

What if... the ECB had decarbonised its portfolio from the start? P&L and decarbonisation implications

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We test the scenario that the European Central Bank (ECB) had decarbonised its portfolio from 2017 instead of waiting until 2022. Why? Real portfolios are the best test of portfolio decarbonisation methodologies. Testing new strategies on a general portfolio like the ECB's can deliver insights to be applied to bespoke investor portfolios and flag topics for further research.

The ECB's corporate bond portfolio, currently in excess of EUR350bn, is arguably the biggest player in the EUR denominated market. As such, the allocation of capital within it may have more impact on cost-of-capital for corporates than other traditional factors.¹

The Corporate Sector Purchase Programme (CSPP), and its expansion through the Pandemic Emergency Purchase Programme (PEPP), were until recently based on market-weights without considering factors such as governance quality or climate impact. In a policy note² dated 20 Sep 2022, the ECB highlights its operational modalities to decarbonise this portfolio.

In this note, we test a counterfactual case where the ECB reweighted bond purchases to reduce the carbon intensity of its portfolio from 2017 rather than the latter half of 2022, when one could argue that the macroprudential risks of fossils exposures were already known.

We arrive at this by deploying the ECOBAR model that was presented in 2017,³ such that it could have been deployed for the lion's share of the purchased programs, and look at decarbonization metrics as well as performance metrics. The ECOBAR approach has the advantage of having been known over a long period of time, as well as having clear similarities with the recently announced ECB modus operandi.

Our results indicate:

- Reweighting would have improved returns marginally, to the tune of 10bps (0.1%) cumulatively, or a P&L of EUR300-350mn in excess returns measures.
- The CSPP portfolio is found to have run a >50% higher carbon footprint than a decarbonised portfolio, even before accounting for Scope 3 emissions.

¹ AFII has covered ECB policy on the CSPP portfolio in a number of articles, e.g. "[Tilt and Run: ECB climate policy update](#)", 5 Jul 2022; "[Wind-down of \(CSPP\) is Coming](#)", 8 Jun 2022; "An ECB Rapid Decarbonisation Plan", 20 Oct 2020.

² "[ECB provides details on how it aims to decarbonise its corporate bond holdings](#)", ECB, 20 Sep 2022.

³ "[Credit Alpha and CO2 Reduction: A Portfolio Manager Perspective.](#)" Ulf Erlandsson, SSRN Working Paper, 2017. For more analysis, see "[Low carbon credit performance 2015-2020](#)", AFII, 27 Jan 2021, and follow-ups.

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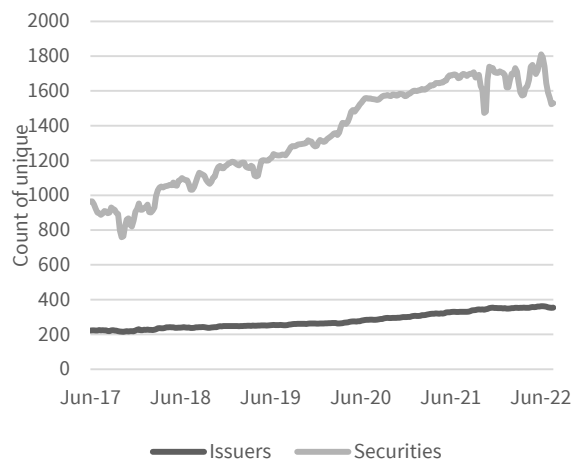
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Methodology

The below text describes how to reduce the ECOBAR score of the ECB portfolio, which is highly correlated to reducing the carbon intensity as well, and how to gauge performance differentials in the related portfolios.

First, the ECB has historical data on the CSPP portfolio since mid 2017, although the program started already in 2016. As a reminder, the CSPP was introduced as a response to the near-freeze of the EUR credit market in Feb 2016, and drove a massive rally in spreads. The data is available on a bond ISIN basis, but without individual position sizes. Hence, what we construct is a theoretical portfolio but, we believe, not substantially different from the actual portfolio in terms of aggregate numbers. The ECB has been clear on using market-weights in its purchase strategy, and hence we assume weights on the ECB-posted ISINs weighted on the amount issued by each individual bond. Given the large number of bonds in the portfolio, illustrated in Figure 1, adjusting the weighting scheme e.g. using equal weights, does not seem to change the aggregate performance much.

