost 1.3 percent of her income (1.3 percent is the average of the 11 impact estimates for warming of 2.5°C). Bovari et al. (2018, p. 383) expect that the private sector will be able to endorse the much needed long-run investments taking into account today's vulnerability of public finances. Authors like Caldecott et al. (2016, p.9) points out that sovereign debt could be at risk for economies that are climate-sensitive either through direct physical climate risks (such as storms or drought) or through overexposure to the fossil fuel sector (i.e. countries with large state-owned resources companies).

Graph 1.: Energy related CO₂ emissions, 1990-2019 (in gigatonnes (Gt) CO₂)

Source: International Energy Agency, *Global CO₂ emissions in 2019*, 11 February 2020

Survey of independent economists, conducted in 2017, had shown that by using different models there are diverse estimates for future damages from climate changes and in turn, different impacts on the economy, ranging from 2% to 10% or more of global GDP per year, depending on the global mean temperature rise (Harris et al., 2017, p. 19). In 2019 International Labor Organization (ILO) made an assessment between the influence of rising temperature and working productivity and concluded that maintaining a core body temperature of around 37°C is essential for continued normal body function. Temperature above that is causing the increased risk of discomfort, of limitations in physical functions and capabilities, and ultimately also of

injuries and heat-related illnesses. If the body temperature rises above 38°C (“heat exhaustion”), physical and cognitive functions are impaired; if it rises above 40.6°C (“heatstroke”), the risk of organ damage, loss of consciousness and, ultimately, death increases sharply. Projections based on a global temperature rise of 1.5°C by the end of this century suggest that in 2030, 2.2 percent of total working hours worldwide will be lost because of higher temperatures, a loss equivalent to 80 million full-time jobs. This is equivalent to global economic losses of USD 2,400 billion.

In order to decrease global warming in the 2016 Paris Agreement was signed and represent an agreement within the United Nations Framework Convention on Climate Change (UNFCCC), dealing with greenhouse-gas-emissions mitigation, adaptation, and finance. The main aim of this agreement is to strengthen the global response to the threat of climate change by keeping the increase in global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the increase to 1.5 °C, recognizing that this would substantially reduce the risks and impacts of climate change (<https://unfccc.int>).

As a way to tackle climate changes and to promote sustainable development in the 2015 General Assembly of United Nations adopted Resolution for transforming our world: the 2030 Agenda for Sustainable Development. The Agenda is a plan of action for people, planet, and prosperity and it is adopted for the period over the next 15 years in areas of critical importance for humanity and the planet. The main aims of Agenda include the end of poverty, and hungry, ensuring healthy lives and inclusive and equitable quality education, achieve gender equality, availability and sustainable management of water and sanitation for all, ensuring access to affordable, reliable, sustainable and modern energy for all and promotion of sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (<https://www.un.org>).

5. CLIMATE CHANGES: CASE OF SERBIA

The Republic of Serbia in May 2014, was affected by the most severe floods in the past 120 years. The floods affected more than 1.6 million people, precisely 22% of the total population in 38 municipalities in central and western Serbia. According to a report by the Public Investment Management Office, EUR 1.345 billion was needed to restructure and rebuild the country after the catastrophic floods. The report showed that the total damage and losses due to this natural disaster in all sectors amounted to EUR 1.53 billion, of which direct damage amounted to EUR 870.1 million, while losses amounted to EUR 661.9

million. The amount of total damage applies to all sectors, including houses, educational institutions, roads, railways, the manufacturing sector, and agricultural goods. According to the presented report, the sectors most affected are mining and energy, housing, agriculture, and trade (<http://www.obnova.gov.rs>). Floods and landslides caused the complete destruction of more than 400 housing units, while about 17,000 apartments and individual housing units suffered partial damage. In agriculture, 12,000 hectares of land was unusable during one agricultural season, about 4,800 hectares of land needed to remove waste, agricultural machinery, and rural roads were destroyed, and irrigation systems were damaged.

In June 2014, Serbia received financial aid in the amount of USD 1.8 million from the United Nations (UN), while in July, the EU approved EUR 30 million in non-refundable financial assistance to Serbia from pre-accession IPA funds for the reconstruction of 24 municipalities. Also in July, a donors' conference was held in Brussels, at which EUR 1 billion and 846 million of aid were collected for Serbia and Bosnia and Herzegovina, of which EUR 995 million for Serbia.

After a positive real GDP growth rate in 2013 of 2.9%, with the dominant contribution of the export industry (automotive and oil), Serbia's GDP fell by 1.6% in 2014, which is a consequence of the flood effect. In the middle of 2014, the insurance sector in Serbia was faced with the payment of damages caused by the catastrophic floods that hit our country. Due to that, but also due to the high costs of conducting insurance, insurance companies in 2014 recorded low profitability (return on capital -2.7% and return on assets -0.6%).

In order to have adequate, long-term disaster risk management system in the Republic of Serbia, in December 2014, the Government adopted the Action Plan for the Implementation of the National Disaster Risk Management Program of the Republic of Serbia (2016-2020). This Action Plan is fully aligned with the Sendai Framework for Disaster Risk Reduction 2015-2030, which was adopted at the Third UN World Conference on Disaster Risk Reduction on 18 March 2015. The general objective of the Action Plan is that by 2020, the Republic of Serbia has a disaster risk management system developed, a solid inter-institutional coordination system established, is resilient to disasters and other hazards, and is capable to do retrofitting after a disaster or any other hazard.

