Central bank foreign currency reserves management

The greening of central banks and reserves management

This document is intended only for Professional Clients and Financial Advisers in Continental Europe (as defined in the important information); for Qualified Investors in Switzerland; for Professional Clients in Dubai, Jersey, Guernsey, Isle of Man, Ireland and the UK, for Institutional Investors in the United States and Australia, for Institutional Investors and/or Accredited Investors in Singapore, for Professional Investors only in Hong Kong, for Qualified Institutional Investors, pension funds and distributing companies in Japan; for Wholesale Investors (as defined in the Financial Markets Conduct Act) in New Zealand, for accredited investors as defined under National Instrument 45-106 in Canada, and for certain specific Qualified Institutions/Sophisticated Investors only in Taiwan.

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Central banks are incorporating climate change and environmental, social and governance (ESG) considerations across their operations – from bank supervision to financial stability and portfolio management. Supervisors have asked financial institutions to report their exposure to climate risk and fold climate risk into financial stability assessments. Many Sovereign Wealth Funds (SWFs) and government pension funds have signed onto the UN Principles of Responsible Investment (UNPRI) and are overlaying social and climate outcomes on return objectives. More recently, the central banks' Network for the Greening of the Financial System (NGFS) has encouraged reserve managers to overlay ESG objectives onto traditional investment objectives of capital preservation, liquidity and return.

This paper, the seventh in Invesco's central bank Reserves Management Series, explores the drivers, opportunities and challenges for reserve managers incorporating ESG considerations within traditional constraints.

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Abstract

Central banks are incorporating climate change and environmental, social and governance (ESG) considerations across their operations – from bank supervision to financial stability and portfolio management. Supervisors have asked financial institutions to report their exposure to climate risk and fold climate risk into financial stability assessments. Many Sovereign Wealth Funds (SWFs) and government pension funds have signed onto the UN Principles of Responsible Investment (UNPRI) and are overlaying social and climate outcomes on return objectives. More recently, the central banks' Network for the Greening of the Financial System (NGFS) has encouraged reserve managers to overlay ESG objectives onto traditional investment objectives of capital preservation, liquidity and return.

This paper, the seventh in Invesco's central bank Reserves Management Series, explores the drivers, opportunities and challenges for reserve managers incorporating ESG considerations within traditional constraints. Do central banks face a trade-off between "green" investing and return? As fixed income securities constitute the preponderance of central bank reserves, we focus, in particular, on the characteristics and dynamics of the "green bond" market as it transitions from a niche to a mainstream market of "sustainable bonds", spanning climate, social and environmental goals. As discussed, both the demand for, and the supply of, sustainable bonds has increased exponentially over the last few years, with standards, ratings and regulations growing apace. The US Federal Reserve joined the NGFS in November 2020, adding the weight of US capital markets to what has been a European-led initiative. Though we would not be surprised if US Treasury issue green bonds to finance the Biden Administration's clean energy proposals, we believe the US is least pre-disposed of major reserve-currency countries to reduce the liquidity and fungibility of its reserve assets.

Much as monetary policy itself is becoming increasingly concerned with the growth and financial stability risks posed by ESG challenges, especially climate risk and climate policies, the principles and practice of reserve management are evolving. Incorporating the challenges posed by climate change, deteriorating biodiversity and other ESG considerations is likely to play a greater role in reserve management. Judging by current trends, these factors will play a rising role both in the national economic and financial insurance function of liquid reserves; and in the use of investment tranches to enhance global goals to green the financial system and indeed, to encourage public and private investment in reducing ESG risks in general and climate risk in particular.

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I. Central bank mandates, climate and the environment

Central banks are increasingly incorporating broader societal goals into their operations – from financial inclusion, to income disparity and the environment. Over the past five years, climate change and environmental, social and governance (ESG) considerations have been increasingly integrated across central banks' mainstream activities–from banking supervision to monetary policy and financial stability. Most recently, the central bank Network for the Greening of the Financial System has focused on central bank investment operations and how ESG considerations can be incorporated into investment decisions.

The leap of climate change from politics to central banking can be traced to the speech by Governor Mark Carney, "Breaking the Tragedy of the Horizon – Climate Change and Financial Stability" in 2015.[1] At a conference of insurers, he laid out the threats of climate change to financial institutions based on two pillars: the heightened credit exposure to extreme weather events and credit exposure to the "transition economy" – carbon emitters at risk from a systemic shift towards renewable energy. He urged central banks to use their regulatory powers to avoid a potential "carbon Minsky moment" – with investors and creditors simultaneously withdrawing from carbon based industries". Two years later, eight central banks formed the central bank and supervisors "Network for the Greening of the Financial System" (NGFS) to support initiatives to mitigate climate risks and scale up green finance. At the same time, the One Planet Sovereign Wealth Fund Task Force published a framework to assist SWFs to integrate both policy and ESG factors into the investment management process.

