



# Building a Green Bond Portfolio

A Reserve Manager's Guide

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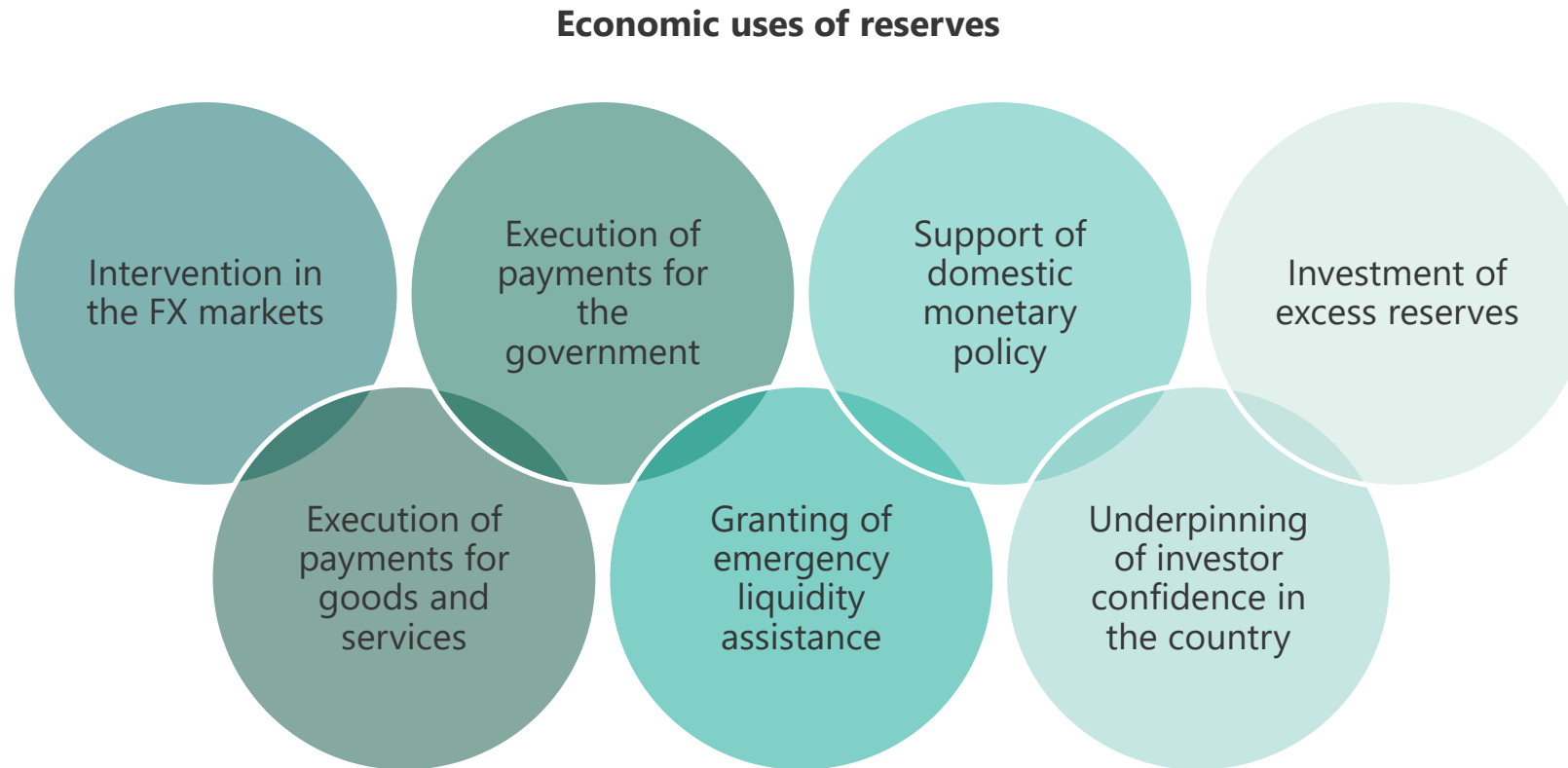
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*Central banks can help mobilise funds to contribute to the large-scale public sector investment required to reach the goals of the Paris Agreement on climate change.*

*In this context, a key tool is the portfolios of assets that central banks have been entrusted to manage in the context of their countries' exchange rate policies: foreign exchange (FX) reserves.*

# Economic uses of FX reserves

- Any debate about whether FX reserves can be employed to pursue sustainability objectives traces back to a discussion of the purposes for holding reserves.