Figure 1. Number of unique securities and issuers in the CSPP portfolio over time. Source: ECB, AFII.



Scoring of the CSPP portfolio

We provide an overview of the ECOBAR methodology in the [Appendix](#). The methodology ranks issuers across two axes: first, sector is ranked [1,2,3] and each issuer within the sector is then ranked [1,2,3] based on some carbon metric, and where a 1/3 indicates a low/high relative emission metric. The ECOBAR score of the issuer is then the product of the two rankings [1,2,3,4,6,9] with 9 being the “worst” score. Green bonds are assigned a value of zero.

For the portfolio in question, we are using BICS Level 1 sector data to classify issuers, which creates 12 sectors. To score the sectors we first consider emissions intensity, here measured as Scope 1+Scope 2 emissions, divided by the sales of the issues.⁴ Results from this classification, which are also in line with the original paper, are shown in Table 1. In line with the original paper, we assign a sector score of 2 to the ‘Financials’

Table 1. Table of CSPP issuers average and median Scope 1 +2 emissions intensity (m tons CO²/sales) and Sector ranks.

Sector	# issuers	Average emissions intensity	Median emissions intensity	Sector Rank
Technology	14	16.88	7.28	1
Health Care	19	32.85	24.54	1
Communications	24	28.69	27.12	1
Consumer Discretionary	23	59.06	30.67	1
Financials	24	8.99	1.45	2
Industrials	81	184.27	41.96	2
Consumer Staples	34	76.79	50.79	2
Real Estate	50	130.03	59.87	2
Energy	16	276.81	236.88	3
Materials	34	961.73	347.00	3
Utilities	61	877.34	614.08	3

Threshold (based on median emissions intensity)	Intra-sector score	# issuers	Median emissions intensity
Below the 33rd pctl	1	131	15.8
Between the 33rd and 66th pctl	2	126	48.5
Above the 66th pctl	3	123	224.7

⁴ Note that we run the ECOBAR scoring on current, rather than historical, data. The ECOBAR scores tend to quite inert as relative magnitudes of emissions are quite slow-moving. We believe this simplification does not significantly alter results.

sector, based on the assertion that Financials carbon metrics are not well suited to being relative to other sectors.

CSPP time series

Given the binary data from the ECB on individual bonds held, we can generate time-series data on the portfolio. Figure 2 shows how many securities that are added and fall out over this time period, corresponding to the total number of securities in Figure 1.

Figure 2. Number of unique securities in the CSPP portfolio that are added over time (left panel), and the number that drop out over time. Week-on-week. Source: European Central Bank, AFII.