Since the 2006 issuance of the UN Principles for Responsible Investment (UNPRI), institutional investors, private equity funds and asset managers have been integrating ESG objectives into investment management for two distinct and, at times, overlapping objectives. From a financial perspective, it was argued that incorporating ESG considerations improved risk-adjusted returns by identifying medium to long term exposures that could materially impact a company's fortunes. From a societal perspective, investors sought to positively impact climate change, the environment and society either by channelling capital to target companies and sectors that "did good" and by restricting capital to companies that "did harm".

For central bank asset managers, these two streams converged in October 2019 with the NGFS publication of "A Sustainable and Responsible Guide for central bank Portfolio Management", which considered how ESG factors could be incorporated into central banks' investment portfolios. In the Invesco 2020 survey of sovereign asset managers, about a quarter of the central banks surveyed responded that central bank balance sheets should be used to mitigate climate change.[2] Central bank membership of the NGFS has multiplied 10-fold over the last three years from the initial eight to 83. That over a third of the world's central banks are now linking policies and reserve asset management to the environment testifies to rapidly spreading engagement with climate policies among reserve managers.

II. Overlaying "doing good" to traditional reserve management objectives

Central banks that seek to integrate ESG factors face somewhat distinct challenges, reflecting the diversity amongst central banks in their balance sheet and portfolio management. Central banks that hold foreign currency reserves to mitigate the impact of economic shocks will generally have little leeway to veer from strict liquidity and capital preservation requirements. Other central banks have more degrees of freedom either because of their policy framework, asset class composition or level of reserves adequacy. Such central banks may invest in equities and corporate fixed income securities, where ESG screening and ratings are more developed, either in the foreign currency reserves, "own funds" or pension portfolios. Within the reserves portfolio, some central banks may be able to incorporate ESG into an investment tranche with a relatively longer investment horizon.[3]

Central bank strategies to incorporate ESG criteria fall into three categories. The first, exclusionary screening, is based on the premise of "Primum non nocere" – "do no harm" and applied mainly to equity and credit portfolios. Perhaps the most widely used because of its simplicity, screening simply excludes sectors or companies from the investment universe based on ethical, moral or scientific beliefs. The second, investment integration, seeks to incorporate ESG considerations into the investment process in order to both improve risk/adjusted returns and for ancillary societal benefits. Investment integration is premised on the belief that financial outcomes are superior when incorporating ESG and may include "corporate activism" or voice for shareholders. The third, impact investing, places policy outcomes alongside financial outcomes and success is measured and reported both in terms of environmental or societal impact as well as traditional financial criteria.

The central bank case studies in Figure 1 depict the strategies deployed by six central banks to incorporate ESG across portfolios, including "own funds", foreign currency reserves and pension portfolios.[4] While these central banks applied ESG considerations mainly to equity portfolios, two emerging market central banks reported explicitly integrating ESG criteria into their foreign currency reserve portfolios through direct investment in green bonds. Both portfolios, however, were described as still small due to challenges, described in more detail below, relating to market size, average maturity and ratings.

Central banks are of course not the only part of the financial sector seeking to "do good" as they carry out their traditional financial sector objectives. "Transitioning from Thinking into Action" segment of Invesco's Climate Risk White Paper series, focuses on the evolving role and practices of the insurance sector in managing climate transition risk and climate events.

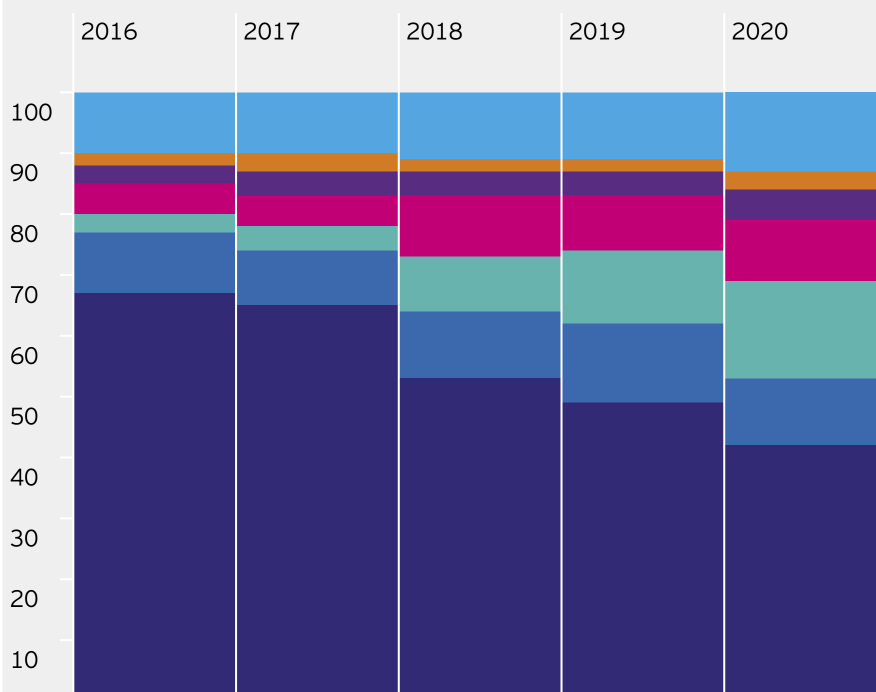
Figure 1
Central bank case studies
Implementation of ESG criteria

