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RELATIONSHIP BETWEEN FINANCE AND CLIMATE

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ABSTRACT

In recent years, many governments, international organisations and private institutions have endeavoured to analyse climate transition-related risks and opportunities with respect to the transition to low-carbon economies, including implications for the global financial system. Financial markets will play a catalytic role in financing the adaptation and mitigation to climate change. The urgency for action on climate change has captured the attention of international institutions, policymakers, regulators, and now the corporate world. Company directors, management, shareholders, and investors alike are calling for firms to do their part to shift to a carbon-neutral world economy—frequently under so-called environmental, social, and governance frameworks. Climate adaptation requires large capital investments that could be provided not only by traditional sources like governments and banks, but also by derivatives markets. Such markets would allow two parties with different tolerances and expectations about climate risks to transact for their mutual benefit and, in so doing, finance climate adaptation. Catastrophe and green bonds in the private sector have become the most prominent innovations in the field of sustainable finance in the last fifteen years. Yet, the issuances at the sovereign level have been relatively recent and not well documented in the literature. This Note discusses the benefits of issuing these instruments as well as practical implementation challenges impairing the scaling-up of these markets. The issuance of these instruments could provide an additional source of stable financing with more favorable market access conditions, mitigate the stress of climate risks on public finances and facilitate the transition to greener low-carbon economies. Emerging market and developing economies stand to benefit the most from these financial innovations.

Keywords: Finance, climate, green bonds, weather derivatives, carbon credits.

1. INTRODUCTION

In addition to the essential carbon pricing that incentivizes low-carbon activities, fiscal policy can aid the transition to a greener low-carbon economy by investing in climate-smart infrastructures, such as renewable energy generation, and encouraging climate-smart technology research and development. Even though these policies would yield substantial long-term economic benefits, they require a substantial amount of financing. The prepandemic research by G20 Foundations Platform calculated that the world needs 2.2 percent of GDP invested annually to deliver commitments from the 2030 Sustainable Development Goals and the Paris Agreement. Furthermore, adapting to the consequences of climate change and minimizing damage from climate-related natural disasters usually necessitates an increase in government spending, among other things, which must be accommodated within a country's overall budgetary structure.

Financial innovation

The development of green and catastrophe bonds has been one of the most important financial breakthroughs in the domain of sustainable finance during the last 15 years. Green bonds are often structured similarly to traditional "plain vanilla" bonds, with the distinction that the bond contains a "use of proceeds" clause stating that the funds would be utilized for green investments. A catastrophe bond is a debt instrument that allows the issuer to get funding from the capital market, if and only if catastrophic conditions, such as a hurricane, occur. Climate change is expected to increase the likelihood and severity of these extreme weather events. Although the two instruments are of different nature, this paper analyzes them together given that both of them can contribute to the resilience to climate risks and have been recently issued at the sovereign level. These innovative finance instruments allow policymakers to tap wider capital markets for the financing of Sustainable Development Goal–related projects (green bonds) and mitigate the stress on debt sustainability after natural disasters (catastrophe bonds). Thus the financial industry is becoming increasingly important in accelerating the transition to sustainability and carbon neutrality.

Green and catastrophe bonds

For instance, sovereign green bonds make up about 0.2 percent of all government debt securities in the Organisation for Economic Co-operation and Development (OECD) area. In emerging market and developing economies (EMDEs), sovereign green bond issuances account for 12 percent of total green bond issuances (OECD 2021). However, the sovereign green bond market is likely to expand as more countries see green bond issuance as a vital tool for demonstrating moral leadership on climate change and sustainability, as well as funding commitments under the Paris

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Agreement. Similarly, a few countries have insured themselves against natural disasters, and even large catastrophe bonds only cover a small portion of the total possible damage. Since both green and catastrophe bonds issuances at the sovereign level are a recent development, most of the literature on sustainable finance has focused on the issuances by the corporate sector and local governments. This note fills this gap and studies the developing markets for sovereign green and catastrophe bonds, examines the characteristics of these instruments, and analyzes their costs and benefits. Our analysis contributes to the understanding of the markets for climate financing and the workstream of the Fund to help mobilize both public and private finance (see, for instance, IMF 2021a and IMF 2021b).

First, the growing popularity of green bonds may allow governments to issue bonds with longer maturities (given the longer horizon of green projects) and at a lower borrowing cost relative to plain vanilla bonds (the "greenium"). However, there are still several obstacles impairing the further development of the green bond market: lack of an international set of guidelines of what constitutes a green bond, narrow investor base, the risk of fund mismanagement (greenwashing), and little issuances in emerging market and developing economies. Second, catastrophe bonds provide effective insurance against natural disasters and can be considered adaptation policies for the countries with exposure to climate change risks. Yet the note discusses significant barriers to the scale up of the catastrophe bond market: high transaction costs, the requirement of complicated underlying catastrophe models, and a narrow investor base (which could in turn be a consequence of the previous two factors).

