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Green Bond, the Financial Instrument that Supports Sustainable Development

Opportunities and Barriers

Summary: Several initiatives have been launched in order to internalize the risks and threats of environmental degradation and climate change. Of these the system of carbon quotas, the spread of green funds and the levying of carbon taxes are the ones that need to be highlighted. Green bonds fit this line. In recent years the market has dynamically developed, but even so these bonds only make up less than 1% of the global bond market. Our article has looked at the barriers to the further expansion of the market and the opportunities for removing these, the uniqueness of environmental threats and the difficulties with their internalization, the possible role of central banks in the development of the green bond market and the arguments for the necessity of global action. Although the widespread adoption of green bonds still awaits, their importance in fostering sustainable growth has by now been widely recognised by both market participants and regulators alike. There have been a great number of initiatives to support market expansion, which may gradually grow into a generally accepted framework that will strengthen the importance of green bonds as a new asset class of its own.[1]

Keywords: green bond, climate change, sustainable finance, central banks
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Green bonds are different from regular bonds primarily in that they only finance investments that offer some kind of direct or indirect benefit for the environment or climate protection.

A SHORT DESCRIPTION OF GREEN BONDS AND AN OVERVIEW OF THE EXISTING MARKET

The purpose of green bonds is to internalize, to a certain extent, the environmental externalities and increase environmentally friendly investments. This creates a situation in which a new aspect can appear in a debt security, one that goes beyond a narrow profit target, but can be maintained on the market in the longer term, and is also very favourable for the society. Essentially, it promotes the channelling of capital into environmentally friendly investments, and thereby efficient capital allocation, taking into account the long-term factors, it is expected to reduce the costs of obtaining resources and calls attention to the financial risks related to the degradation of the environment. The funding obtained from issuing green bonds can be used in several

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areas, *Figure 1* was published by S&P Global Ratings[2] and shows these project categories and their percentage.

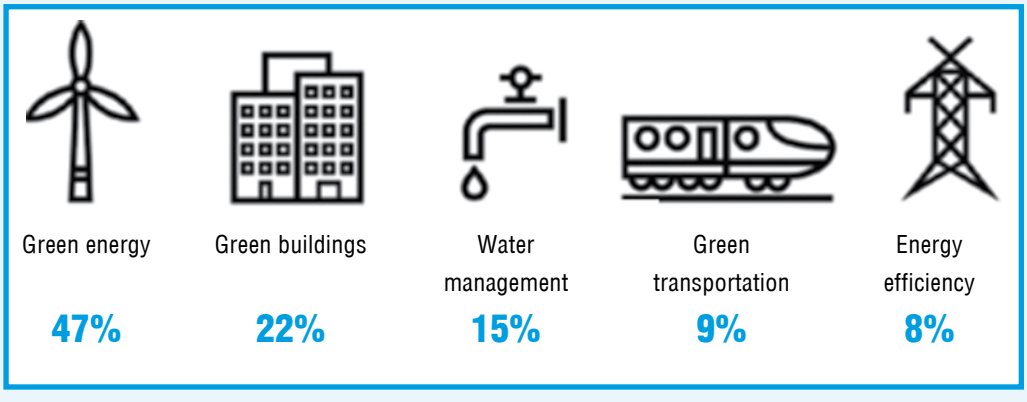
Compared to regular bonds another difference is that since the given instrument is only allowed to finance a defined scope of utilization and aims, therefore both the processes intended to ensure that and the specific utilization of the resources should be clearly defined and documented. This provides investors with additional information on the competency of the given company in areas such as control, auditing and project management, which may also support the assessment of the credit risks of the bond. On the other hand, issuers incur additional costs because of the issuing framework of the green bond, project control, the need to develop and operate internal processes, which are intended to be counterbalanced by several positive factors.[3] Of these one of the most important are demonstration of commitment to the aims of environment protection beyond words and announcements, diversification of the investor base of the bond, the market is currently dominated by the so-called *buy-and-hold* [4] investors, and the improvement of internal processes. A fact to be highlighted. The development of the green bond issuing system can be considered "head-heavy" in terms of costs, i.e. in an issuing framework verified by an external party later on it becomes possible to issue several bonds, which reduces the initial fixed costs per bond, an item that can be considered significant at the beginning.

The green bond market was originally called into life by the European Investment Bank in 2007, with the so-called *climate awareness bonds*, which was the first Green Label bond. The Green Label is intended to ensure that the funds obtained from the bond financed only specific activities related to environment protection and the fight against climate change.