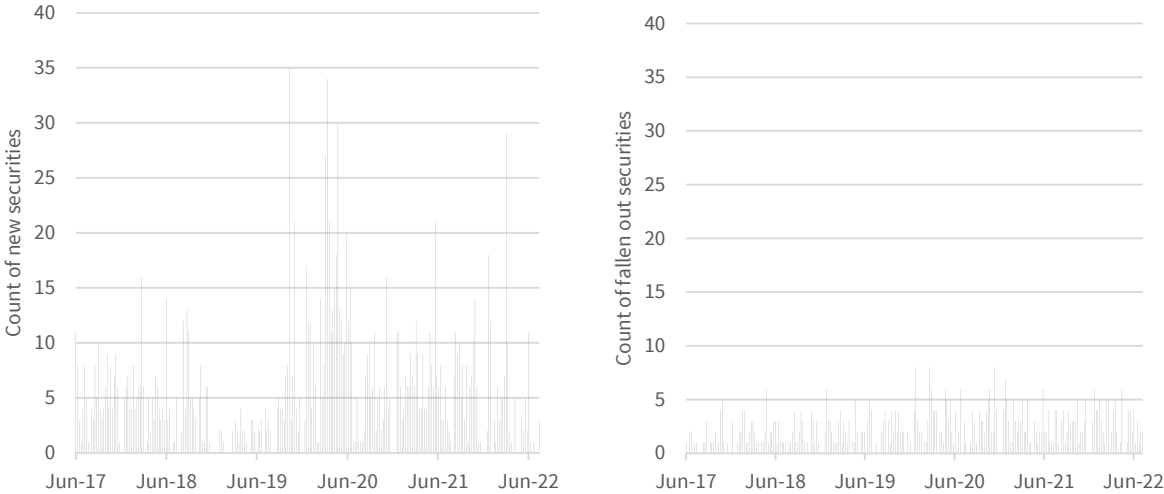
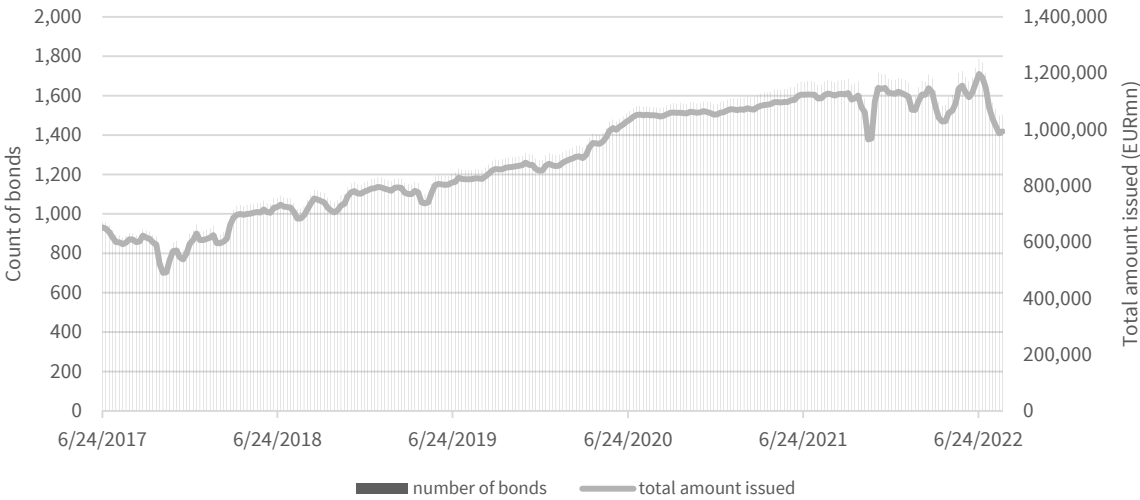


Figure 3. Number of bonds and total amount issued in the CSPP portfolio over time. Source: ECB. Bloomberg.



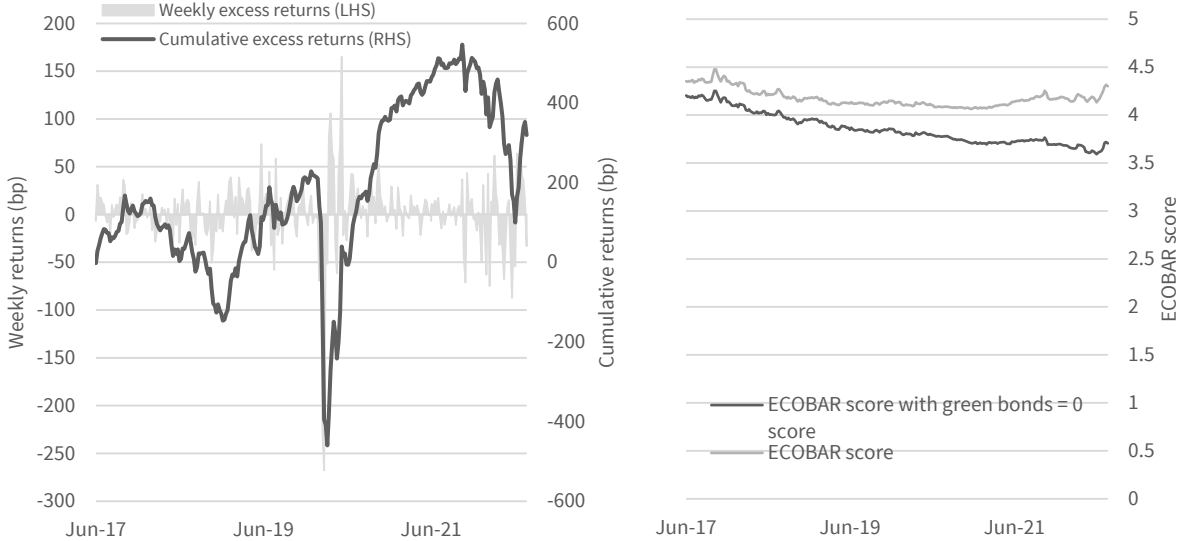
As mentioned, we assume that the ECB is buying the CSPP portfolio according to a key based on amount issued in each bond it has bought, e.g. we would expect the ECB to hold twice the amount of a bond with an issue size of EUR1bn compared to one with an issue size of EUR500mn.

