

RESPONSE OF MONETARY POLICY ON CLIMATE CHANGES

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Abstract: *The world has commenced a transition towards sustainable development that respects the need to preserve the environment. Central banks are making efforts to encourage and facilitate the transition to a sustainable finance model that is a prerequisite for a green transition. Central banks have been working intensively on adjusting the existing framework for the implementation of monetary policy in the light of the requirements for the incorporation of climate considerations, so the paper provides an overview and analysis of possible changes in the framework. The conclusion of the paper is that central banks must be careful in weighing the respective measures so as not to jeopardize their primary goal - price stability.*

Key words: *central bank, climate changes, sustainable finance*

JEL classification: E5, G2

1. INTRODUCTION

The financial system is vitally important for the social welfare and the functioning of the economy. The flows of financial resources, that take place in it, constitute the bloodstream of the economy, while one of the most refined financial system's function is risk assessment and evaluation. Widespread failures in the practice of risk management may occasionally take on a systematic character and cause major economic damages, because risk management is a focal part of the capital allocation mechanism in which efficient uses of scarce capital have been being sought. The first financial crisis of this century is a

reminder of what devastating repercussions can be produced by a compromised and underperformed risk management practice that does not fully understand and appreciate the associated risks, and incorrectly values them. A lesson learnt from the previous crises is that a cardinal error in risk management manifests itself commonly in two forms: 1. flagrant underestimation of relevant risks and/or 2. complete ignorance of relevant risks.

At present, the risk of climate change with its resulting pervasive and scattered impacts accounts for a leading risk for the global economy and business operations of companies, and highly likely for human civilization as well. The continuous emission of harmful gases (carbon dioxide, etc.) into the atmosphere based on human activity produces the greenhouse effect. As a consequence of this, the planet has been warming and the air temperature has been rising that changes the climate, living conditions on earth and the state of the environment (floods, wildfires, droughts, precipitation, heatwaves) with unforeseen general economic and social consequences. Due to its acute importance, management of climate risk has become the focus of the attention of the corporate financial sector, monetary policy and international institutions that altogether take certain steps each day, enact and implement measures aimed at achieving sustainable economic development and business operations of companies. Setting the economy on the path of sustainable development that is in accordance with the need to preserve the environment has become a universal global goal.

2. SUSTAINABLE FINANCE AND CLIMATE RISK

Central banks, as institutions of public interest, carefully monitor developments in the financial sector and the economy. As a result, they could not have remained on the sidelines when in 2015, at the regular annual conference of the United Nations (Conference of the Parties-COP), the Paris Agreement was adopted by which the signatory countries (195 in total) obliged to maintain the global temperature between 1.5 and 2 degrees Celsius above the average temperature in the pre-industrial era (ie. around the 1850s).

The European Central Bank and national central banks of European Union countries take into regard and adhere to the decisions, recommendations and adopted policies of the European Commission, such as the Action Plan for Financing Sustainable Development (EU, 2018). The intention of the plan is to stimulate sustainability and the transition towards a low-carbon and circular economy with greater resource efficiency, which is the key to ensuring the long-term competitiveness of the EU economy.

The term sustainable finance refers to the process of making decisions about investments and placements of financial resources in which relevant environmental and social factors are explicitly taken into consideration. The effect of the modified decision-making process is expected to be increased financing of sustainable and socially justified economic activities. In addition to climate change, environmental factors include air and water pollution, resource depletion, biodiversity conservation, etc. From the point of view of the EU, social factors are no less important in determining the available financial resources. All investments that promote equality in society, greater inclusiveness of vulnerable groups, fair labor relations and working conditions (freedom of association of employees, equal pay, absence of discrimination, safety in the workplace), investment in human capital (training, education) and the wider community (stimulating business start-ups in more rural or underdeveloped areas) and consumer protection are promoted within the framework of sustainable finance. The sustainable finance is a vehicle for transforming the whole of the society for the better.

Financial investments in sustainable economic activities in the given circumstances are not sufficient to support the transition to an economic system that respects environmental and social factors in the right manner and to the full extent. It is estimated that the gap between the required and current investments for the transition to a

sustainable and greener economic system in the EU is 180 billion euros annually.

The impulse for changes stemming from the aforementioned civilizational aspirations of the EU necessarily leaves its mark on the framework of monetary policy in the Eurozone.