It has given another push to the market that in 2014 ICMA (International Capital Market Association) laid down the Green Bond Principles, which contributed to the significant increase of the market of green label bonds. In 2016 the annual total volume of issued bonds had already exceeded the 100 billion dollars limit, and in 2017 it passed the 150 billion level and is expected to exceed that in 2018.

Figure 1

RATIO OF PROJECT CATEGORIES



Source: S&P Global Ratings

The market is growing dynamically, but there is still much room for development, which is confirmed by the analysis prepared by New Climate Economy[5] (it estimates that by 2030 the global demand for the establishment of the new infrastructure related to climate change could be approximately 90 thousand billion dollars, part of which could be funded from green bonds). This is a huge sum, and in the best case scenario it could fundamentally rearrange the bond market, considering the fact that at present the total global bond portfolio hovers around 78 billion dollars.[6]

AN OVERVIEW OF THE EXISTING MARKET, MARKET ACTORS

The pioneers in the market of green bonds were supranational institutions/ development banks

The market has been catalysed by supranational issuers from the very beginning, and as there was no international model, they have established their own internal systems of criteria, which are therefore different from one another. EIB applies one of the most stringent standards, green financing could almost only be used on the generation of renewable energy and on the increase of energy efficiency. Other supranational issuers, such as the African or the Asian Development Bank, have also issued green or so-called social bonds for several years, they apply an even more comprehensive approach, as the regions planned to be developed by them face different challenges than the ones we see, for example, in Europe. AfDB targets a comprehensive development of the African continent using social bonds based on 5 pillars: generation of renewable energy, food production, development of agriculture, industrialization, improvement of transport and job creation.

The first sovereign bond issuers

The first sovereign green bond was issued by Poland at the end of 2016 (for a term of 5 years and in the value of 750 million Euros), since then several actors have entered the market. Poland has identified several areas serving sustainability, including the generation of renewable energy, clean traffic/ transport, rehabilitation of landfills and afforestation, all of which require funding. Currently, Poland sources about 80 percent of its electricity needs from coal, but it is willing to diversify the energy mix and to make it greener in the future. The bond issuance has also demonstrated that issuing green bonds is not much more complex than issuing regular bonds, specifying the details took a few months, but the next one will probably take even shorter time.

The next large issuer was France at the beginning of 2017 (a bond with a term of 22 years, in the value of 7 billion Euros). France has declared that it would use the bond proceeds to serve the aims defined in the Paris climate agreement, and with the bond issue they intended to demonstrate their commitment. Even the large issue volume was oversubscribed three times, which could encourage other countries planning on green issue as well. Belgium also issued green bonds in February 2018.

The green bond label could mean favourable and long-term funding, but in exchange it imposes higher disclosure requirements, and requires transparency. The adoption of the green bond principles opens the international capital markets to emerging countries whose credit ratings would make it probably more expensive or downright impossible for them to get funding for environment-friendly projects. A case in point is the bond issue of the Fiji Islands in October 2017, through which this Pacific country raised cash in the value

of 50 million dollars for the funding of green projects.

Several countries plan to enter the green bond market in the near future. Through its banks, China was the largest green bond issuer in 2015 and 2016 already, and it is only a matter of time when they would place a sovereign bond in the market, similarly to India. Both of these large emerging countries are committed to keeping the climate agreement. In addition to China and India, other emerging countries could also enter the market in the near future, including Brazil and Indonesia, countries rich in natural resources, just as Morocco, which has scant resources, but is a leading country in the utilization of solar energy. These countries have already taken steps for laying down the green bond principles in their domestic markets as well.

Sub-sovereign issues

In many cases green bonds are issued in order to finance some kind of local environmental project as a result of bottom-up initiatives, so often these are not issued by countries, rather by cities or provinces. For example, although Sweden is one of the most environmentally conscious countries of the world, at national level they have never issued a green bond, because it was not necessary owing to the favourable budgetary situation. However, Göteborg, its second largest city, found itself in a financially adverse situation after the downturn of the shipping sector in 2013, which is why it became the first issuer of sub-sovereign green bonds. The limited green bond supply available to dedicated investors at the time enabled the city to issue easily, while it might have had a more difficult time with a traditional bond. After Göteborg, New York, Wuhan, Hong Kong and Cape Town entered the green bond market in 2017, the list of further possible issuers includes Amsterdam, Mumbai, Tokyo and Lagos. Until 2017 a total of 180 green labelled city bonds were issued from 13 countries. It is important to emphasize that although there might be some marketing factors behind the issuances, the spread of green bonds is favourable due to its favourable long term impact. The issuers that already use green bonds to finance their projects will, in our view, adapt later on much better to future pressure from regulators, if any, and later possibly turn entirely to sustainable finance.