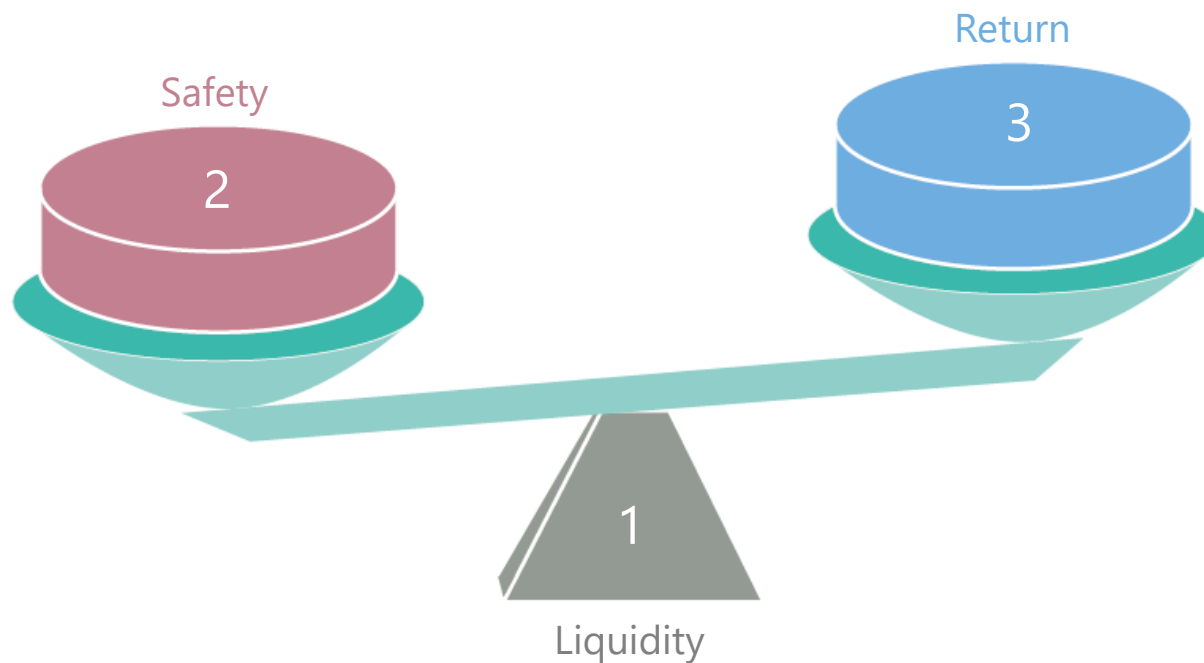


Source: Borio et al (2008).

# Balancing reserve management objectives

- This balance can be represented as a trade-off, where liquidity (ease of sale / low price impact) is always present, and a combination of safety (lower risk) and return (higher profit) is attempted through a hierarchical approach.

