
A Significance of Climate Risks for the financial Stability: What do Trends in Central Banks Communication Tell Us?

Łada Wołoszczenko-Holda

SGH Warsaw School of Economics
e-mail: lvolos@sgh.waw.pl

ORCID: 0000-0002-4401-3634

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Quote as: Wołoszczenko-Holda, Ł. (2022). The significance of climate risk for financial stability: What do the trends in central banks communication tell us? *Financial Sciences*, 27(2).

DOI: 10.15611/fins.2022.2.07

JEL Classification: E52, E58, E71, G41

Abstract: The article examines to what extent central banks transmit the significance of climate risks for the financial stability to markets. Using simple text-mining techniques the article explores Financial Stability Reports (FSR) of central banks from the sample to assess the relative importance of climate-related topics, in particular to assess an intensity and regularity of climate topics in FSRs as sub-factors of their importance. The author assumed that the great importance of climate topics in central banks communication, facilitated by their regularity, gives a strong signal to markets about the significance of climate risks for financial stability. However, the findings indicate the generally low importance of climate-related topics in central banks' communication (by means of FSR), which remains in contrast with the great urgency of climate considerations for financial stability nowadays.

Keywords: climate risk, financial stability, central bank, communication, FSR.

1. Introduction

Climate change will have a great impact on many aspects of the financial system. Central banks being an important part of the financial system will eventually become involved in climate initiatives, whether directly or indirectly. The globally adopted manner of the transition to a net-zero economy is based on sustainable finance, seen as key in enhancing such a transition (European Commission, 2018). Sustainable finance covers a number of initiatives aimed to support investments into projects essential to limit carbon emissions. Sustainable finance initiatives will bring about substantial changes in the financial landscape. Central banking, as part of the financial system, cannot stay neutral to these changes. Eventually central banks will be part of the transition, the only question is – to what extent? Both academics and experts are

debating what role central banking is supposed to play in the net-zero transition, which is still in its early stage. This article contributes to the growing literature on how central banks address climate change, and focuses on their role in raising the financial markets awareness of climate risk.

Boneva, Ferrucci, and Mongelli (2021) pointed out that most central bank mandates “do not explicitly reference sustainability, raising the issue of whether central banks have the legitimacy to deploy their monetary policy tools to support sustainability objectives”. Dikau and Volz (2021) examined the mandates of 135 central banks worldwide and showed that currently only 12% of them operate under mandate that explicitly include sustainable growth and development, while other 40% are tasked to support their government policy objectives within their secondary remits¹. Formally most inflation targeting banks continue functioning within a single mandate framework, which means that the primary objective of their activity is concentrated on achieving price stability. In practice, due to the central banks involvement in providing financial stability during and after the financial crisis, their mission has been seen as broader over the last decade: beyond the primary objective, such a broader central bank mandate also incorporates, implicitly or explicitly, financial stability tasks while secondary remits are viewed as room for the possible expansion of the central bank’s mission in the face of ongoing developments. There are, however, supporters of a narrow central banks’ mandate, limited to the price stability objective, which is seen as the way to maintain central banks’ effectiveness in the monetary policy domain. This ‘narrow mandate’ argument often appears in criticism of central banks involvement in climate considerations (see e.g. Bartholomew & Diggle, 2021; Bolton et al., 2021; Boneva et al., 2021). Central bankers recognize the significance of this problem. These legitimacy concerns were defined most explicitly by the President of the ECB Christine Lagarde speaking on the Green Swan Conference in 2021: “our planet is burning and we, central bankers, could look down to our mandate and pretend that it is for others to act and we should be simply followers? I don’t think so” (Carstens et al., 2021). Yet, Bolton et al. (2021) pointed out that the urgency of addressing climate change risk could potentially bring us to a situation described by as “mission creep”: “where the central bank keeps adding tasks with accountability suffering”. In this regard, the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), launched to promote the implementation of best practices and to develop analytical work on green finance, has recommended to its members to explain the implications of legal mandates for their climate-related actions (NGFS, 2021). This effort may be helpful in determining the climate commitment degree of central banks by resolving the aforementioned “mandate dilemma”. The author also recognised the significance of this dilemma in

¹ Niedzwiedzinska (2020) identified as the more popular secondary remit definitions: “economic policy support”, “balanced economic growth”, “full employment” or “prosperity”, usually captured in single mandates as those subordinated to the primary objective of price stability. A mandate designed in such a way enables the central bank to conduct monetary policy in a flexible manner.

determining how committed the central bank is to climate concerns, and in this study sought to link assessments of the importance of climate--related topics in the financial stability communication to the legitimacy issue of a central bank mandate (i.e. whether a central bank explicitly includes sustainable growth or development, and if not, what flexibility for the central bank's involvement in climate considerations brings its secondary remit, whether a central bank incorporates financial stability in its mandate explicitly, etc.).