Green Bonds

For example, Rose (2021) discusses green bonds as well as other instruments, including green Sukuk, green loans, and green Schuldschein. World Wildlife Fund (2018) describes other examples including equity finance and debt for climate swaps. Among these instruments, the green bond is one of the fastest-growing segments. In this section, we overview sovereign green bonds, highlighting the recent development and policy issues. The exact definition, however, varies depending on what constitutes green projects. For example, the Green Bond Principles (GBPs), which were established in 2014 and are maintained by the International Capital Market Association (ICMA), provide guidelines and green project categories (ICMA 2021).

The Climate Bonds Standards (CBSs), built on top of the GBPs by the Climate Bonds Initiative (CBI), provide a sector-specific definition of "green" and are used for the certification of green bonds by CBI (Climate Bonds Initiative 2019). ICMA (2017) explores four databases (Bloomberg, Environmental Finance, Dealogic, CBI) and discusses the difference in the definitions. For example, Bloomberg tags the "Green Bond" label when an issuer self-labels its bond as green or declares its compliance with the GBPs on the use of proceeds.[2] The Green Bond Database by Environmental Finance lists all bonds that are self-labeled as "Green." Eikon is another database that provides green bond data, whose definition is aligned with the CBSs; the data are reviewed by CBI. Thus the analysis of green bonds, in general, should be understood with caveats on the data. The analysis in this paper relies on Eikon as it is consistent with the CBSs and has been used extensively in the literature of the sovereign green bond (for example, Doronzo, Siracusa, and Antonelli 2021).

For sovereign green bonds, Eikon and Bloomberg are comparable. For example, the People's Bank of China issued guidelines in 2015 and a catalog in 2021, defining the projects that are eligible for green bond issuance (People's Bank of China 2021). The European Union adopted the regulation of EU taxonomy in 2020 that defines environmentally sustainable economic activities. In 2021, the European Commission proposed the legislation of the European green bond standard (European Commission 2021). Many other countries have issued green bond guidelines and frameworks as summarized by CBI (2022).[3]

Costs and benefits of sovereign green bond issuance

For example, Doronzo, Siracusa, and Antonelli (2021) discusses three types of costs relative to the costs of the conventional bond:

- Green bond requires more disclosure and tracking for the use of proceeds. For example, if a green bond issuer wants certification from CBI, documentation to show that the CBS is met and engagement with verifiers is needed. But more information provision could lead to less uncertainty for buyers, so the net impact is not clear.
- The reputation of the issuer could be damaged if the green project that the green bonds finance fails or is perceived as greenwashing (falsely claiming that the financed investment is green). The net impact is again ambiguous since the green bond plays the role of a commitment device and thus can lower the probability of failure by motivating better planning and governance of the projects.
- The issuance of green bonds can crowd out that of conventional bonds, resulting in lower liquidity and higher funding costs for both segments. Doronzo, Siracusa, and Antonelli (2021) summarize Danish and German

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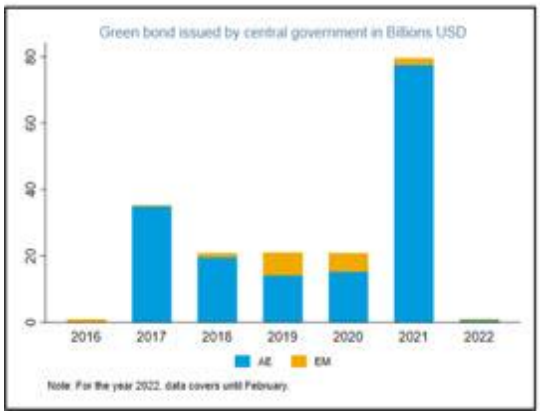
techniques to mitigate the liquidity problems. For example, the Germany Finance Agency mitigates the impact on the liquidity of conventional bonds by increasing its stock of conventional bonds at the time it issues green bonds by the same amount. The additional own holdings in conventional bonds can be used on the secondary market for repo transactions or for lending activities.

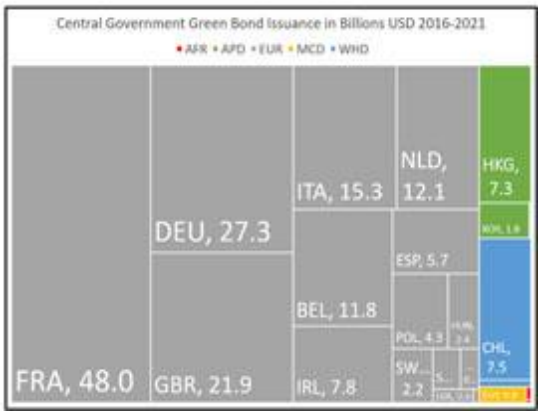
OECD (2021) also points to gaps in supply constraints

A pipeline of green projects needs to be established to sustain the supply and liquidity of the green bonds. OECD (2021) argues that the supply constraints can be mitigated by utilizing technical assistance from experts and aggregation of small-scale projects with securitization.[7] Another obstacle to sovereign green bonds is that most sovereign debt legal frameworks do not allow the earmarking of proceeds. Figure 1, panel 2, shows the green bond in Eikon issued by the central government.[5] The list of green bonds used for the figure is provided in Annex 1. Poland was the first country to issue a sovereign green bond in 2016, followed by France in 2017, and the issuance recorded nearly $80 billion in 2021. Most issuance was by advanced economies until February 2022 (Figure 1, panel 1).[6] Geographically, the cumulative issuance from 2016 to 2021 is mostly concentrated in European countries ($161 billion), followed by Asian Pacific countries ($9 billion), Western hemisphere countries ($8 billion), the Middle East and Central Asian countries (less than $1 billion), and African countries (less than $1 billion).