Using these weights, and linking the individual bond data, we can generate excess returns for the CSPP portfolio as well as ECOBAR scores for it,⁵ as illustrated in Figure 4. On the returns side, we

⁵ We generate returns based on changes in z-spreads of the bonds with associated duration metrics, with various algorithms to handle missing data and exit/entry of bonds into the portfolio. Missing data is a relatively small problem in this exercise, as the CSPP has been focused on relatively liquid bonds.

note the high volatility: the cumulative excess return is 342bp over the measured time-period, currently in a drawdown from 542bp (peak) in November 2021. We also note the high volatility around the inception of the Covid crisis in March 2020.

Figure 4. Weekly excess returns (LHS) and cumulative excess returns (RHS) of the CSPP portfolio, weighted by issued volume. Source: ECB, Bloomberg, AFII.



Turning to the right-hand panel of Figure 4, we see the evolution of the CSPP’s ECOBAR score, without and with zero scores for individual green bonds. Interestingly, the portfolio has more clearly trended toward a lower ECOBAR score when accounting for green bonds, whereas the issuer-only score is almost flat over the sample. This could indicate, to a certain extent, a slight preference of the ECB to buy green bonds.

A carbon-reduced CSPP portfolio

The ECOBAR score does not make any investment suggestions per se, it only measures what is in the portfolio.⁶ However, the step to adjusting a portfolio can be quite straightforward. For example, one can re-adjust weights in the portfolio mechanically through mapping the ECOBAR score to a percentage adjustment of the weight. We illustrate one example in the left-hand panel of Figure 5, which is similar to the approach taken by the S&P index (see appendix) but adding a full stop to investments in the most high-carbon exposed issuers, the 9s.

We now look at how a decreased ECOBAR CSPP portfolio could be generated, just using a simple judgement-based reweighting where we weight the portfolio by the following distribution based on ECOBAR scores for the securities we have, as can be seen in Figure 5.§

⁶ Again, we would highlight forthcoming research from AFII going further into recommendations on how to allocate between different relative ranking scores in a portfolio.

Figure 5. Discretionary ECOBAR-linked portfolio re-weightings (left), with resulting changes in CSPP ECOBAR portfolio score over time (right). Source: AFII.