The ECB has recognized the fact that climate change has the power to affect price stability. According to the initial typology of risks associated with climate change, which has not changed significantly to date, three types of risk stand out: natural (physical) risk, transition risk and risk of potential liabilities (BOE, 2018).

Physical risk leads to direct damages and losses caused by climatic events. A climatic event can be related to acute, one-off and unexpected climatic incidents (fire, flood, heatwave, storm), or to long-term movements with a chronic character (rising ocean levels, temperature rise). In the first case, there are damages and breakdowns to physical assets (real estate, fixed assets) due to which there is a drop in local economic activity and possible disruption of a larger scale caused by interruptions in supply chains. In this sense particularly noteworthy are incidents in Asia in areas prone to flooding such as the Guangzhou area in China. Given the importance of this region, relevant incidents may trigger disturbances and put production, logistics and supply chains in China and the rest of the world at risk. The same reasoning applies to Thailand as well, which is also susceptible to climatic incidents. In addition, the consequences of chronic natural risks manifest gradually over a longer period of time and particularly affect certain sectors through reduced productivity (agriculture).

Transition risk is associated with unfavorable economic and financial consequences induced by the transition to an economy that does not emit environmentally harmful substances (gases) or emits them to a minimum extent, that could ultimately bring global warming to a halt. Key factors of transition risk are changes in technologies, policies and public (consumer) attitudes. A sharp drop in the value of the respective assets (e.g. oil reserves or business assets that use coal as an energy source) or a change in consumer preferences in favor of sustainably produced products to the detriment of carbon-intensive production are the representations of this risk. A special subtype of transition risk refers to fiscal policy measures and changes in current regulations. Imposing direct carbon costs on direct emitters or introducing a specific tax aimed at taxing them additionally could produce a sharp rise in costs for many companies that have not prepared in time for the upcoming transition.

Liability risk refers to the costs that companies would be obligated to pay if they were legally proven to be responsible for the consequences of global warming.

The financial implications of the transition to a new, greener economy are significant. In the years ahead, there will likely be a dramatic reallocation of capital and trillions of financial resources will be redirected into new sustainable investments, leaving environmentally unfriendly businesses and facilities without financial fuel.

3. REVIEWING THE FRAMEWORK FOR THE IMPLEMENTATION OF MONETARY POLICY IN THE CONTEXT OF THE GREEN TRANSITION

In incorporating climate change considerations into its monetary policy framework, perhaps due to a greater sense of accountability for the implementation of the key global agreement on climate change (concluded in Europe - Paris), the ECB went furthest so as to position itself as a leader of change in this regard that should set a positive example and pave the way for other central banks to follow. According to ECB's assessments, the physical risk and uncertainties surrounding the path to a greener economy create new uncertainties over the achievement of the

ultimate goal of price stability, as well as over variations in other relevant macroeconomic parameters (production, employment, investments, interest rates). Therefore, due attention to this process and adequate response by central banks are imperative. Also, in addition to price stability, the implications of the green transition on financial stability should also be taken into account by central banks.

Technological advances and tax measures of fiscal policy (the introduction of a carbon tax) have a direct impact on prices. However, this influence on prices can also be indirect, through the influence on supply and demand in the market, which is further transferred to investments and productivity growth. (ECB, 2019). Climate policies and measures taken by the governments to prevent further global warming have a direct impact on the operating costs of companies, but also a feedback influence on the state, through the impact on the health of public finances.

The ECB has prepared a set of measures and activities that clearly demonstrate its commitment to include climate change factors in its framework for the implementation of monetary policy. A significant part of these measures has already been implemented.

Table 1: ECB's roadmap of climate change-related actions

	2021	2022	2023
Eurosystem/ECB staff macroeconomic projections	Introduce technical assumptions on carbon pricing for forecasting and regularly evaluate the impact of climate-related fiscal policies on the Eurosystem/ECB staff macroeconomic projections baseline		
Macroeconomic modelling and scenario analyses		Integrate climate risks into the ECB's workhorse models and assess their impact on potential growth. Conduct scenario analyses regarding transition policies. Model implications of climate change for the transmission of monetary policy.	
Statistical data for climate change risk analyses	Develop indicators on green financial instruments.		Develop new statistical collections related to climate change
	Construct indicators on exposures of financial institutions to climate-related physical risks through their portfolios		
	Derive indicators on the carbon footprint of portfolios of financial institutions		
Market neutrality and efficiency concepts in monetary policy operations	Assess potential biases in the market allocation amid market inefficiencies and the pros/cons of alternative allocations	Make concrete proposals for alternative benchmarks, in particular for the Corporate Sector Purchase Programme (CSPP)	
Disclosures in line with EU policies as an eligibility requirement in collateral	Design adequate policies and conduct legal and operational preparations		Adaptation period for issuers