Numerous experts acknowledge that the materialisation of climate-related risks can result in increasing financial risk (Bolton et al. (2020), Brunnermeier & Landau (2020), Sveriges Riksbank (2019), Board of Governors of the Federal Reserve System (2020)). This was adopted to identify at least two main channels through which climate change can affect financial stability: "physical risk" and "transition risk" (see Bolton et al. 2020; Monnin, 2018). Kuroda (2021) indicated that financial institutions as well as other economic entities are exposed to the impact of climate change through the aforementioned channels, which could potentially lead to the destabilization of the financial system. Pereira da Silva (2019) suggested that such potential financial consequences of climate-related risks could "amount to a new form of systemic risk with implications for financial stability". Similarly to the interlinkages between the price stability and the financial stability tasks – price stability strengthens financial stability and vice versa financial stability is necessary for effective monetary policy transmission – the stability of the financial system (resulting in the proper functioning of financial intermediation) is vital for achieving climate goals (Kuroda, 2021).

The aforementioned interlinkages between central bank tasks within the broader mandate imply that climate change issues should be incorporated by central banks in many areas of their activities. As C. Lagard said: "climate change has to be factored in throughout the whole range of central banks activity (Carstens et al., 2021). Boneva et al. (2021) proposed dividing actions into three main categories. The first covers the actions aimed to protect central banks' balance sheets and preserve their ability to carry out the price stability mandate against the materialization of climate risks. The second category covers actions aimed at mitigating climate change by raising awareness of climate risks, but without the central bank having to make active use of its balance sheet. The actions covered by these two categories do not compromise the primary mandates of central banks, while those under the third category are more proactive, also in using central banks' balance sheets. They involve greening the portfolios of central banks as well as non-monetary policy portfolios, green QE, etc. This study considered the second category of central banks' actions.

A body of literature has identified the problem that financial markets still do not fully price climate change risk – a larger exposure to climate change has not yet been reflected in a higher risk premium (see e.g. Carney, 2015; Christophers, 2017; IMF, 2020; Monnin, 2018). The reason is often seen in "the climate change tragedy of horizons" (see e.g. Carney, 2015; Monnin, 2018) – market participants do not

consider climate change risks because they are beyond the horizon of their analysis. The central banks' role in breaking this discrepancy is to raise awareness of climate risks. This article focuses on assessing to what extent climate-related considerations are important for central banks nowadays, and considers climate-related risk as part of the financial risk within the financial stability framework. In order to assess the current importance of climate-related considerations for central banks the author examined their communications with the markets in the financial stability domain.

2. Methodology

The study used simple text-mining techniques to explore the importance of climate-related topics in a key central banks publication on financial stability – the Financial Stability Report (FSR). The examined sample covers 16 central banks: ECB, the Federal Reserve, the Bank of England and central banks of 13 EU countries (see Table 2). The study is mainly focused on EU countries, considering the EU as a global headliner in addressing climate risks. Additionally, the Global Financial Stability Reports (GFSR) published by the IMF were analysed mainly as a benchmark of global trends.

The preliminary analysis indicated the presence of climate-related topics in FSR issues published by the central banks from the sample mainly from 2018 onwards², which could be associated with the introduction by the European Commission of its action plan on sustainable financing implementation that year (European Commission, 2018). This also corresponds to the trend noticed in GFSR publications. Thus this study covers all FSR published by the central banks from the sample in the period 2018-2021. Typically, these reports are published twice a year, but in the case of certain central banks this is done only once a year (in total 4 countries of out the sample)³, which amounted to 111 FSR to examine.