As a way to achieve sustainable business, some banks in Serbia have provided energy efficiency loans to their clients. These are the credit lines of the European Bank for Reconstruction and Development (EBRD) within the EBRD Western Balkans Sustainable Energy Direct Financing Facility (WeBSEDF) program, which was launched with the aim to

provide debt financing for renewable energy and industrial energy efficiency projects to small and medium-sized enterprises (SMEs) in the Western Balkans. In the first phase of this facility, launched in 2009, EBRD approved credit lines totaling EUR 92 million, through Energy Direct Financing Facility (maximum individual loan of EUR 6 million) and Energy Credit Line Facility (maximum individual loan of EUR 2 million). In the second phase, undertaken in January 2013, the financing amount was increased to EUR 117 million.

6. PROPOSALS FOR FUTURE ACTION

By sustainable development it is generally meaning the development of a society that meets human needs with available resources, without endangering natural systems and the environment, thus ensuring the long-term existence of human society and its environment. In order to achieve sustainable development, among which climate changes are an important topic, it is important to give proposals for future action:

1) *green finance* – in order to finance sustainable development, various initiatives, and projects it is necessary to have an appropriate level of funding. For the most part, green finance refers to climate change, but the possibility that the collected funds are used for other purposes such as water sanitation, industrial pollution control, or biodiversity protection is not excluded. Generally speaking, green finance consists of the financing of green investments, financing of public green policies, and green financial system.

2) *institutional building at national and supranational level* – previous analysis had shown that regulators are taking serious questions regarding climate changes. For that reason, it is essential to build institutions both at national and supranational levels whose aim is developing a mechanism to compact against influence of climate change risk. In this way, these institutions can do better data collection and data sharing, as well as the distribution of best international practices.

3) *identifying and monitoring disaster risks* – by using different climate change risk management approaches disaster risks can be timely identified and consequently proper action can be delivered. One of the approaches can include a system for early warning in order to achieve better preparedness for all forthcoming disaster risk. In order to develop a system for early warning, institutions need to have data series, set the benchmark, and the threshold for all variables and to closely monitor movements regarding disaster risks. Finally, step is response capacity by developing adequate procedures, instruction, and instruments of action to downsize the impact of the disaster risks.

4) *resilient recovery* – in case of disaster risks it is necessary to have recovery plans prepared in order to arrange a country's economy for retrieval. In this regard, it is necessary to prepare recovery, rehabilitation, and reconstruction plans, in order to achieve resilient recovery and making nations and communities more robust to disasters.

5) *active promotion of sustainable development* – the government of each country should set a target of sustainable developments and time frames for their accomplishment. Ministry of finance can reshape the tax system and fiscal policies to discourage carbon emissions from coal and other polluting fossil fuels. At the same time tax incentives could be set to promote clean industries, green growth, for using alternative fuels, and for energy conservation.

CONCLUSION

Climate changes have been recognized as one of the risks for financial stability taken into account their influence not only for financial sector but also for the real one. For that reason, monetary and fiscal policymakers are dealing with climate change with the highest priority. In line with that regulation had been developed with the further ability of improvement and with forming organization on the national and supranational level to promote sustainable development and to implement best international practices. Climate change represents financial risks and it, therefore, falls within monetary policy mandates to ensure that the financial system is resilient to those risks.

European Commission, EU, IMF, central banks, and other authorities have adopted various regulations with the aim to decrease pollution, global warming, and other disaster risks. The main risks which come from climate change can be grouped into three channels: (1) transition risk, (2) physical risk, and (3) liability risk. For monetary and fiscal authority it is an obligation to have coordinated action in order to keep and improve financial stability, as one of the important precondition for healthy and prosperous economic development. Without that, at the global level, there is always a risk from climate change and the cost of crisis remediation may be greater than the preventive action to combat the risk of climate change.

In order to deal with climate change risk and their materialization different risk management approaches have been developed. According to the American Meteorological Society, climate change risk management approaches generally can be represented into four broad categories: (1) mitigation, (2) adaptation, (3) geoengineering or climate engineering, and (4) knowledge-based expansion. The aim of risk management approaches

is to have timely reactions and to downsize the effects of climate change risks. This can be done with the implementation of early warning systems, data collection and data sharing, and with adoption of best international practices.

In May 2014 Serbia faced the most severe floods in the past 120 years. According to a report by the Public Investment Management Office, EUR 1.345 billion was needed to restructure and rebuild the country after the catastrophic floods. Because of the floods, real GDP in Serbia in 2014 fell by 1.6%. In order to have adequate, long-term disaster risk management system in the Republic of Serbia, in December 2014, the Government adopted the Action Plan for the Implementation of the National Disaster Risk Management Program of the Republic of Serbia (2016-2020).

There are a few proposals that can improve future sustainable development. Green finance is a way to collect funds in order to support different projects and initiatives regarding climate changes, then institutional building at national and supranational levels, adequate identification and monitoring disaster risks, resilient recovery, and active promotion of sustainable development. In Serbia, the Ministry of Environmental Protection established a green fund, which allocates funds for the purchase of seedlings and works for afforestation of land with indigenous species of trees and shrubs, on publicly owned land on the territory of local governments (cities and municipalities) and urban municipalities.

The only way to achieve a balance between economic growth and price and financial stability is to accomplish sustainable development. Growing awareness for the influence of climate changes on financial stability is creating an opportunity to reach sustainable green growth and improvement of the quality of the environment.

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