The Paris Climate Agreement was signed by 195 countries, which justifies the expectation that the market of green bonds is probably going to produce a huge growth, in order to contribute to meeting the obligations undertaken in the climate agreement. According to expectations, cities will take on a significant role in the fight against climate change, since they are responsible for 70 percent of the total emission of greenhouse gases, while they could also be the main victims of a rising sea level caused by global warming, since many of them are located in low-lying, coastal areas.

Issues by companies and commercial banks

Commercial banks are also present in the market with green bond issues, which they use to finance projects related to environment protection, but their share can still be considered low. The first time that banks issued securities in a significant amount was in 2016, Chinese financial institutions were particularly active. The accomplishment of environmental goals has been more and more important for banks on the lending side as well, for example, some of them offer discounted interests on mortgage loans

projected to finance real estate properties with higher energy efficiency. According to industrial experts, green bonds are expected in the future to be issued at better prices for financing similar objectives.

Bond issues by companies now play a more significant role, green bonds have been issued by several companies whose core activities create a significant environmental footprint and that want to change this, however, green bonds are also used by companies that want to greenwash their image. This kind of activity is called *greenwashing* in the professional literature, which can usually be considered a PR activity rather than a real commitment to green objectives. Several articles discussed this topic, e.g.: Greenwashing: Deceptive business claims of Eco-friendliness – https://www.forbes.com/sites/realspin/2012/03/20/greenwashing-deceptive-business-claims-of-eco-friendliness/#10e104b93d9a

GREEN BONDS: CHALLENGES AND OPPORTUNITIES FOR RESOLUTION

Several obstacles need to be overcome in order for the green bond market to surge, at present, owing to the low level of market liquidity, both the issuer and the investor sides are rather thin, despite the dynamic growth of previous years. It is important to highlight that the problems are not independent of each other, therefore a success accomplished in one area could bring about a breakthrough in other areas as well. The professional literature is quite unequivocal when it comes to the identification of inhibiting factors[7,8], and the industry and our own experiences underline the relevance of these problems. In the following part we will review the challenges and the possible responses, while trying to focus on the most important issues.

The lack of clearly defined green bond standards

The lack of standards means a risk for both investors and issuers, since it is difficult to control compliance even with a prudent and appropriately careful approach. It may happen that an issuer issues bonds for a project thought to be green, the investor purchases them and later on this classification will be questioned. This runs reputational risks for both parties, therefore at present the green bonds of the large, trusted issuers provide the "ironclad" solution, this segment is less accessible for smaller participants.

In addition, the lack of standards requires complex screening solutions (due diligence), which are expensive, both implicitly and explicitly. This occurs on both the issuer and the investor sides, it incurs extra costs in many cases to issue green bonds, due to the increased administrative requirements.

Possible solutions: Development of internationally recognised, uniform standards for the assessment of green projects. The "Green Bond Principle"[9] and the "Climate Bond Initiative"[10] can be considered steps taken in this direction. While the former only formulates general principles, the latter is intended to specify green bond compliance requirements at industrial level. If there were standards that were as specific as possible and took into account the features of the individual sectors, the green bond certification process itself could speed up as well, as it would become simpler and cheaper.[11] Naturally, it is not possible to eliminate completely the discretionary aspect because of the diversity of the investments, projects, but this also applies, for example, to credit ratings that have been used and accepted in the market for several decades. (As to these latter ones, despite the errors and scandals that occur from time to time, we can still talk about a system that has been used for a long time). In addition, the

green compliance of a particular project can be considered more exact in many cases because of the methods applied in science – i.e. the favourable impact on the environment can be quantified with relative accuracy.

At present, the responsibility of entities performing the evaluation of projects cannot be considered appropriately transparent

The lack of a uniform principle accepted by the market on what kind of opinions, ratings of what entities are needed for a bond to be purchased, with appropriate care, as a green bond means uncertainty for the investors. In many cases, for example, the entity performing the rating and control participates in the development of the green bond issue framework as well, which raises concerns about a conflict of interests. There are entities, for example auditors, that only assess whether the funds are spent on the specified aim, but disregard whether the given project is in fact a green one or is only presented as such by the management.

Possible solutions: The compliance standards defined in the first section, accepted by the entire market, could mean the first step towards resolving the uncertainties. The appearance of credit-rating agencies in the market of green bonds as certifying entities could separate the roles, it could become clear which are those entities that are more advisors and which are those that are responsible for the integrity of the green bond issuing principles.