framework and asset purchases			
Climate stress-testing of the Eurosystem balance sheet	Prepare data and methodology	Conduct pilot stress test based on the 2021 ECB economy-wide climate stress test and 2022 supervisory climate stress test of individual banks	Build upon the pilot stress test and introduce regular climate stress-testing
Climate change risks in credit ratings for collateral and asset purchases	Assess rating agencies' disclosures and understand how they incorporate climate change risk in ratings		Introduce requirements into the Eurosystem Credit Assessment Framework (ECAAF) targeted to climate change risk, if warranted
	Develop minimum standards for internal credit ratings		
Climate change risks in the collateral framework	Review collateral valuation and risk control framework to ensure that climate change risks are reflected. Assess financial innovation related to environmental sustainability		Monitor the adequacy of the collateral valuation and risk control framework to ensure that climate change risks are properly reflected
Climate change risks in the Corporate Sector Purchase Programme	Conduct enhanced due diligence to incorporate climate change risks		
	Prepare climate-related disclosures of the CSPP		
	Develop proposals to adapt the CSPP framework to include climate change considerations	Adapt CSPP framework	

Source: European Central Bank (2021). Roadmap of climate change-related actions

The common working framework for central banks' decision-making starts with collecting timely and accurate information, continues with macroeconomic models that employ collected information, and ends with projections and outcomes derived from the respective models. Central banks use a macro model approach in which they try to assess the necessity of intervention, the required changes in the policy instruments at their disposal and the effects of the measures undertaken. The ECB has committed itself to developing a new class of models, as well as conducting theoretical and empirical studies and analyses, with the notion to monitor the implications of climate change on the economy, the financial system and the transmission of monetary policy.

The lack of adequate information and reliable indicators is considered an obstacle in monitoring trends related to climate change. Analysis of climate change risks is impossible without appropriate statistical data. The creation of a reliable database on climate change can only be achieved with coordinated action with other EU institutions and the policies they adopt. On the part of the ECB, its engagement should take place primarily in the making records and monitoring of "green" financial instruments, the assessment of the carbon footprint of financial institutions and the exposure of financial institutions to physical risk.

Greater transparency through better and more comprehensive disclosure of information related to climate change risks is likely to become the norm in the world of finance and business. An Australian bank (Commonwealth Bank of Australia) has already been sued by its shareholders for failing to disclose information about business risks associated with climate change. The court proceedings were suspended only when the bank supplemented its Annual Report for 2016 with the requested data. Currently, a considerable number of national and international initiatives has been being registered, that place companies' reporting on climate change exposure (FSB, 2017) in the level of rules and regulations belonging to the domain of business compliance.

The ECB has been preparing to introduce a requirement to disclose information on exposure to climate change risks in its operational policy on collateral and the purchase of financial assets. The policy of the ECB is in this sense harmonized with the policy and requirements of disclosure and reporting on climate risks at the EU level and ensures their effective and consistent implementation (EC, 2019). There are two options available to the ECB to introduce this requirement. The stricter option introduces this requirement as a general eligibility criterion for all collateral and assets issued by the private sector and used in the ECB's operations. Under the more moderate option this requirement will lead to a differential

treatment, instead of more of a discriminatory under the first option, of private sector assets where those assets that meet the requirements would enjoy preferential treatment.

Since the financial crisis, stress tests have become an indispensable tool in the analysis of financial stability, that are used to gauge the resilience of financial institutions in adverse circumstances. Stress tests of the banking system investigate the extent to which a bank's liquidity and solvency are threatened in the context of several dramatic (but realistic) scenarios of future events. Common scenarios for stress tests are recessions and crises in financial markets.