**Graphical representation of the trade-off between reserve management objectives**

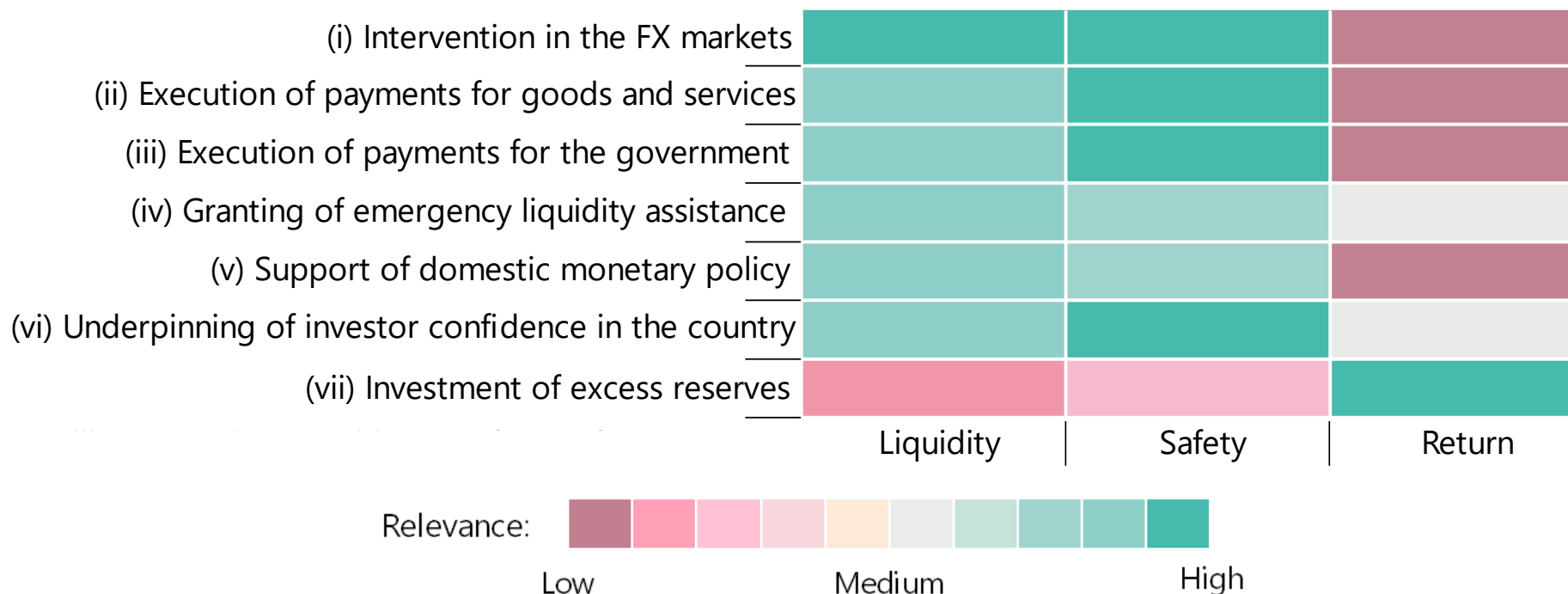


Source: Authors' elaboration.  
For illustrative purposes.

# Implications for portfolio construction

- This suggests a direct link (or "mapping") between the seven economic uses of reserves that are usually identified in the literature and the triad of objectives commonly pursued by reserve managers.
- We can express the relevant trade-offs by way of a 7 x 3 matrix.

**Mapping between economic uses of reserves (rows) and reserve management objectives (columns)**



Source: Authors' elaboration.  
For illustrative purposes.

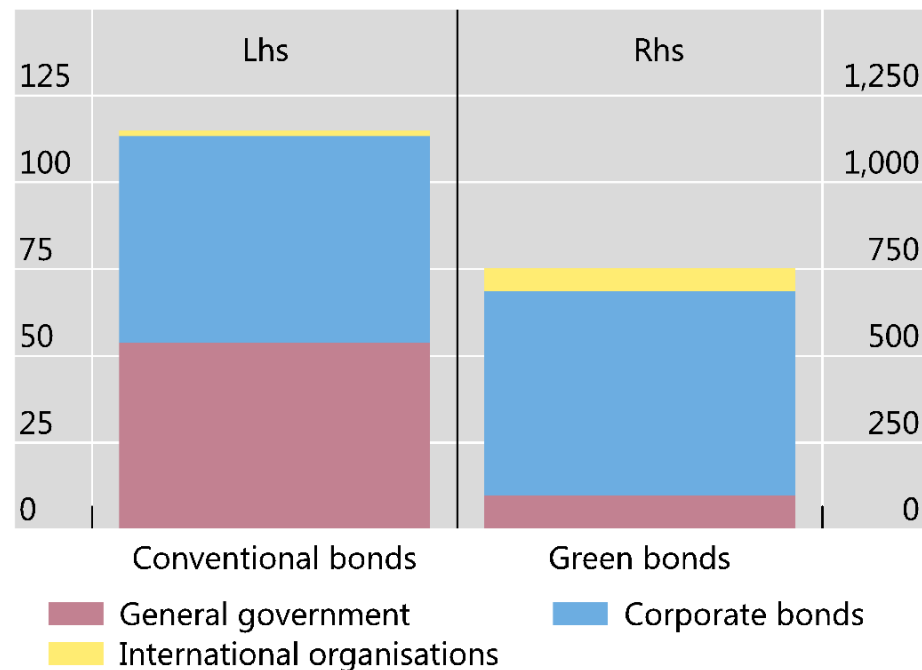


# Green bonds: liquidity

- We find that from an accessibility and liquidity standpoint, there are some constraints. As a result, green bonds may not be ideal for the liquidity or working capital tranches of central banks' reserve portfolios.