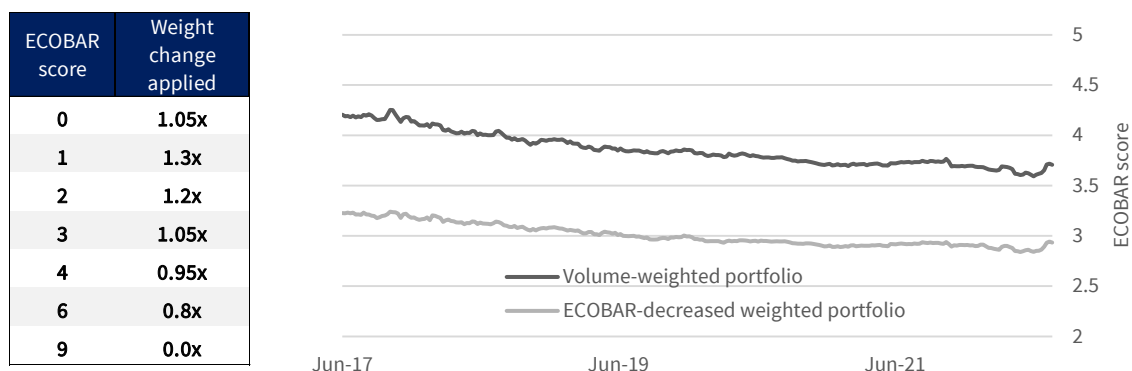
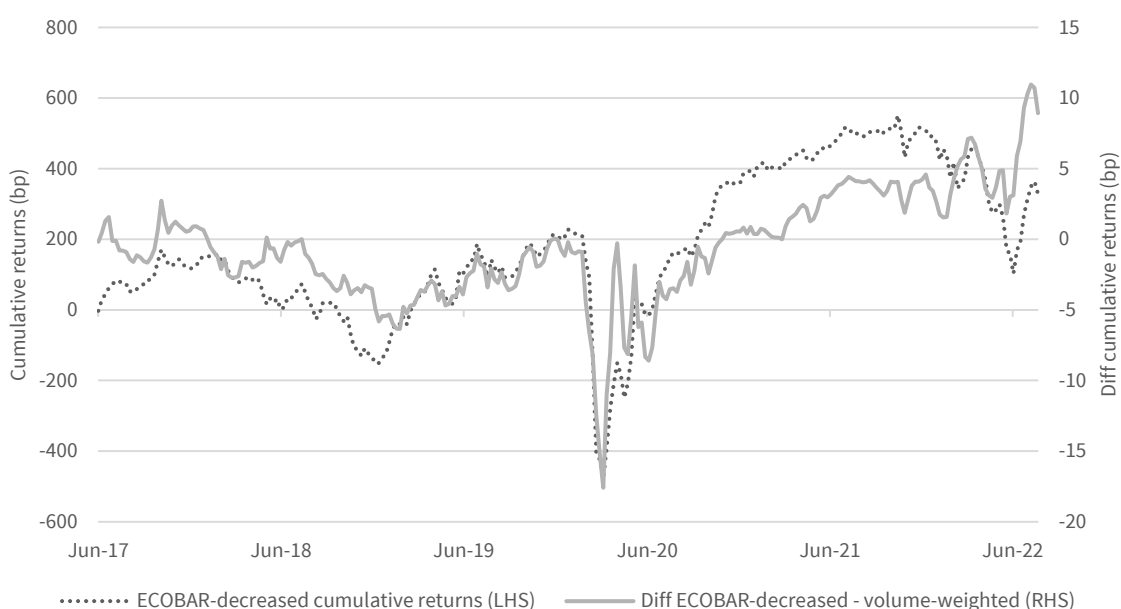


Figure 6. Volume-weighted vs ECOBAR-adjusted cumulative returns of the CSPP portfolio over time. Relative returns as solid line and with scaling on right hand. Source: ECB, Bloomberg, AFII.