Central bank	Portfolio	Asset Class	Strategies	Objective
Norges Bank (Norway)	Global Pension F/X Reserves	Equities Bonds Real Estate	Exclusion/screening Investment Integration Active Ownership	Financial Returns Extra-financial objectives
Banca d'Italia (Italy)	Own Funds	Equities	Exclusion/screening Investment Integration	Financial Returns Extra-financial objectives
Banque de France (France)	Own Funds F/X Reserves Pension	Private Equity	Investment Integration	Financial Returns Extra-financial objectives
Magyar Nemzeti Bank (Hungary)	F/X Reserves	Bonds	Investment Integration	Extra-financial objectives
Swiss National Bank	F/X Reserves	Equities	Active Ownership	Good corporate governance
De Nederlandsche Bank (Netherlands)	Own Funds F/X Reserves	Bonds Equities	Exclusion/screening Investment Integration	Financial Returns Extra-financial objectives
Banco de Mexico (Mexico)	F/X Reserves	Bonds	Investment Integration	Financial Returns

Source: NGFS Technical Document, "A Sustainable and Responsible Investment Guide for central banks' Portfolio Management", October 2019, P. 23, "Implementation Studies".

Despite increasing acceptance of "alternatives" (equities and credit) within reserves, the preponderance of central bank reserves are still invested in sovereigns, government agencies and supra-national bonds ("SSA"). Although the 2020 Invesco Global Sovereign Asset Management Study shows a gradual increase in non-traditional asset classes, the share was still only 13% of total reserves of the central banks surveyed. We will thus focus on the size and dynamics of the "sustainable bond" market.

Figure 2
Central bank asset allocation by sector



Source: Invesco, https://www.invesco.com/content/dam/invesco/igsams/en/docs/Invesco-Global-Sovereign-Asset-Management-Study-2020-Global.pdf, p. 43.
(Sample size: 2020 = 36)

III. Demand for "sustainable" bonds brings forth supply

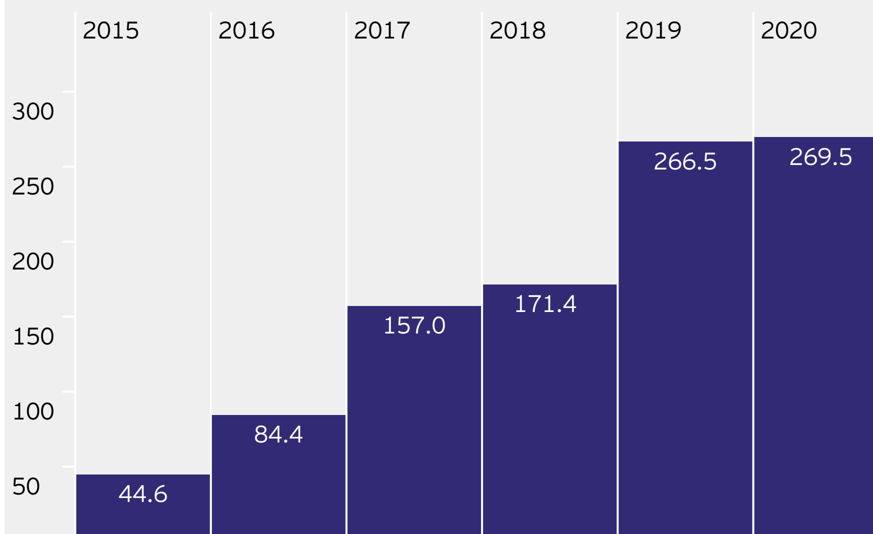
Investor interest in green bonds has brought forth a sharp increase in supply as well new types of "sustainable" bonds and structures. Since the World bank's first "green bond" issue in 2008, market issuance has increased sharply in size and breadth, encompassing social factors as well as new structures, where bond pay-out is contingent upon quantifiable environmental outcomes. For this paper, we will use the high-level definitions adopted by the International Capital Markets Association (ICMA), an organization which has been instrumental in seeking to support the sustainable bond market through the issuance of standards and principles. As illustrated in Figure 3, green bonds are a subsector of Sustainable Bonds, which includes four distinct types: (i) green and climate bonds; (ii) social bonds; (iii) sustainable bonds; and, (iv) sustainable-linked bonds.