This study's assessment of the importance of climate-related topics is based on an integrated evaluation of its intensity and regularity. First, the author computed the raw count of the word 'climate' collocated in the subject literature with the words 'risks', 'policy' 'change', 'neutrality', etc.⁴ For each individual FSR body of text from the sample. In order to assess the intensity of climate-related topics in these texts the author obtained scaled word frequencies dividing the raw count for 'climate' topics by the raw count for 'risk' topics ($F_t^{\text{climate/risk}} = F_t^{\text{scaled_climate}} / F_t^{\text{scaled_risk}}$, $t \in [2018:2021]$)⁵. The regularity assessment was based on variances of the obtained intensities – the bigger the variance, the lower the regularity.

² The frequency of climate-related topics in FSR published by central banks from this sample in 2016 was zero and in 2017 – mostly around zero.

³ Belgium, France, Germany and Finland.

⁴ The collocation is important because it allows to avoid any overcounting by including 'climate' used in a different context, e.g. 'business climate'.

⁵ "FSR is defined as a regular, self-contained central bank publication that focuses on risk and exposure in the financial system" (Cihak, 2006).

To assess the importance of climate-related topics the author used the rank ordering of the degree of the regularity and the intensity obtained for each central bank from the sample. The criteria divided the regularity and the intensity into ranges and assigned each an assessment with the following categories: very low, low, intermediate and high (Table 1).

Table 1. An assessment of the importance of climate-related topics in central banks' communication (by means of FSR)

Criteria of an importance's assessment	Regularity (measured by variances of climate topics scaled frequencies in FSRs texts ($\text{Var}(F^{\text{climate/risk}})$))		
	>0.04	$0.04-0.01$	<0.01
Intensity (measured by means of climate topics scaled frequencies in FSRs texts ($\text{Mean}(F^{\text{climate/risk}})$))			
<0.085	very low	very low	low
$0.085-0.15$	very low	intermediate	high
>0.15	low	intermediate	high

Source: author's own elaboration.

In this assessment the author assigned a slightly heavier weighting to the regularity compared with the intensity. The reason is due to the following: the study regarded the regularity of climate-related topics in communication (by means of FSR) as indicative of climate-related risks incorporated by central banks as an inherent part of financial risks identified as substantial within their financial stability framework. Such regularity sends a stronger signal to markets that climate risk issues are "here for good" compared with the intensity, which is measured as a mean of the relative frequency of climate topics in FSRs. To determine the ranges, the author chose assessments obtained for ECB publications as the benchmark for the rank ordering by assigning the category of being very high. This choice was also justified by the results of comparing the assessment obtained for the ECB with the assessment obtained for the Global Financial Stability Report. The former proved to have a higher level of intensity and regularity of climate topics, which further confirms the ECB's status of a headliner in promoting climate issues within the financial stability framework.

3. The importance of climate considerations in central banks' communication on financial stability

The findings indicated a rather low regularity of climate-related topics in central banks' communication on financial stability. Only in a few cases from the sample could the regularity of climate-related topics in FSR be regarded as quite steady (the EU, the Netherlands, Belgium and Sweden). The rest of the banks in the sample

communicated to markets on climate-related issues fairly occasionally, in a ‘non-core’ part of their FSR⁶ which includes research articles or special sections (e.g. Sveriges Riksbank, 2019) or exceptionally in a special issue (e.g. Banque de France, 2019). However, the author suggests that this irregularity could also be strengthened by the recent dominance of financial stability considerations associated with the COVID-19 crisis in central banks’ agendas. Table 2 summarises the findings regarding the assessment of the importance of climate-related topics in central banks’ communication on the financial stability with reference to the objectives assigned by their current mandates, as well as their involvement in climate initiatives.

The findings show that climate-related topics is an important and regular part of the Financial Stability Reviews published by the ECB from 2019 onwards, which significantly distinguishes the ECB from the majority of central banks from the sample. The ECB mandate is hierarchical, with price stability as the priority objective and with the secondary remit to “support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union” but “without prejudice to the objective of price stability”. Since the net-zero transition became recently a strong priority of the EU, the ECB’s secondary remit could be considered as a support of the EU climate-change policy. The ECB involvement in climate initiatives also seems to be systematic, which confirms the roadmap on incorporating climate change considerations into the ECB’s policy framework presented in 2021. The author compared the findings for the ECB with the assessment obtained for the Global Financial Stability Report published by the IMF. The latter obtained a lower rank due to a weaker regularity compared with FSRs published by the ECB.