**Fixed income market size by type of issuer and currency**

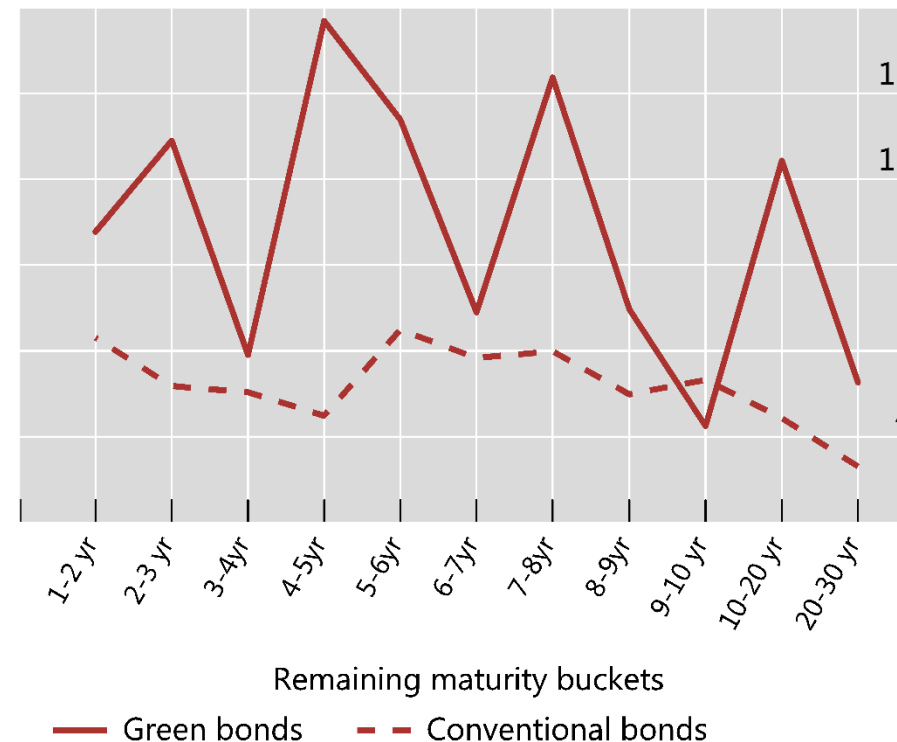
USD trillion (Lhs) and USD billion (Rhs)



Sources: IMF; Climate Bond Initiative; Dealogic; Environmental Finance Bond Database; Euroclear; Thomson Reuters; Xtrakter Ltd; national data; BIS debt securities statistics; BIS calculations.

**Term structure of bid-ask spreads for USD agency and supranational bonds**

Basis points



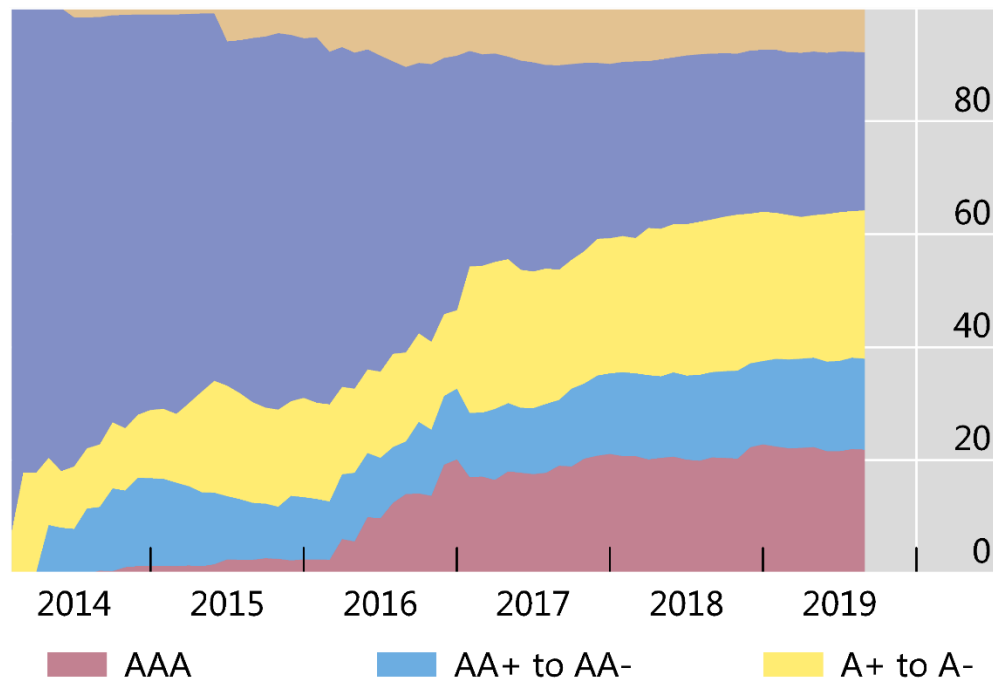
Sources: Bloomberg; BIS calculations. Median of July-2019 daily data.