Figure 3
Green, Social and Sustainable Bonds

Sector	Definition	Standard
Green Bonds and Climate Bonds	Proceeds ringfenced to be invested in climate and environmental projects accordance with standards and principles	CBI Climate Bond Standards (CBI) ICMA Green Bond Principles (GBP)
Social Bond	Proceeds ringfenced to be invested in social activities in accordance with principles	ICMA Social Bond Principles (SBP)
Sustainable Bond	Proceeds invested in either environmental or social projects in line with the UN Development Goals	ICMA Sustainable Bond Guidelines (SBG)
Sustainable-Linked Bond	Bond pay-out linked to achievement in meeting measurable environmental and climate metrics	ICMA Sustainable -Linked Bond Principles (SLBP)

Source: ICMA. https://www.icmagroup.org/sustainable-finance/

Figure 4
Green Bond Issuance



Source: Climate Bond Initiative (CBI), (USD bn).

The market capitalization of sustainable bonds topped $1 tn in 2020 after two years of record growth. This growth is expected to continue with many sovereigns and the European Community announcing plans to introduce or increase issuance in the coming years, which will help improve liquidity – a key factor in central bank reserves. The EU's "SURE" bonds – temporary Support to mitigate Unemployment Risks in an Emergency – were issued in four tranches totalling €53.5bn, of a total envisioned 100bn – to help member-states finance the costs of employment preservation and short-term work programs to manage the socio-economic costs of the COVID pandemic. About 37% of the heavily oversubscribed issues were purchased by central banks.[5]

While the market capitalization of this sector is now significant, the investable universe for central banks is generally less so because of market characteristics including sector, credit ratings, duration and currency. Looking at 2020 issuance by sector, only about half of the market would fall within "traditional" reserve asset classes, including sovereigns, government agencies and multi-laterals. As mentioned earlier, currently only 13% of central bank reserve assets were invested in "alternatives" including corporate bonds, bank debt and local government bonds as well as equities.

Another challenge for reserve managers may be currency. While only 20% of global reserves are denominated in EUR, nearly half of 2020 Green bond issuance was in EUR and less than one-third in USD. Over the last five years, Europe has taken the lead in the issuance of green bonds with France and Germany, in particular, taking the lead. The Eurosystem of national central banks that, together with the ECB itself, implement the monetary policy of the Eurozone (EZ) and manage both monetary policy portfolios through internal EZ asset purchases and international reserves, has already established a common stance for climate change-related investments in non-monetary policy portfolios. This imbalance, however, is likely to change with Biden Administration and its policy commitments to the environment and green finance. The UK Debt Management Office has announced its intent to issue its first Green Gilt in 2021 and it would not be surprising should the US Treasury follow suit.

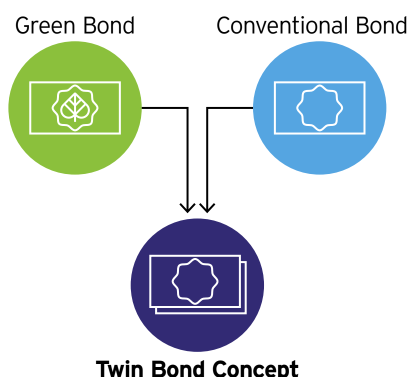
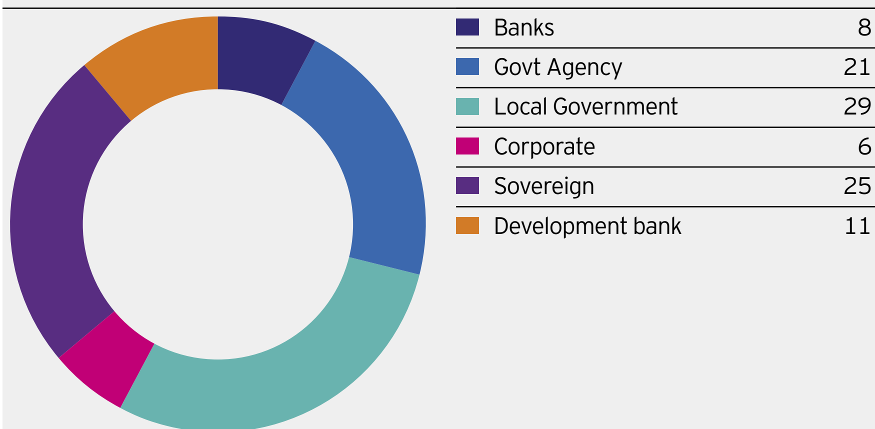
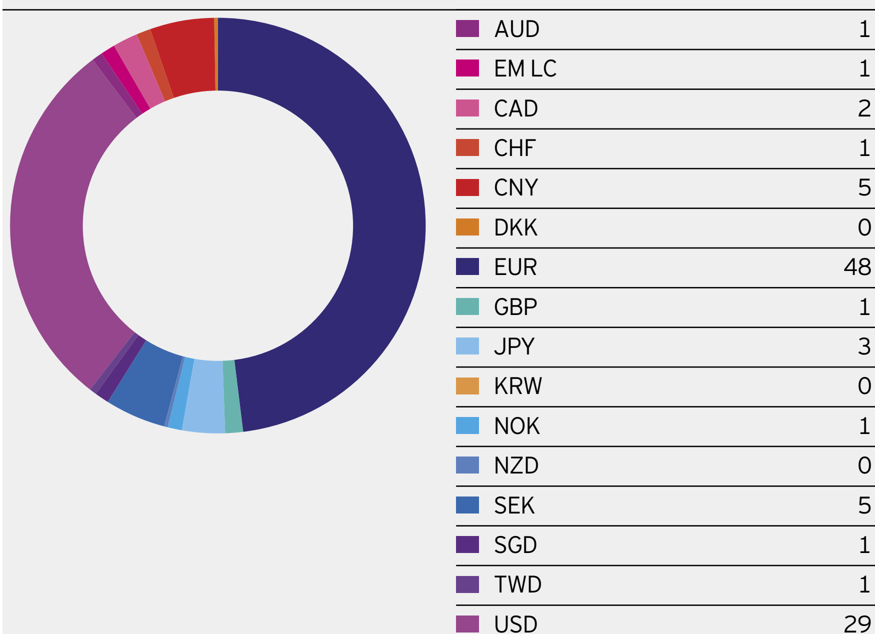