A high regularity of climate-related topics in FSR publications were also found for central banks of the Netherlands, Belgium, Sweden and Romania. The first three have leading positions in country sustainability ranking⁷ (RobecoSAM, 2021) and their central banks are characterized by their relatively greater involvement in climate initiatives (particularly De Nederlandsche Bank, see Table 2).

The study’s findings on the assessment of the importance of climate-related issues mostly overlap with the global country sustainability ranking map – the better the sustainability performance, the higher the importance achieved. There are however some exceptions, e.g. Romania, where the importance of climate-related topics in the central bank’s communication is very much ahead compared with the country’s sustainability performance. This is probably linked with Romania’s

⁶ There is an increasing differentiation between the ‘core’ part of an FSR (the sections that are repeated in every issue) and its non-core part (called for instance Selected Issues, Special Issues, or Articles). The core accounts for 73% of the reports on average, but the cross-country variation is rather high: there are some FSR that consist only of the core, while others contain only about 30% of the core (the French FSR being an example of the latter) (Cihak, 2006).

⁷ Sweden tops the current ranking from 2021 (RobecoSAM, 2021).

Table 2. Central banks' objectives, their involvement in climate initiatives and the importance of climate-related topics in their communication on financial stability

Country	Primary objective	Secondary remits	NGFS membership	Other climate initiatives	Importance
EU	price stability	Without prejudice to the objective of price stability support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union	member (2019)	Climate change centre (2021) Roadmap on incorporating of climate change considerations into ECB's policy framework (2021)	high
USA	price stability and full employment	–	member (2020)	–	very low
United Kingdom	price stability	The Financial Policy Committee's primary objective is to protect and enhance stability of the financial system of the UK. Subject to meeting this, the FPC has a secondary objective to support the economic policy of the Government. The Government's economic policy objective is to achieve strong, sustainable and balanced growth	founding member (2017)	Co-chair for the G20 Green Finance Study Group (2018); Launched climate-stress-testing for UK banking sector (2018); Launched a report, A framework for assessing financial impacts of physical climate change: a practitioner's aide for the General Insurance Sector' (2019); The BoE's climate-related financial disclosure 2020; Key Elements document outlining the Biennial Exploratory Scenario on financial risks from climate change (2021)	low
Spain	price stability	see EU	member (2018)	–	low
Italy	price stability	see EU	member (2019)	–	low
France	price stability	see EU	launched NGFS (2017)	–	intermediate
Netherlands	price stability	see EU	founding member (2017)	Sustainable Finance platform (2017); Signed up to UN principles for Responsible Investments as first central bank (2018); Numerous publication on climate-related topics	high
Belgium	price stability	see EU	member (2018)	–	high
Germany	price stability	see EU	founding member (2017)	–	intermediate

Sweden	price stability, a safe and efficient payments system	–	member (2018)	Launched the consultation on the renewed sustainable finance strategy (2020)	high
Finland	price stability	see EU	member (2018)	Responsible investment principles (2021)	very low
Denmark	price stability, financial stability, safe payments system	–	member (2019)		very low
Poland	price stability	The basic objective of the activity of NBP shall be to maintain price stability, while supporting the economic policy of the Government, insofar as this does not constrain the pursuit of the basic objective of NBP.	–	–	very low
Czech Republic	price stability and financial stability	Without prejudice to its primary objective, the Czech National Bank shall support the general economic policies of the Government leading to sustainable economic growth and the general economic policies in the European Union	–	–	very low
Hungary	price stability	Without prejudice to its primary objective, the MNB shall support the maintenance of the stability of the system of financial intermediation, the enhancement of its resilience, its sustainable contribution to economic growth; furthermore, the MNB shall support the government's economic policy and its policy related to environmental sustainability, using instruments at its disposal.	member (2019)	Preferential capital requirement programme for credit institutions to support the growth of green financial products and to improve the energy efficiency of Hungarian building stock (2019)	
Romania	price stability	Supports the general economic policy of the Government without prejudice to its primary objective	member (2020)	–	high

Source: author's own elaboration.

membership in the NGFS (less popular among central banks from Central Europe compared with the Western Europe countries). In the case of the United Kingdom, Denmark and Finland, this is contrary: the importance due to the study's assessment is low, while the sustainability performance is rather high (especially for the Nordic countries⁸). The unexpectedly low importance obtained for the FSRs of the Bank of England contrasts with its actual involvement in climate initiatives (see Table 2). The BoE has a well-defined climate mission⁹ and a developed communication on climate-related considerations. The latter could be probably an explanation for the low importance obtained for its FSR publications – the BoE uses diverse channels other than FSR to communicate with the markets about climate change implications for financial stability and about its involvement in their addressing.