# Green bonds: safety

- We find that the ratings composition of green and conventional bond markets has broadly converged, supporting eligibility. Recent data for total amounts outstanding at the sectoral level appear to confirm this observation.

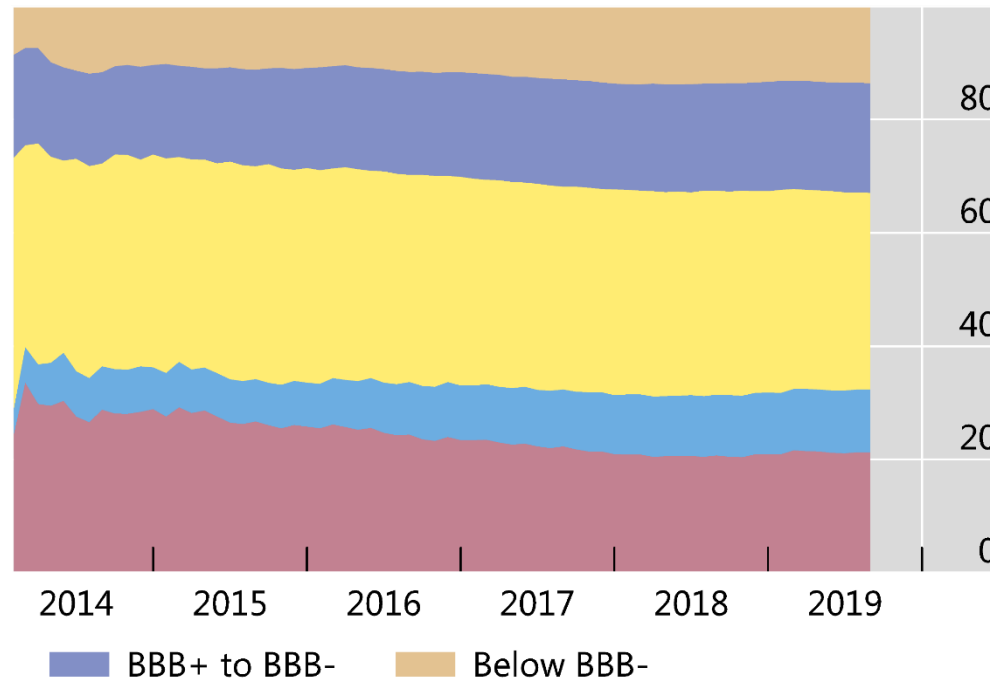
**Cumulative green bond issuance since 2014, by credit rating bucket**

In percent of amount issued



**Cumulative conventional bond issuance in reserve currencies since 2014, by credit rating bucket**

In percent of amount issued



Sources: Bloomberg; BIS calculations.

S&P, Moody's and Fitch credit ratings average; expressed in S&P credit ratings.

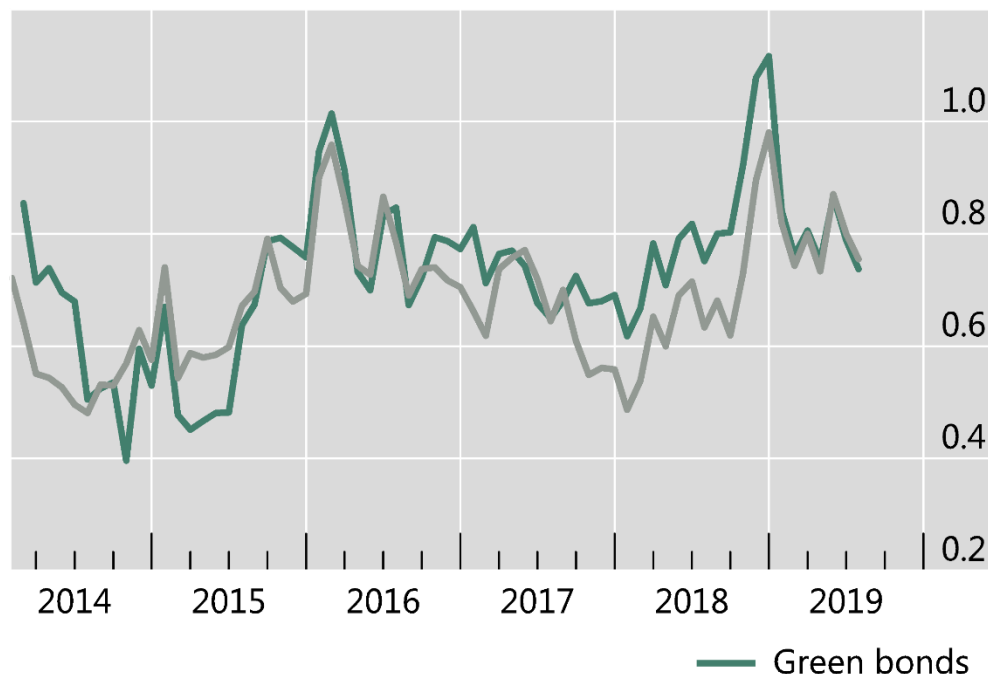
Reserve currency issuance includes all government, quasi-government and corporate bonds issued in USD, EUR, GBP, JPY and CNY, since 2014.