Figure 5
2020 Green Bond issuance by issuer type (%)



Source: Climate Bond Initiative

Figure 6
2020 Green Bond issuance by currency (%)



Source: Climate Bond Initiative

The Federal Government of Germany, in particular, has put its strength as one of the highest rated sovereign issuers behind the Green Bond market. In 2020-Q3, the German Government launched its Green Bund program whereby the Government committed to issuing a Green Bund "twin" alongside every conventional bond issue.[6] Of particular importance to central banks, this program provides regular issuance at the 1,2,5 and 10 year points of the yield curve, balancing the long duration issuance to date. Moreover, the German Government addressed potential liquidity concerns by allowing a bond holder to swap the Green Bund Twin for its conventional counterpart. Each Green Bund Twin has identical terms to its conventional counterpart but is issued in a smaller size and with a short time lag. Proceeds of the Green Bund are earmarked for clean energy and projects contributing to the Government's commitment of net zero carbon emission by 2050. Germany issued its first Green Bund in Sept 2020, a €6bn ten-year issue that was five times oversubscribed, demonstrating the still substantially greater demand than supply and premium.

As the market is developing, central banks report investing simply through a green "tilt" or by incorporating ESG factors into external managers.[7] Challenges include the size of the investable market relative to the size of reserves and bond maturities at issuance that are typically in the 10-15 year range at issuance. Figure 7 depicts the size of the major green bond indices, each of which applies restrictions based on currency, credit rating and issuance size. Some also require that bonds meet either the Climate Bond Initiative (CBI) standards or conform to ICMA's Green Bond Principles. Of these, the Solactive Green Bond index reflects most closely the investment characteristics associated with most central bank reserves. Specifically, it includes only USD and EUR issues and only investment grade bonds, including corporates. On this basis, the size of the investable market would be only $394 bn – still too small to play a major part in central bank reserves portfolios.

Figure 7
Major Green Bond indices[ii]

Index	Bloomberg Ticker	Currencies	Credit quality	# of bonds	Issuer or sector caps based on MV weights	Min issue size	Mod Duration	Standard	Mkt Value (USD-bn)
BB Barclays MSCI Green Bond Index	GBGL	Global	IG	581	No caps	USD300M	8.31	MSCI ESG	576
Bank of America-ML Bond Index	GREN	Global	IG	678	Issuer cap 10%	USD250M	8.32	CBI	542
S&P Green Bond Index	SPUSGRN	Global	No min	7,716	No caps		7.38	GBP	791
S&P Green Bond Select Index	SPGRNSL	USD, EUR, JPY, GBP, CHF, AUD, NZD. CAD, SEK, NOK	No min	644	Issuer cap of 10%; HY sector cap of 20%		8.16	CBI/ GBP	553
Solactive Green Bond Index	SOLGREEN	20 currencies	No min		Bond cap of 5%	USD100M	7.3	CBI	684
Solactive Green Bond Index Investment Grade	SGREENIG	EUR, USD	IG	440	Corp issuer cap: 5%; Gov issuer cap 10%	EUR300M USD300M	9.1	CBI	394

Source: Bloomberg, as at 30 November 2020.
For Solactive Green Bond Index and Solactive Green Bond Index Investment Grade, source: Solactive as at 7 December 2020.

At the level of the strategic asset allocation (SAA), a central bank could theoretically substitute a Green Bond index as part of its fixed income risk allocation. A principal characteristic, however, of the SAA or policy portfolio is that it be "investable" and can be replicated by the portfolio managers. Given current market characteristics, this strategy would likely be feasible only for a small share of the total SAA.