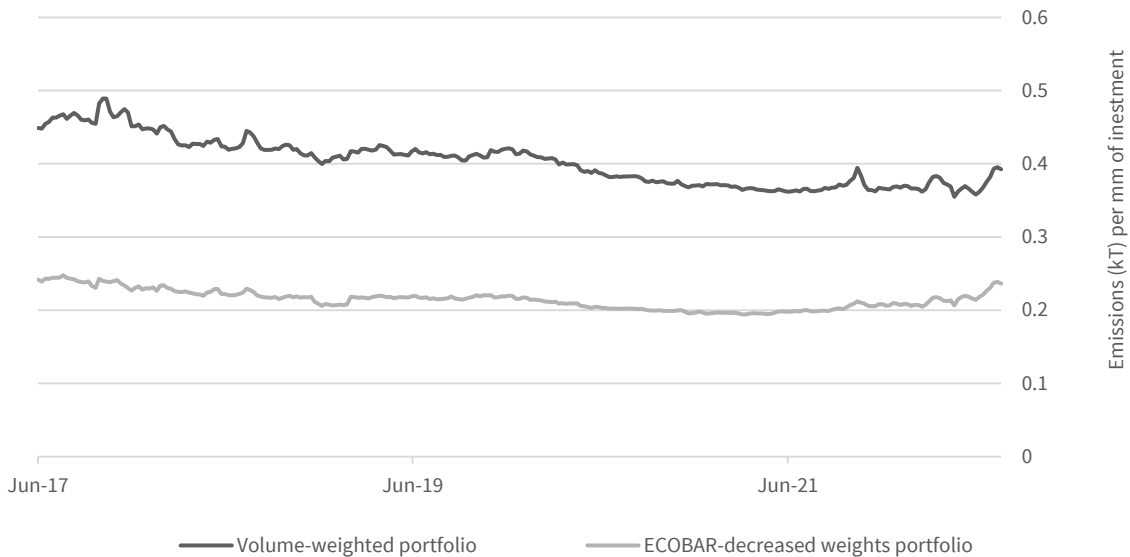
In terms of performance differential, this re-weighting has positive effects.⁷ In Figure 6, we illustrate how the ECOBAR adjusted portfolio actually achieves a higher cumulative excess return than the original portfolio, to the tune of approximately 10bp, but also noting that this return difference appears to be somewhat correlated with the underlying portfolio performance.

How would this altering of portfolio weight have affected financed carbon emissions? In Figure 7, we show the emissions over enterprise value footprint of the respective portfolios,⁸ where the ECOBAR based portfolio has a significantly lower emission trajectory than the CSPP original. Indeed, the CSPP portfolio has a 56% higher footprint than the ECOBAR version.

⁷ It is important to note that our key point here is not to find out-performance, 'alpha', per se, but to find ways to decarbonise a portfolio without restricting alpha potential too much.

⁸ There are numerous issues in interpreting these numbers on an absolute basis, not least the decision whether to include Scope3 emissions or not. For purposes of this exercise, the relative emissions is the interesting indicator.

Figure 7. Volume-weighted vs ECOBAR-decreased weighted Emissions in kton over market cap + long term debt of the CSPP portfolio over time. Where no data was available the average for the sector was included as a proxy. No discount for green bonds. Source: ECB, Bloomberg, AFII.