Lack of specification, quantification of the environmental benefits of investments financed from green bond resources

In certain cases, efforts are made to quantify the environmental impact,[12] but in most cases only the conventional bond metrics, such as a yield to maturity, spread, duration, are available for the investors to assess. Thus, the segment of green bonds somewhat loses its main benefit, i.e. that it is intended to support a globally important aim, in other words, the ethical and moral aspect of the asset class is not presented with appropriate emphasis. Several studies have demonstrated that people cannot be considered as beings that only focus on short-term financial benefits, even in their financial decisions, although undoubtedly this is the most important driver, therefore an exact indicator could help even the actors who prefer rational decisions.

Possible solutions: At industrial level, development of a universal environmental benefit framework, i.e. relying on the assistance of external, independent experts, it is possible to develop such an objective, possibly quantitative scale of assessment that shows the environmental yield of projects financed by the given bond.

In the vast majority of green projects this could be captured in the volume of reduction/avoidance of harmful substance emission, i.e. development of a green equivalent indicator that would allow individual bonds to be easily compared. For example, at an annual level how many tons of CO_2 emission can be avoided by a given wind power station, projected on a specified nominal value (e.g.: 1 ton of CO_2 reduction/1 million nominal value). This way, if the environmental impact of the project was also presented to the green bond investors as a decision factor, there would be higher demand for the bonds of more efficient investments and thus financing costs would be lower. In other words, in addition to the psychological impact mentioned above, replacing the list of abstract benefits by a more specific system of emission targets could also promote the more efficient allocation of capital.

It is important to highlight that there are already initiatives in progress for the applica-

tion of a uniform metric for measuring the environmental impact of green bonds. The common use of such metrics could significantly promote the investor ranking of green bonds compared to one another. Traditionally, bond investors assess their investments according to yield, duration and risk rating, but in the green bond category they add the environmental impact to this, which can be quantified by several metrics. As we have said above, the industry has developed the metric that can be considered the most widely accepted today; in the renewable energy category it is the reduction accomplished in CO_2 emission projected on a bond with a given face value expressed in dollars. For the time being, this information is not available for every bond, therefore the *Figure 2* can be considered examples, which could serve as a kind of template for the future.

The question is what are the methods that can be used to express, in monetary terms, the CO_2 load that is avoided (reduced, decreased) owing to the projects implemented using the green bonds, which could mean further convergence to the conventional framework serving the optimization of investments. According to certain experts,[13] such calculation could be based on the CO_2 price per ton, calculated from the CO_2 quotas (cap-and-trade) and the carbon taxes. This means, for example, that if the price per ton is 10 dollars (which can be considered a realistic value at the end of 2017, based on the taxes and the quotas), it is possible to express accurately the value of the avoided CO_2 emission, which then needs

Figure 2

TRADITIONAL AND ENVIRONMENTAL METRICS (CO_2 REDUCTION, DECREASE PROJECTED ON FACE VALUE OF 1 MILLION) OF SEVEN GREEN BONDS

Name	Coupon	Maturity	Moody's	S&F	CO_2 Study by	CO_2 Offset/ USD million Bond	Method
Continental Wind	6,000%	Feb-33	Baa3	BBB–	Carbon Count	1037	Wind
Sthm. Cal. Public	4,00%	Jul-19	Aa3	AA–	Carbon Count	392	Wind
Solary City Series LMC	1,80%	Dec-26		BBB+	Carbon Count	161	Solar
Topaz Solar Farms	5,75%	Sep-39	Baa2	BBB+	Carbon Count	198	Solar
HASI Sustainable	2,79%	Dec-19			Carbon Count	522	Energy Efficieny
HASI Sustainable	1,28%	Oct-34			Carbon Count	390	Solar/Wind
KfW	0,38%	Jul-19	Aaa	AAA	ZSW	885	Wind/Solar
KfW	1,75%	Oct-19	Aaa	AAA	ZSW	885	Wind/Solar

Source: HSBC, Alliance to Save Energy, ZSW

to be modified by the necessary global factors, because in certain countries there are no quotas or taxes to be considered, after that it can be projected on the nominal value and expressed in basis points. In other words, this way two yields could be considered for one bond when the investment decision is made; on the one hand, the conventional yield, while on the other hand, the environmental benefit priced by the market. This latter, of course, is still only an estimate since probably neither the quotas, nor the taxes express the price justified by the risks, but the general application of these calculations could be considered a step in the right direction.

The market risk and yield expectations continue to play a key role in the case of green bonds as well, which is one of the reasons why it is important that the emission of green bonds should not impose additional burden on issuers. This means that any increase in demand stimulated by the green label will provide compensation for the incurred costs.