Some central banks, particularly in emerging markets, have tranched reserves into a liquidity and longer term investment portfolio. Incorporating a green bond benchmark–whether an external or internal index-- into the investment tranche could be more feasible given the relatively smaller size of the investment tranche, broader investment guidelines and longer investment horizon. The Hungarian National Bank adopted such an approach by creating a "filtered" or tailored index to support a dedicated green bond portfolio as part of its Green Program launched in 2019.[iii]

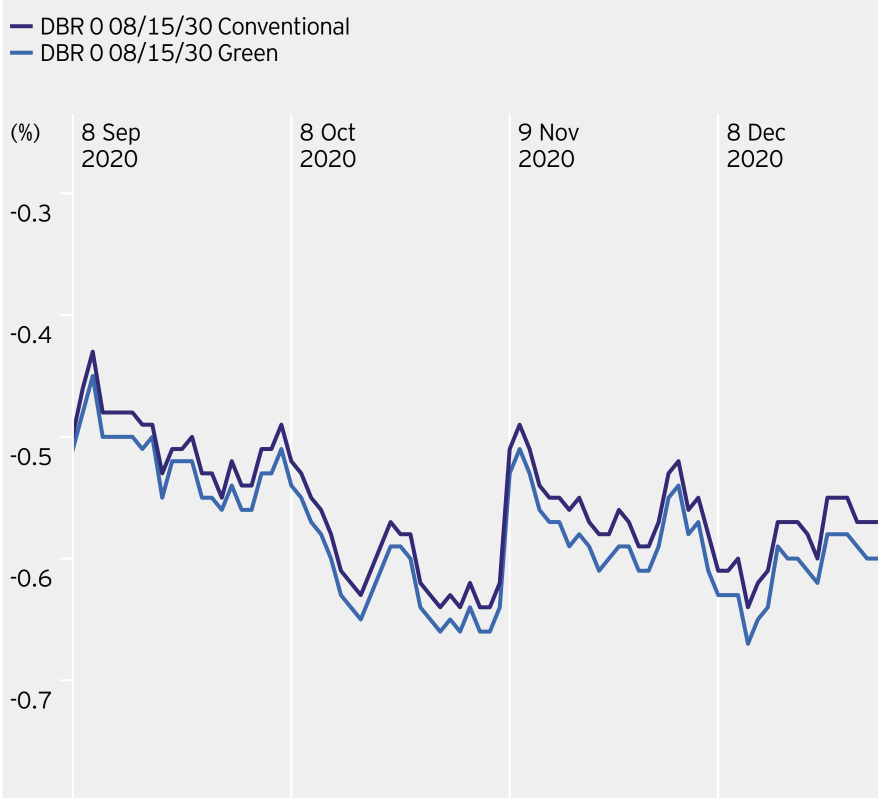
Another approach is to adopt a "tilt" towards sustainable bonds either through a strategy known as "enhanced indexation" or "best in class". In such a strategy, the invested portfolio replicates the main risk characteristics of the underlying index, such as currency and duration. At the level of security selection, however, the portfolio manager can invest in a green labelled security within a given duration "bucket". The Bank of Italy adopted this strategy as part of ESG integration into its equity portfolios. While replicating the main characteristics of a customized benchmark, portfolio managers favour issuers with a higher ESG score based on a carefully selected data provider. In assessing portfolio outcomes, performance is reported both in financial terms and in terms of the resulting environmental footprint versus the benchmark.

Finally, central banks can "outsource" incorporation of ESG and security selection by either investing in a Green ETF or by integrating ESG into an external manager dedicated mandate. The central bank of the Netherlands incorporate ESG criteria into the selection process for two investment grade credit managers and, as a next step, is enhancing the socially responsible investment (SRI) monitoring process for all its external managers.[iv] The market currently offers green ETFs across asset classes in a range of products varying from those that track a green index to ETFs focused on specific sectors such as water, climate change or transportation.

Many institutional investors have argued that long-term performance is better for companies that respect good ESG practices. Research done over the past five years in financial journals and, most recently, by Morningstar, has tended to support the contention that investing in ESG securities has not negatively affected returns. While one cannot extend these conclusions to official sector issuers – the domain of most reserve managers – recent trends do provide insight to current relative value dynamics in the sovereign green bond sectors.[8]

The German Green Bund program, which launched in October 2020, illustrates the price performance of a traditional bund and its Green counterpart. Since its launch, the Green bund twin has consistently traded at a 2 bp premium. While the Green Bund does offer the option of conversion, the size and stability of the premium is evident also in other issues across the fixed income sector. Despite fungibility of public funds, investors are willing to pay for a bond where the use of its proceeds are committed to mitigating the risk of climate change or other social goals.

Figure 8
The "Greenium"
Yield spread between the Conventional Bund and its Green Twin



Source: Bloomberg, 15 December 2020. (Bid yield).