In 2021, the ECB has conducted a broad preliminary stress test on climate risk at the level of the Eurozone, which covered about 4 million companies and 2000 banks. The time horizon has been set at 30 years. The stress test focused on assessing banks' exposure to future climate risks based on an analysis of their clients' resilience in different scenarios. The results of the test showed that the costs of a rapid transition to a sustainable green economy for banks and companies were significantly lower than the costs to which they would be exposed if the status quo were maintained in terms of the way economic activities were carried out. In the medium and long term, maintaining the status quo will cause more frequent and devastating natural disasters. A new stress test aimed at assessing the exposure of the ECB's balance sheet to climate change risks is foreseen in 2022.

Some control of the quality of work and services will be carried out over the qualified rating agencies by the ECB. In the future, the ECB will insist on the disclosure of information on whether and how rating agencies use data related to clients' climate change risk exposure when assigning credit ratings. Credit rating is a measure of the creditworthiness and financial capacity of companies and countries that reflects all risks whose materialization has an impact on the debt repayment performance and creditworthiness of the analyzed subjects. Without exception, in the future all credit ratings issued will have to incorporate climate change risk in addition to conventional risks. For its part, the ECB also indicated that it would define minimum standards for incorporating the risk in question in the calculation of its internal ratings, thereby indirectly expressing the expectation that banks should follow suit and adjust accordingly their internal rating methodologies.

The aforementioned steps in the domain of stress testing and determination of credit rating should

contribute to raising the quality and capacity of the ECB in terms of risk assessment.

In addition to the announced changes in the collateral policy related to the general eligibility of certain assets used by banks when withdrawing funds through open market operations as collateral, the ECB's framework rules for collaterals will undergo changes in the part of the valuation and control of the ECB's risk exposure based on the portfolio of financial instruments. Climate risk will gain weight and importance in this domain as well, because the ECB will explicitly insist on taking them into account.

It is evident that the ECB will try to make a turn in the future in terms of favoring financial instruments that meet the criteria of sustainable finance in its collateral framework. The expected turnaround will certainly stimulate the structural development of this segment of the financial market, which is still in its infancy. In 2021, the ECB already made a decision according to which bonds whose coupons (coupon rate) are tied to the achievement of certain sustainability performance are eligible as collateral in the central bank's monetary operations (repo operations and direct purchases). For these bonds, it is expected that the performance objectives are to be expressed in accordance with the taxonomy of environmentally sustainable investments of either the EU or the UN.

The collateral framework defines standards, rules and criteria for financial instruments used in regular monetary operations (open market operations - refinancing operations). On the other hand, the balance sheet of the ECB maintains a portfolio of financial instruments that has been formed through the Corporate Sector Purchase Programme (CSPP). Also, one should have in mind that there exists the investment portfolio of ECB that is consisted of the portfolio of financial instruments that are not used for the purpose of implementing monetary policy. The respective investment portfolio is made up of stocks, bonds and other financial instruments and its goal is to achieve adequate return for a predefined level of risk tolerance.

In the construction of a portfolio on the basis of CSPP, which implies the composition of its structure through the selection of the type and nominal size of financial instruments involved, the risk of climate change grows in importance. When purchasing new financial instruments, the ECB will make sure that their issuers are committed to the implementation of the Paris Agreement, that is, that they comply with the corresponding EU regulations and that they have set goals and developed strategy in terms of reducing its carbon

footprint. From the first quarter of 2023, the ECB will commence regular disclosure of information on the environmental characteristics of the portfolio of debt financial instruments of the corporate sector in its possession.

Finally, the ECB introduced a new organizational unit in its organizational structure – the Center for Climate Change. The task of the Center is to unify the bank's climate-oriented activities that are dispersed across different sectors and departments of the ECB. Working on climate issues through the formation of a new unit verifies the need for an approach that affirms strategic planning and coordination, which is in line with the essence of climate change that is multidimensional in nature and has long-term effects.