"Short-termism" in the financial markets versus long term social and economic impacts[14]

It is difficult to coordinate the fight against climate change with the target function of an actor who optimizes his investment for the short time horizon. Thanks to the fast development of technology, today several green projects can be considered fully competitive on a market basis as well, and thus fortunately, the above contradiction no longer applies to these. However, the above statement does not apply to some of the projects, their favourable impact materializes only on a longer time horizon. (It could also happen that the benefits will not materialize in the given project, rather in the next investment realized on a higher level of technology, which is built on the results of the first one). Climate change poses such a significant risk, that in this case the incentives, support provided by the state can be considered fully acceptable.

It is important to highlight that the costs of climate change, the degradation of the environment can no longer be considered entirely abstract today, according to expert opinions, the negative impacts are being felt through increasingly direct channels by the actors of the economy, and within that the financial sector as well. For example, the increasingly extreme climatic events impose huge economic risks on the specific physical level as well (means of production, living space of employees, etc.), and their ripple effects could already affect the balance sheets of banks as well, through the possible collapse of the loan collateral value of assets.

Possible solutions: The increasing role of state and supranational entities could be a solution both on the issuers' and the investors' side. In their case the short-term market pressure does not apply so powerfully, their credibility enables them to make investments that generate long-term social and naturally, economic benefits. Tax benefits may also be used as further incentives for both investors (for example, they could be exempted from taxes on interest, FX gains) and issuers, or for example, issuers may be supported by granting partial subsidy towards the costs of obtaining the green label.

In the case of a green default, there are no consequences clearly specified in advance, which increases moral hazard

At present, only the credit risks similar to those of conventional bonds exist also in the case of green bonds, i.e. there is no default as long as the issuer can meet the obligations imposed by the bond. In the case of a green

default there is no legal relevance for other promises made in the green bond, i.e. on what the bond proceeds will be spent, this means there is no "penalty" if these promises are not kept. In other words, it is an obvious benefit of the green bond that unlike in the case of conventional bonds, the buyer of a green bond knows exactly what purpose their investment will serve and what projects the monetary assets will finance. But what happens if the entity issuing the bond fails to comply with such purpose?

Possible solutions: Development of a legal framework that would make the payment of an implicit or explicit penalty obligatory. For example, after the green default, the issuer of the bond is ordered to repurchase the green bonds (which could, however, threaten its entire solvency, and this additional risk could make the issuers wary of green bonds), or they automatically lose their tax benefit, or the green classification of all their green bonds could be withdrawn, etc. Although there are several possible ideas, however, in our view it is necessary to preserve the delicate balance, one that does not yet scare off the possible issuers, but still provides enough guarantee to the investors for the accomplishment of the green targets.

The necessity to reflect environmental risks in the decisions of actors of the financial market

As was highlighted earlier, in most cases the time horizon of the environmental issues and that of the decisions of the economic actors differ significantly. While decision-makers attempt to optimize their operations for a time horizon of a few years at most, the risks related to climate change, the state of the environment, which will probably adversely impact the financial results as well, can be expected to materialize in the longer term, in a way that is difficult to predict. However, the recognition and appropriate pricing of risks, in other words, the internalization of the environmental externalities to a certain extent, currently requires a theoretical framework that is capable of identifying such threats and translating them into real financial impacts.

Coming back to the uncertainty of climate models, models used to predict environmental impacts, a very important aspect has to be highlighted (based on the manifesto–like opinion of Nassim Taleb et al.[15]). At present, a lot of the debate going on between decision-makers focuses on the unreliability of the models, the uncertainties existing inherently in the models provide the main ammunition for global warming sceptics in their arguments against any change. Therefore they can argue with the short-term adverse impacts of economic adaptation (downsizing certain industries, lay-offs etc.) against the long-term negative scenarios, admittedly building on probabilities, scenarios that in their opinion may never materialize. However, Taleb et al. claim that the conclusion drawn from the uncertainty inherent in the models should not be that presented above, rather the opposite. *Since we only have one planet and the potential negative impacts of a climate disaster are immeasurably huge (famines, mass extinction, etc.), therefore ignoring the environmental impacts of the current economic system is not an option even if the probability of occurrence is very low.* In short, even if there is a small chance that the conclusions described in the models are correct (it is important to stress that even those who fiercely deny climate change acknowledge higher probabilities than that), we have no other option than to reduce emissions. We face a drastically asymmetric situation: maintaining the existing system could give a few more years to some obsolete, polluting industries (industries that carry health

hazards even without climate change, reduce biodiversity and lower the quality of life for all beings of our planet) with strong lobbying power. In other words, this one single benefit stands versus a climate change that could even prove to be fatal. The costs of adaptation could be financed with the issue of so-called social bonds defined earlier, which would also point in the direction of the increase of ESG investments.