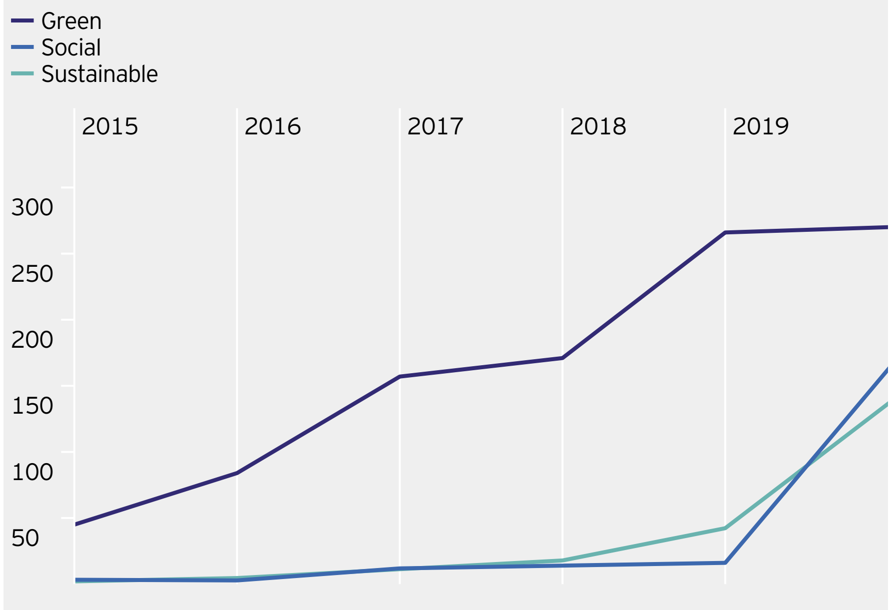
The "greenium" also provides a source of savings for public issuers, which will incentivise sovereigns to continue to issue Green Bonds. The UK Debt Management Office pointed to this savings when announcing its intent to issue green bonds, as has the European Union in funding the €750bn Euro Recovery Fund. It remains to be seen whether governments and corporates that commit to environmental targets ultimately outperform also with respect to economic and financial results. But the near-term investment prospects for Green Bonds remain good with demand outpacing supply and recent sovereign issues many times over-subscribed.

In response to COVID 19 and the focus on social justice, sovereign and government agency "Social Bonds" have taken off. In 2020, issuance of social bonds increased ten-fold to $162bn, mainly by governments spanning both developed and emerging market countries. During 2020, the European Commission launched a €100bn Social Bond program, the proceeds of which are earmarked to address poverty, inadequate housing and joblessness in member states. Its first issue was 13 times oversubscribed. The French Govt Agency Cades and Unedic issued €22bn in Social Bonds to fund projects tackling unemployment. The Government of Japan issued social bonds to fund programs to support an aging population. And amongst emerging markets, the Governments of Indonesia and Chile issued "Social Bonds" to fund health and welfare initiatives relating to COVID 19. Issuance of Social Bonds was not, however, limited to sovereigns. Commercial banks in Spain and the US issued Social Bonds to finance specific lending activities relating to minority communities, low income housing, health care and education.

This boom appears motivated by the intersect between strained public sector finances relating to the pandemic, and social equity demands and investor demand for sustainable bonds from a burgeoning number of institutional investors who have signed up to the UNPRI. And, while Europe has taken the lead in Social Bond issuance, the US could follow under the new Administration with its commitments both to the environment and social justice. This new sector could provide central banks an opportunity to invest both in sovereign bonds by major reserve issuers while aligning the investment with central banks' broader societal goals.

This movement, however, points to a splintering of the capital markets with public sector bonds tied to specific projects with potentially severe liquidity implications. Such bonds are not fungible and tend to be issued at long maturities, leading to the risk of being stranded. As societal priorities change, investors may shift out of "old" sectors into more contemporary ESG bonds, leaving older bonds quite illiquid. This is a particular risk given that most "sustainable bonds" have been issued at longer maturities of up to ten years and beyond. Some borrowing programs address this risk of fragmentation and the potential for stranded assets. As discussed earlier, the German Government has granted the option of converting the Twin bund into its conventional counterpart. Also, the bonds issues by supranationals such as the World bank are no longer fragmented with all World bank bonds labelled "sustainable" based on the institution's alignment with ICMA's Green Bond Principles. Nevertheless, there is a potential impact on liquidity if the trend of fragmenting public finance of major reserve currency issuers were to increase significantly. Indeed, the Bank of International Settlements (BIS) has found that the most important constraint for central bank investment in green bonds is liquidity risk.

Figure 9
Sustainable bond issuance



Source: Climate Bond Initiative and Environmental Finance

VI. Macro considerations and concluding remarks

Alongside its many other ramifications in geopolitics, geo-economics and the global financial system, the COVID-19 pandemic is a spur to reassess, and perhaps even reform, central bank reserve management in an increasingly uncertain global environment. The pandemic has widened the crucial range of policy and investment challenges for both official and private institutional investors. By precipitating decisions by governments around the world to lockdown national economies in quick sequence, the world economy has undergone the sharpest, most deliberate downturn in recorded history – a "Great Compression" in national and global economic activity. These unique events and their aftershocks have crystallised the concern that extreme events and accelerated trends, including those that are not directly "man made" or attributable to policy decisions, can have systematic economic effects and financial ramifications.