4. GLOBAL INITIATIVES OF CENTRAL BANKS - NETWORK FOR GREENING THE FINANCIAL SYSTEM

At the initiative of the Banque de France at the One Planet summit in Paris in 2017, the Network of Central Banks and Supervisors for the Greening of the Financial System was established. The purpose of setting up the Network is to: 1.) help the development and adoption of the best practices related to climate change risk monitoring in the financial sector and 2.) analyze the channels through which shocks related to climate change are transmitted to the financial system in order to conduct a sensitivity analysis and stress tests focused on financial institutions

Table 2. Stylised options for adjusting operational frameworks to climate-related risks

Credit operations	
1. Adjust pricing to reflect counterparties' climate-related lending	Make the interest rate for central bank lending facilities conditional on the extent to which a counterparty's lending (relative to a relevant benchmark) is contributing to climate change mitigation and/or the extent to which they are decarbonising their business model.
2. Adjust pricing to reflect the composition of pledged collateral	Charge a lower (or higher) interest rate to counterparties that pledge a higher proportion of low-carbon (or carbon-intensive) assets as collateral or set up a credit facility (potentially at concessional rates) accessible only against low-carbon assets
3. Adjust counterparties' eligibility	Make access to (some) lending facilities conditional on a counterparty's disclosure of climate-related information or on its carbon-intensive/low-carbon/green investments
Collateral	
4. Adjust haircuts	Adjust haircuts to better account for climate-related risks. Haircuts could also be calibrated such that they go beyond what might be required from a purely risk mitigation perspective in order to incentivise the market for sustainable assets
5. Negative screening	Exclude otherwise eligible collateral assets, based on their issuer-level climate-related risk profile for debt securities or on the analysis of the carbon performance of underlying assets for pledged pools of loans or securitised products. This could be done in different ways, including adjusting eligibility requirements, tightening risk tolerance, introducing tighter or specific mobilisation rules, etc.
6. Positive screening	Accept sustainable collateral so as to incentivise banks to lend or capital markets to fund projects and assets that support environmentally-friendly activities (e.g. green bonds or sustainability linked assets). This could be done in different ways, including adjusting eligibility requirements, increasing risk tolerance on a limited scale, relaxing some mobilisation rules, etc.
7. Align collateral pools with a climate-related objective	Require counterparties to pledge collateral such that it complies with a climate-related metric at an aggregate pool level
Asset purchases	
8. Tilt purchases	Skew asset purchases according to climate-related risks and/or criteria applied at the issuer or asset level
9. Negative screening	Exclude some assets or issuers from purchases if they fail to meet climate-related criteria

Source: *Network for Greening the Financial System (2021), Adapting central bank operations to a hotter world.*

Starting with 8 members at the inception, the Network grew to 114 members and 18 observers in 2022. The National Bank of Serbia became a member of the Network in July 2021. The network is designed as a place for members to meet and share their experiences, highlighting best practices, evolving risk management methods and promoting the mobilization of necessary funds to support the transition to a sustainable economy - green funding. Participation in the work of the Network should help in the development of tools that will be helpful in identifying the risks of climate change, but also in preventing fraudulent activities in which financial resources collected formally for green projects are not being used for expected or planned purposes (greenwashing). The network has prepared a list of nine generic options for effectively incorporating climate change risks into the implementation of monetary policy. The options are shown in Table 2. The expected results and implications of these options are to be appraised by the means of their impact on the effectiveness of monetary policy, contribution to the mitigation of climate change, protection of the central bank from potential risks and operational feasibility of the options.

CONCLUSION

Central banks proved to be smart and capable in responding to recent acute crises (financial crisis and the Covid-19 pandemic crisis) when they launched new instruments and facilities that were an adequate response to the problems at the challenging times. However, many criticisms, often well-grounded, have been directed at central banks regarding these instruments and how they likely compromised the central banks' primary goal (e.g. high inflation after unconventional measures that were a response to the pandemic). That is why central banks must wisely approach to the formulation of the optimal strategy, and carefully weigh the set of measures, that will serve as an effective response to the complex challenge of global warming and associated economic transition.

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SUMMARY

The global economy is in the process of transition to a green economy with zero carbon emissions. An integral part of this transformation are changes in the financial system. Sustainable finance is being promoted, which will initiate the reallocation of capital in the direction of financing sustainable economic activities. Climate change has the power to affect price stability. Due to these developments, central banks are obliged to react and act as a catalyst for change in the financial sector. The involvement of central banks in the combat against climate change has been reflected in their framework for the implementation of monetary policy. In monetary operations there will be ever less room for assets with a high carbon footprint. Joint fiscal and monetary policy action will accelerate the green transition, but also create new uncertainties for central banks.