1. Across years



2. Cumulative from 2016-2021



Green bonds issued by central government in billions of US dollars

Citation: Staff Climate Notes 2022, 004; 10.5089/9798400210006.066.A001

Source: Eikon and IMF staff calculations

Carbon credits

In the case of green bonds, a greater issuance (with appropriate institutions to prevent greenwashing) would facilitate the financing of climate-related projects and, hence, the transition to greener low-carbon economies. Moreover, increasing the size of the market could make the greenium more sizable, as observed in advanced economies. EMDEs usually face higher premiums and volatility in regular bond markets and thus stand to benefit greatly from green bond issuance by tapping the wider capital markets at reasonable rates. In turn, catastrophe bonds could be critical for EMDEs which face the highest climate risks but still feature low adaptive capacities. Strengthening countries' debt absorption capacity is an important necessary condition to leap the gains from these financial instruments given the large climate finance needs. Overall, the issuance of green bonds seems to be a potentially useful resource for EMDEs at high risk of climate change that need to undertake large green mitigation projects (which may be the reason behind the larger greenium for these countries), while catastrophe bonds seem more appropriate for countries which are already exposed to natural disasters or those in which climate change is expected to increase the likelihood and severity of these events (such as small islands). Finally, although these new instruments could contribute to deepening financial development, LICs and EMDEs with weak fundamentals tend to have limited access. For these countries, combining financial innovation with more traditional support from the international community in the form of grants and equity financing would be useful.

Climate derivatives

A derivative is a financial product that derives its value from an underlying asset or index such as a share price. It is a contract between two parties, where one (the writer) promises to make a financial commitment to another (the purchaser or contract owner) if pre-defined conditions associated with the underlying asset eventuate. In return for this promise and the financial risk it entails, the writer receives an up-front payment. In general, financial derivatives are used for

three reasons: to hedge against unwanted financial risk; to speculate in the hope of financial gain; or to benefit from asymmetry in information or circumstances via arbitrage. Derivatives are commonly used as a market-based instrument to transfer risk from one party that is exposed to risk, to another that is considered able or willing to bear it. There are several types of derivatives; one of the most commonly used, called an option, is a contract that gives the owner the right, but not the obligation, to exercise the contract at a specific condition of the underlying index, called the 'strike' by a deadline called the 'maturity date'. Options come in different types. A 'call' option gives the contract owner a pay-off if the underlying index is above the strike by the maturity date, while a 'put' option gives the contract owner a pay-off if the underlying index is below the strike by the maturity date.

Climate change

While catastrophe and green bonds in the private sector have become the most prominent innovations in the field of sustainable finance in the last 15 years, the issuances at the sovereign level have been relatively recent and not well documented in the literature. This note filled this gap by presenting an overview of the development of markets for these instruments, as well as discussing their benefits and the barriers for further development. The demand for green instruments can potentially allow governments to issue bonds with a longer maturity (as green projects are long-term projects) and to borrow at lower costs. While the estimated greenium in this note is not large, it has been increasing over time alongside the level of sovereign green bond issuances. Whether the administrative costs associated with green bond issuance exceed the benefit is a country-specific question, but strengthening peer learning and climate information architecture could help reduce the costs and increase the benefits over time (Ferreira and others 2021). It remains an open question whether the purpose of the project associated with the green bond is a key determinant of the greenium, and whether green bonds have resulted in the climate outcomes they intended to achieve. The further development of the green bond market could be facilitated by improving transparency and creating clearer national guidelines and standards relating to eligibility and green definitions.

2. CONCLUSION

These challenges include their high transaction costs and limited investor base. Catastrophe bond issuance through the World Bank has mitigated some of these barriers and offers an attractive venue for the countries that seek insurance against natural disasters and could also help in broadening the investor base. Climate derivatives, priced using process-based climate models, can be used to quantify and manage climate risk in the future. They can be widely applied wherever there is a well-defined index, threshold, and a basis for predicting future probabilistic outcomes. Although fiscally constrained climate-vulnerable economies face the tradeoff between investing in resilience-enhancing adaptation and buying catastrophe bonds, one should note that the former could reduce the disaster risks, and thus the premium for the catastrophe bonds, and the latter could improve financial sustainability for the former. In this sense, green and catastrophe bonds can complement each other, and policymakers need to optimize their use.

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