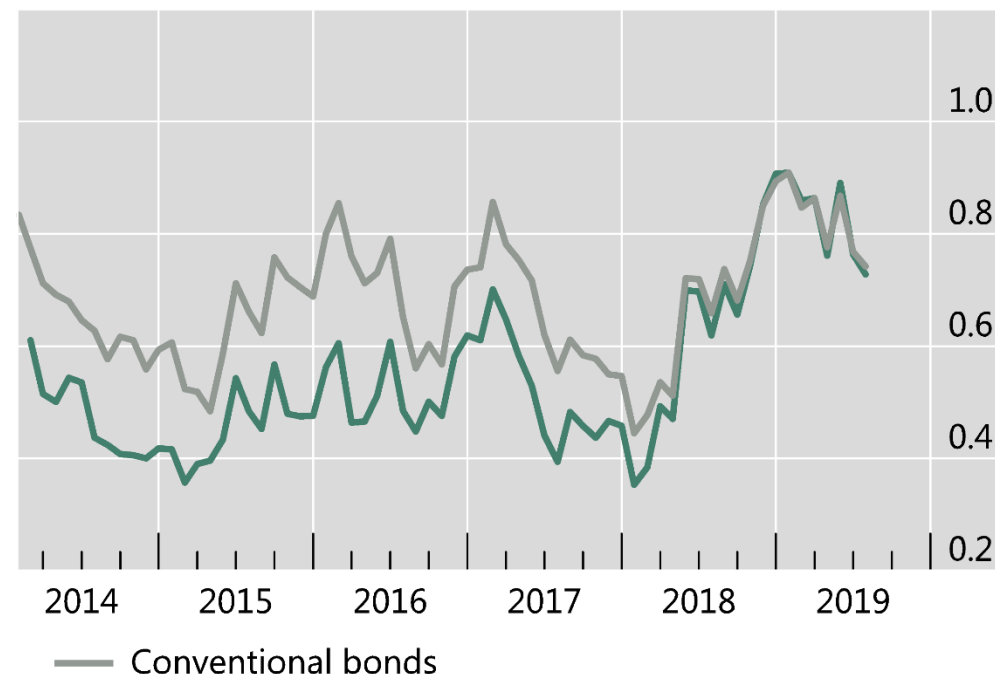
# Green bonds: return

- Calculating portfolio spreads, we find that historically there was a gap between green and grey bond portfolios of similar duration, issuer type and credit rating. However, it has closed, leaving no yield opportunity cost for “going green”.

**US dollar green and conventional bond spreads to the reference curve**  
Percentage points



**Euro green and conventional bond spreads to the reference curve**  
Percentage points



Yield curve factor model for the reference curve uses monthly data since 1953 for US Treasuries from the Board of Governors of the Federal Reserve System and monthly data since 1974 for German bunds from the Bundesbank (see Annex for details).