The very low importance obtained for the FSRs published by the Federal Reserve was rather expected, for two reasons. First, the Federal Reserve launched the FSR publishing only in 2018, while many central banks were publishing their Financial Stability Reports long before the financial crisis¹⁰. The initial phase of the communication on financial stability, and the later outbreak of the COVID-19 crisis shortly after their publication was launched, were not favourable for the incorporation of climate risk during such a short and intensive period. Second, climate change considerations were not among government priorities during the Trump presidency, which led to a weakening sustainability performance of the US. The role of the Federal Reserve in the climate domain will rather stay limited to the existing mandates, which was made clear by its Chairman, Jerome Powel during the Green Swan Conference in 2021. This contrasts with the view of C. Lagarde quoted earlier, emphasizing the need for a more concerted involvement of central banks in addressing climate risk.

The study's findings also indicate the very low importance of climate-related topics for Central and Eastern Europe countries, namely the Czech Republic, Hungary and Poland. This corresponds with their weaker sustainability performance in the global ranking compared with the Nordic and Western European countries; none of these countries joined the NGFS as yet. The Czech Republic and Hungary are the only countries from the sample, where 'sustainable' or 'sustainability' are explicitly mentioned in mandates of their central banks in the secondary remit.

⁸ "Continue to sustain their sustainability leadership in the world" (RobecoSAM, 2021).

⁹ "Climate change creates financial risks and economic consequences. These risks and consequences matter for our mission to maintain monetary and financial stability", <https://www.bankofengland.co.uk/climate-change>.

¹⁰ According to Cihak et al. (2012), between 1996 and 2005 the number of central banks publishing FSR grew rapidly from 1 to about 50 across the world. In the following five years their number reached about 80.

4. Conclusions

In this study the author considered the regularity of climate-related topics in central banks' communication as indicative of climate-related risks incorporated by them as an inherent part of financial risks within their financial stability framework. The study considers that such regularity gives a strong signal from central banks to the markets about the significance of climate risks for the stability of the financial system. The main finding indicates the rather low regularity of climate-related topics in central banks' communication on financial stability. Only in a few cases from the sample could the regularity of climate-related topics in FSR be regarded as quite steady. The findings on the assessment of the importance of climate-related topics in central banks' communication mostly overlap with the global country sustainability ranking map – the better the sustainability performance, the higher the importance achieved (with some exceptions). The ECB leads the ranking of central banks of the importance granted to climate-related topics in their communication. The author argues that, despite the more active role of central banks in addressing climate risks observed recently, the generally low importance indicated by the study contrasts with the high urgency of climate considerations for financial stability nowadays. Extending the central banks' mission by including climate objectives, whether formally (by a reconsideration of their mandates) or informally (through a consensus in the debate), could facilitate their involvement in combatting the climate change.

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Istotność ryzyka klimatycznego dla stabilności finansowej: na co wskazują trendy w komunikacji banków centralnych?

Streszczenie: W artykule podjęto próbę oceny stopnia, w jakim banki centralne przekazują w swojej komunikacji z rynkami istotność ryzyka klimatycznego dla stabilności finansowej. W tym celu zbadano raporty o stabilności systemu finansowego wybranych banków centralnych przy wykorzystaniu prostych technik z zakresu text miningu, dążąc do oceny istotności tematów związanych z klimatem. Określenie istotności bazuje na ocenie dwóch czynników: intensywności oraz regularności tematów związanych z klimatem w tekście raportów o stabilności systemu finansowego. W badaniu przyjęto założenie, że istotność tematów klimatycznych w komunikacji banków centralnych, wzmocniona poprzez regularność ich podnoszenia, wysłała rynkom mocny sygnał o wadze ryzyka klimatycznego dla stabilności finansowej. Wyniki przeprowadzonej oceny wskazują jednak na ogólnie niską istotność tematów klimatycznych w komunikacji wybranych banków centralnych, co kontrastuje z pilnością aktualnych wyzwania dla utrzymania stabilności finansowej w związku ze zmianami klimatu.

Słowa kluczowe: ryzyko klimatyczne, stabilność finansowa, bank centralny, komunikacja.