Of course, there are also several other scenarios drawn up between the two extreme cases, but owing to the non-linear outcomes so typical of complex systems (i.e. the "tipping points" of the system are not known, we cannot determine which dose could trigger irreversible, disastrous events), this does not matter from that aspect. Therefore, the uncertainty about the future of the climate, the future of the environment does not undermine, rather support green transformation.

As was mentioned above, a G20 task force was established for the development of a framework that discloses and possibly quantifies risks, and for implementing this framework in practice (Task Force on climate-related financial Disclosures – TCFD). The purpose of the task force[16] is to identify the information by which the investors, creditors, insurers can properly assess and price climate-related risks and opportunities. Through this a voluntary, consistent climate protection-related financial reporting and disclosure framework could be established, which would constitute part of the annual corporate financial statements. Disclosure would affect four levels, the level of management (company management would focus on climate-related risks and opportunities), the strategic level (the current and potential impacts on the business and financial plans of the company), the level of risk management (processes aimed at the identification, quantification and management of the risks), and that of metrics and targets (quantified aims). The disclosure scenario developed by the task force is based on analysis, i.e. the companies need to prepare their assessments according to various scenarios defined with scientific accuracy, which may help companies improving the robustness of their strategy.

All in all, the risks of climate protection generate financial impacts that are difficult to quantify owing to complexity, non-linear processes, time horizon and idiosyncrasy, nevertheless, these financial impacts do exist. The aim is to develop frameworks that enable capturing such risks as best as possible. In all probability, from the aspect of the expansion of the green bond market the quantification of risks can be considered favourable, since as a result of lower environmental risks it could provide cheaper financing for the issuers. Investors could regard the market of green bonds as a possible tool to address the risks of climate change (diversification, coverage, etc.).

CENTRAL BANKS AMONG THE GREEN BOND INVESTORS

Central banks and financial supervisors can have an impact on the financial sector from the regulatory side on the one hand, while on the other hand as large reserve managers, they can lead by setting a good example on what they invest in.

A survey by questionnaire among central banks of the EU

The green bond universe has only existed for a few years, therefore it is considered a relatively new asset class, and although it is dynamically growing, its share within the entire bond market is still almost negligible.

At present 0.2 percent of the entire global outstanding bonds have an explicit green label (although more bonds than that have some kind of positive environmental or social aim, which could support an expansion of the market later on). At the same time, central banks are traditionally considered conservative investors that enter new submarkets carefully, to avoid financial losses or possibly the loss of reputation.

Accordingly, we cannot expect the foreign currency reserves and equity portfolios of central banks (the euro denominated portfolios of central banks that are members of the euro zone are not constitute a part of the foreign currency reserve) to contain significant green bond investments at this point already. Therefore, our survey by questionnaire conducted at the end of 2017[17] was intended to be used for a kind of assessment of the starting situation, i.e. to explore whether the central banks of the European Union hold expressly green or social label bonds, or perhaps they hold such a targeted portfolio, or plan to establish such portfolios, furthermore, what would be the conditions that would prompt them to invest or increase their exposure in the asset class.

Of the 16 central banks that responded, 8 (50 per cent) already held green labels in their reserve portfolios, the ratio of these within the reserves is typically below 1 per cent, although there is a central bank where it is below 2 per cent and below 5 per cent in another, which is substantial compared to the 0.2 per cent share of the market. Otherwise, it can be assumed that even those central banks that gave a negative answer could hold green or social bonds issued by some kind of supranational institution (EIB, AfDB, EBRD, ADB, etc.) or development banks, since some of these bonds, for example, the KfW bonds issued before 2014, do not bear the green label at all. Currently, none of the respondent central banks have any portfolio that is only and exclusively dedicated to green bond investments. Several of them are allowed to hold such bonds in their existing framework already, but the somewhat lower yield that had developed by the end of 2017 and the beginning of 2018 is a deterrent force in the increase of exposure.

Another reason why many central banks operating in the EU do not hold any or only a minimum amount of green bonds is that a significant number of the green bonds were issued by banks/companies, and there are many central banks that do not hold such bonds in their investment universe, nor do they typically hold bonds issued by local governments/cities or ABSs either. At the same time, in the case of green bonds issued by highly rated countries and supranational institutions central banks can be expected to be important investors in the long term as well.