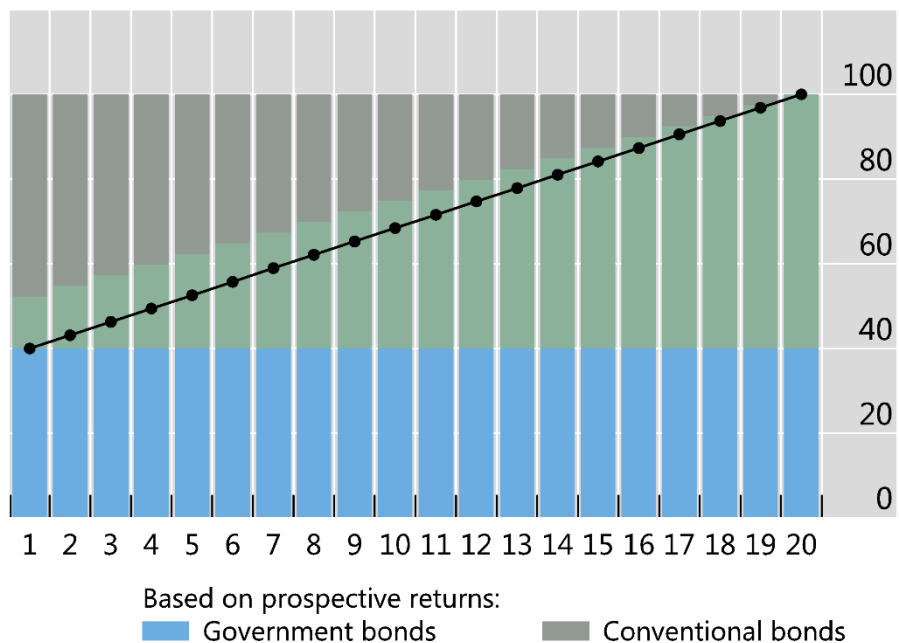
Sources: Board of Governors of the Federal Reserve System; Deutsche Bundesbank; Bloomberg; ICE BofAML indices; authors' calculations.

# Impact on reserve portfolios' risk/return profile

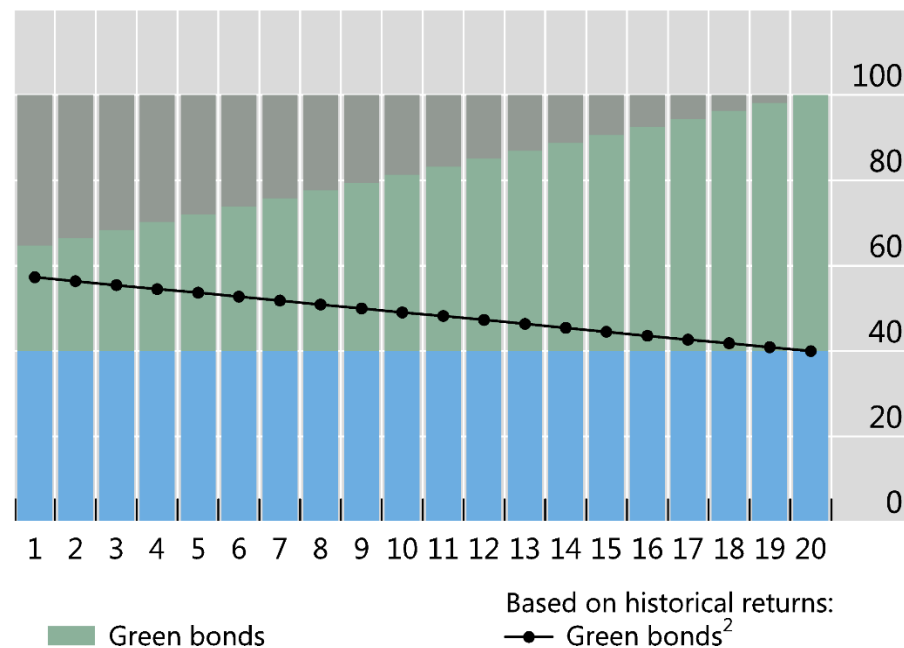
- An illustrative asset allocation exercise suggests that adding both green and conventional bonds can help improve the risk-adjusted returns of traditional government bond portfolios.

## Composition of portfolios on the efficient frontier<sup>1</sup>

In percent of each portfolio  
USD reserve manager



## EUR reserve manager



Sources: Bundesbank; US Federal Reserve Board; Bloomberg; ICE BofAML indices; BIS calculations.