For central bankers and reserve managers, the key factors in monetary policy as well as reserve management seem to be widening ever further from conventional concerns of familiar economic cycles, terms of trade shocks or even "conventional" balance of payments and financial crises. Paramount among these is the central challenge of climate risk and the accelerating threat of deteriorating biodiversity, extreme weather events and ultimately, the potentially destabilising or even devastating trends of rising global temperatures, sea levels and the potential for disruption to domestic commerce, international trade and global financial markets.

These shocks and accelerations brought about by the pandemic also crystallise the value of insurance of many kinds – public health insurance; "self-insurance" including household savings, corporate cash, commercial bank liquidity, reserves and tangible common equity, and indeed central bank reserves. It is true that, so far at least, economic and financial crises seem to have been avoided by the rapid, forceful and coincident actions of many central banks in both developed and emerging market countries.

But when it comes to ESG problems, traditional approaches of managing risk, liquidity and maximising return may simply not measure up. This is clearly true for the E – but arguably also the S and G, given the rising challenges of inequality within national populations, displacement and migration, and disruption by technology and trade. In extreme events or accelerations, conventional or even unconventional economic policy responses whether monetary or fiscal, may simply not suffice to restore financial stability and prevent severe national or even global balance sheet damage. There may be few places to hide from rising sea levels or severely challenged ecosystems, for example, given how much economic activity takes place at sea level, where so many major cities, ports and people are located; or given how many people live in arid areas that are increasingly likely to become uninhabitable or at least infertile and inhospitable.

In this context, the private sector has been taking the lead in ESG, rather than waiting for governments or multi-lateral organizations to set the agenda, the standards and enforcement mechanisms. Official investors, like the Norges Bank, have often set the pace. Central banks, arguably are coming to the idea late, not unlike national governments. But there are many ways that central banks, among other official investors and institutions, can take a lead now. Central banks, both through monetary policy decisions and policy portfolios, as well as international reserve assets can focus as much on reducing national and global climate risk, as well as other social and governance risks, much as they seek to regulate, manage or reduce the risks of economic and financial instability such as high inflation or excessive currency volatility. Foreign currency reserves exist as a prudential portfolio against both short-term and long-term country risks. Incorporating ESG considerations into investment criteria can play an important part in the prudent protection of a country and economy from the potential ravages of climate change, loss of bio-diversity and other natural resources that form, alongside the reserves, the wealth of nations.

Investment Risks

The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested.

Currencies generally are volatile and are not suitable for all investors.

Notes

1 Speech by Governor Mark Carney, Bank of England and Chairman of the Financial Stability Board, at Lloyd's of London, London, 29 September 2015. See https://www.bis.org/review/r151009a.pdf

2 See https://www.invesco.com/content/dam/invesco/igsams/en/docs/Invesco-Global-Sovereign-Asset-Management-Study-2020-Global.pdf, page 63.

3 The topic of strategic asset allocation, reserves adequacy and tranching is explored in more detail in Invesco, White Paper #2, "Central bank Reserves Management-Balancing Stability and Return", https://www.invesco.com/content/dam/invesco/uk/en/pdf/63265-2%20Central%20bank%20whitepaper.pdf

4 See "A Sustainable and Responsible Investment Guide for central banks' Portfolio Management, NGFS, October 2019, Annex V.

5 https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/financial-assistance-eu/funding-mechanisms-and-facilities/sure_en

6 https://www.deutsche-finanzagentur.de/en/institutional-investors/federal-securities/green-federal-securities/

7 https://www.invesco.com/content/dam/invesco/igsams/en/docs/Invesco-Global-Sovereign-Asset-Management-Study-2020-Global.pdf, page 63.

8 "Majority of ESG Funds Outperform Wider Market over Ten Years", Financial Times, June 10, 2020

i Climate Bond Initiative (CBI) standards:
See https://www.climatebonds.net/standard

ii International Capital Markets Association (ICMA) Green Bond Principles, 2018:
See https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/Green-Bonds-Principles-June-2018-270520.pdf
ICMA Social Bond Principles:
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ICMA Sustainable-Linked Bond Principles, 2020:
https://www.icmagroup.org/green-social-and-sustainability-bonds/sustainability-linked-bond-principles-slbp/

iii See NGFS "A Sustainable and Responsible Investment Guide for central banks' Portfolio Management" "Green Bond Investments at the Magyar Nemzeti bank" October 2019, https://www.ngfs.net/en/liste-chronologique/ngfs-publications?year=2019,

iv Idem, "External Manager Selection at De Nederlandsche Bank"

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GL225/110321