The third and probably the most often mentioned reason why these bonds are not yet really popular is that recently green bonds have been traded at higher prices than "grey" ones. In line with the international professional principles, so far they only optimise their portfolios in the risk-yield space, i.e. they often hold them until maturity, without considering the environmental impacts. Therefore, polled investors say that this asset class cannot be considered clearly attractive due to the premium being included in the pricing.

One of the central banks is now planning to establish a corporate bond portfolio, and although it is not meant to be a dedicated green/social portfolio, issues of sustainability would be considered in the selection of the bonds (ESG[18]). The assessment of the ESG criteria is a long process that requires detailed, specialized knowledge in many cases, which means that it might even be necessary to involve an external advisor, which makes the process both more complex and more expensive, and this additional effort may prevent

investors from applying the ESG standards. This is another reason why a generally accepted "green bond" standard would be necessary, where the existence of the label would guarantee for investors that the funds raised by the issue will be spent on the planned purposes, and that the spending will, in fact, have favourable environmental/social impacts. This relevant need was emphatically formulated in the responses given by the portfolio managers as well.

HSBC survey

HSBC[19] also conducted a detailed survey in a group of central banks that was larger than the group of banks affected by the European Union survey presented above, concerning the trends of reserve management, which also included questions on green bonds. In their regular survey entitled HSBC Reserve Management Trends and conducted in 2017, they processed the responses of 79 central banks. The results indicate that 11 percent of the responding central banks invest into green bonds at present, this option is being considered by an additional 16 percent, while 34 percent claimed that they were not interested in this sub-market at all. Therefore, these ratios are lower in the global survey than those seen among the central banks of the European Union, where 50 percent already hold some kind of green bond.

WHY COULD THE GREEN REVOLUTION BE IMPORTANT FOR THE CENTRAL BANKS?

Preserving financial stability in a broad sense of the term is an important function of central banks and financial supervisory authorities. In the long term, climate change poses a serious threat to global growth and financial stability. This was acknowledged at the international level in the Paris Climate Agreement. Both the G20 and the Financial Stability Board acknowledged it to be one of the major risks at the level of the financial system. In addition, in several countries the central banks and the financial regulatory authorities are increasingly worried about the risks, which were assigned to three categories by the Bank of England.[20]

❶ Physical risks: the more and more intense climate change imposes physical risks, such as rising sea level, floods, devastating storms, draughts, etc. On the one hand, this could damage the infrastructure, buildings, real estate, on the other hand, it could disrupt supply chains. The change of global and local weather could indirectly lead to losses of production in agriculture, low productivity in the labour market, even to famines and mass migration, etc. The costs of the physical damage are borne either by the insurers or the owner companies, households.

❷ The risks of the transition: impairment of the assets, raw materials and products of industries with traditionally high levels of CO_2 emission, depreciation of traditional technologies and together with that, devaluation of equities and debts of companies operating in these industries (oil, coal, conventional energy, conventional vehicles, etc.).

❸ Risks affecting liabilities (debts, other liabilities): the compensation, insurance claims caused by the above events, the risk of impairment, drop of collateral value of the assets backing up these loans owing to the events mentioned above, etc.

WHAT ELSE COULD CENTRAL BANKS DO IN ORDER TO SUPPORT THE GREEN REVOLUTION?

In addition to entering the market as investors, there are several areas where central banks can

contribute to the development of the green bond market.

Market development[21] – a comprehensive greenwash of finances

Central banks and financial supervisory authorities could play a pioneering role in the development of green bond markets, especially as far as the regulation of bond issues and reporting are concerned. The clear regulation implemented by central banks, laying down the green label and the development of rules could accelerate the establishment, development of local markets. The Central Bank of China was the first one to publish a system of rules applying to the issue of green bonds in December 2015, it also issued a project list containing projects eligible for financing from the issue of such bonds.

The High-Level Expert Group[22] set up by the European Commission published its report and strategic recommendations on making finance greener. This aims to create a comprehensive union wide strategy, in order to be able to reach the goals of the Paris Agreement.

The aim of the agreement is to reach a 40 percent reduction in greenhouse gas emission by 2030. According to the estimates of the Commission 180-billion-euro worth of excess investments will be needed annually to achieve this target, and financial institutions are expected to play a key role in financing this. Developments that are sustainable in the long term are expected to increase the stability of the financial system.

In the near future the strategy will be finalised and the details will be worked out, afterwards the new rules prioritizing green finances may be implemented across the EU.

Not only the EU has increased its activites. The Paris Agreement drew attention to the systemic financial risks related to climate change. The G20 has set up a green finance working group,[23] moreover eight central banks initiated a global network of central banks and financial supervisors to make the financial system greener.