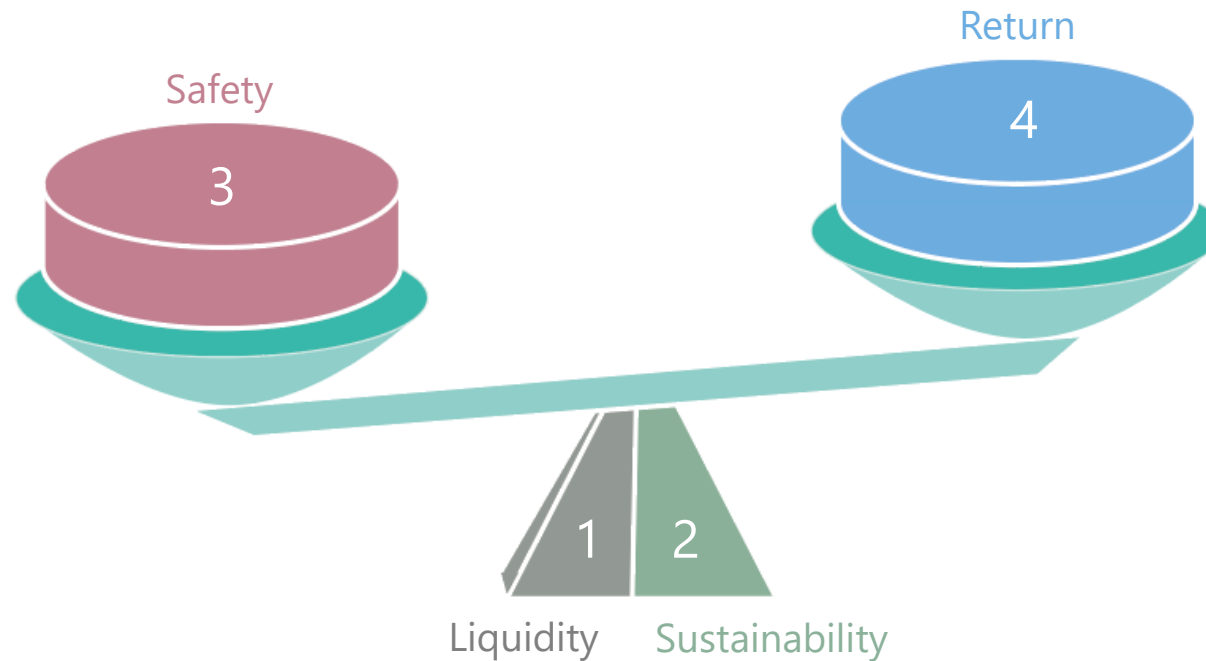
1/ Efficient frontiers for illustrative reserve portfolios, based on monthly returns. Historical returns are calculated from a sample from Jan-2014 to Jul-2019; prospective returns are calculated based on 5-year-ahead projections as described in Box B. Sovereign bond investment imposed at 40% for all exercises. Portfolios on the frontier are sorted from lower to higher volatility. Minimum risk portfolios are labelled 1; maximum risk portfolios are labelled 20.

2/ Weight is the sum of the fixed government bond allocation (40%) and the resulting green bond allocation.

# Balancing reserve management objectives: revisited

- A new hierarchical approach to portfolio construction could: first, trade off liquidity and sustainability; then, trade off safety and return.
- For institutions where it is instead a first-order consideration, sustainability could precede the whole process.

**Graphical representation of the trade-off between reserve management objectives**



Source: Authors' elaboration.  
For illustrative purposes.

# Managing green portfolios: the challenges

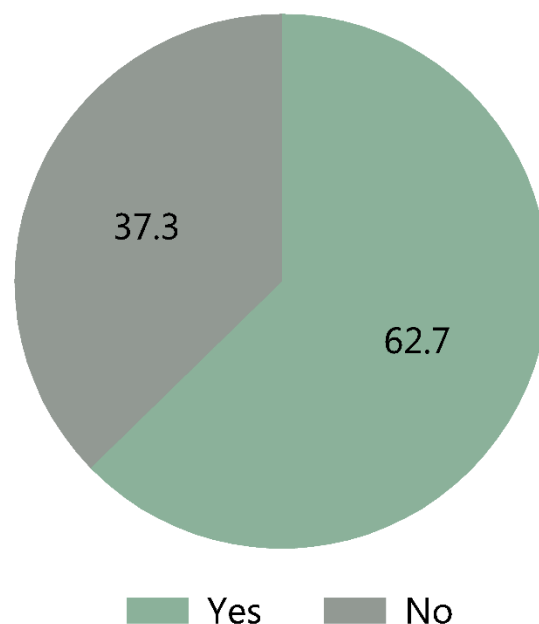
Source: BIS. To learn more about the BIS green bond fund for central banks, visit [the press release](#).

## Is sustainability supported by central banks?

- Over half of the institutions in the sample consider that there is scope to include sustainability as a fourth reserve management objective in addition to liquidity, safety and return.

### Do you think there is scope to include sustainability as a reserve management objective?

Percentage of respondents



Sources: Authors' survey of reserve managers and official institutions; authors' calculations.  
67 central banks and official institutions participated in the survey.

To read more about reserve management and sustainability visit: [Green bonds; the reserve management perspective.](#)

# Questions?

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