Supporting the issue of green bonds[24]

The issue of green bonds is more expensive than that of conventional ones, owing to the needs of administration, since in order to strengthen integrity, in the case of companies, banks, local governments it usually becomes necessary to involve consultants, external accreditation, services, etc. The financial regulatory authority could absorb some of these costs, thereby lowering the barrier to entry in the green bond market. There is an international case in point for similar operations, for example, the Singapore Monetary Authority refunds 100 percent of the costs of issuing green bonds up to a value of 100 thousand Singapore dollars, if the bond meets a number of criteria: It is issued in Singapore and is quoted on the stock exchange there, in a face value of at least 200 million Singapore dollars and with a maturity of at least 3 years.

Disclosure requirements related to climate change[25]

Informing market participants is essential for the efficient operation of the markets. At present, the investors do not have the necessary information for pricing climate change related risks. At the same time, the companies do not know, either, what and how they should report on these matters. At the request of the G20, the Financial Stability Board set up a working group for elaborating that issue with

Michael Bloomberg in charge, the proposals of the groups were published in July 2017. The recommendations are supported by several central banks, the acceptance and mandating of such recommendations prompt companies to identify the risks all over the world, while on the other hand, the make risks accessible for investors.

Notes

[1] This article presents the authors' views and does not necessarily reflect the official opinion of the National Bank of Hungary.

[2] Green Finance = Sustainable Finance? – Abhishek Dangra, 30 November 2017 S&P Global Ratings

[3] Green Bonds: Country experiences, barriers and options – G20 Green Finance Study Group http://unepinquiry.org/wp-content/uploads/2016/09/6_Green_Bonds_Country_Experiences_Barriers_and_Options.pdf

[4] In other words, the bond is held until maturity, which can be considered a stabilizing factor in the case of market turbulence.

[5] The Better Growth, Better Climate – The global commission on the economy and climate, September 2014

[6] https://www.climatebonds.net/2014/05/9-useful-facts-about-global-bond-market

[7] Study on the potential of green bond finance for resource-efficient investment – European Union, November 2016 http://ec.europa.eu/environment/enveco/pdf/potential-green-bond.pdf

[8] Green Bonds: Country experiences, barriers and options – G20 Green Finance Study Group http://unepinquiry.org/wp-content/uploads/2016/09/6_Green_Bonds_Country_Experiences_Barriers_and_Options.pdf

[9] https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/green-social-and-sustainability-bonds/green-bond-principles-gbp/

[10] https://www.climatebonds.net/standards

[11] The working group invited by the European Commission (High-Level Expert Group) works on removing this barrier, among others, with the definition of a uniform project rating, green label standard.

[12] For example: http://oekom-research.com/homepage/SPO/oekom_BNPP_SPO_FINAL_20161116.pdf – here Oekom and BNP try to quantify the CO2 reducing effect of the projects in tons and as an annualized figure

[13] Dan Krieter, CFA, Dan Belton, PhD: 2018 Green Bond Outlook, BMO Capital Markets, 15 December 2017

[14] The July edition of "High-Level Expert Group on Sustainable Finance", operated by the EU, deals with this question in detail: https://ec.europa.eu/info/sites/info/files/170713-sustainable-finance-report_en.pdf

[15] Climate models and precautionary measures - Nassim Taleb et al. http://www.blackswanreport.com/blog/2015/05/our-statement-on-climate-models/

[16] https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062817.pdf

[17] We delivered our questions in the Monetary Work-

ing Group of ECB, to representatives of EU central banks working in the market area.

[18] ESG – Environmental Social Governence

[19] HSBC Reserve Management Trends 2017

[20] https://www.bankofengland.co.uk/research/climate-change

[21] https://www.climatebonds.net/2017/05/china-issues-special-green-bonds-guidelines-listed-companies-new-china-local-govt-green-bond

[22] Final Report 2018 by High-Level Expert Group on Sustainable Finance, https://ec.europa.eu/info/sites/info/files/180131-sustainable-finance-final-report_en.pdf

[23] The eight founding central banks and supervisory authorities are: Banco de Mexico, Bank of England, Banque de France, De Nederlandsche Bank, Deutsche Bundesbank, Finansinmnpektionen (supervisory authority in Sweden), Monetary Authority of Singapore, People's Bank of China

[24] https://www.climatebonds.net/2017/03/hot-press-singapore%E2%80%99s-central-bank-announces-green-bond-grant-scheme-cover-any-additional

[25] https://www.fsb-tcfd.org/

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