Conclusion

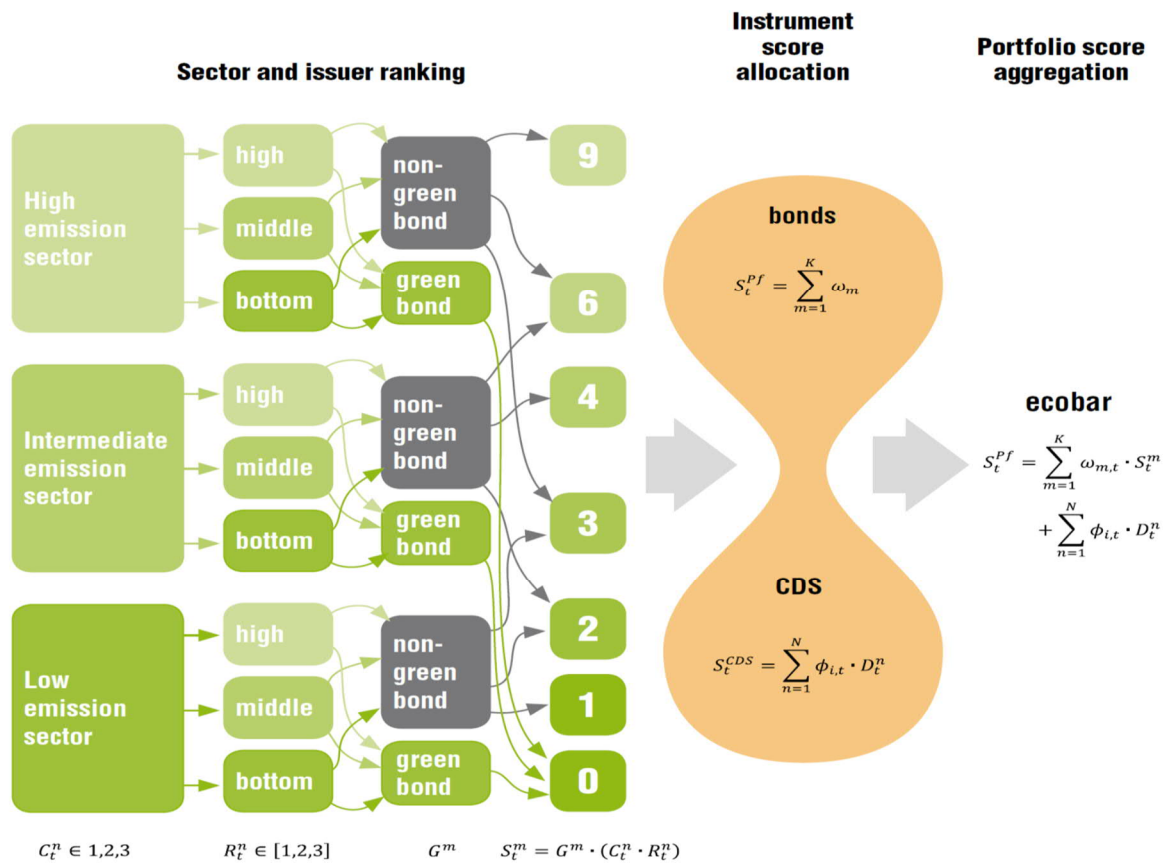
Our reverse engineering of the CSPP portfolio strategy is clearly based on a hypothetical rather than an actual portfolio. However, the relative effects that we find are likely to hold even if we were to have access to the actual portfolio, as it aligns with other out-of-sample empirical results - decarbonisation of a bond portfolio often comes at little cost to performance (or even produces a positive performance). Decarbonisation could have been achieved earlier, at little cost, and had a substantial impact.

Furthermore, we believe a decarbonised approach would have avoided the ECB passively funding projects like Colombian/Australian thermal coal mine purchases and developments, the Eastern African Oil pipeline, South African seismic blasting and other potentially risky carbon emission-contributing projects. One could even argue there would have been macroprudential advantages in having avoided such activities.

Appendix

ECOBAR⁹ is a system to quantify climate metrics in complex fixed income portfolios. The paper behind the methodology suggests ways to quantitatively answer questions such as “how do I weigh the climate impact of a 2yr bond vs a 10yr bond?”, “what is the impact of a short/underweight position in a brown bond vs a long/overweight position in a green bond?”. It is designed to provide non-constraining ways for portfolio managers to trade alpha and credit conviction while simultaneously apply climate sensitivities.

Figure 8. ECOBAR scoring system, reprinted with permission from Creditflux Magazine (July 2017).



The basics of the ECOBAR scoring system is to rank credit issuers based on their carbon-intensity. Ranking is conducted between sectors, giving a company within a certain sector a score C in the range 1, 2, 3, where a 3 would be given to a company within a high carbon sector. Furthermore, every company gets a within score R , based on their carbon-intensity relative to other companies in the sector. Again, this ranges between 1 and 3 with a 3 being assigned to a company with high relative carbon intensity.

To produce the full ECOBAR score for the issuer, you finally multiply C and R , to get a score in the range 1...9. At the portfolio level, all positions are then summed up multiplying the absolute duration-contribution of the position to the total portfolio duration by each issuer’s ECOBAR score. Green bonds score a 0 in this setting.

Short/underweight positions are generated through inversion of the score, e.g., a short position on a dirty energy producer with (long) ECOBAR score 9 inverts to a score of 1. This incentivizes

⁹ A 15 minute video presentation of the paper and model from the GRASFI 2019 conference is available [through this link](#).

portfolio managers to reduce carbon intensity not only through moving long-risk elements into lower-carbon sectors and issues, but also to use the short side of their portfolios.

Figure 9 shows how the ECOBAR methodology is analogously reflected in index reweighting in the S&P index. The matrix representation is an alternative way to think about the ECOBAR score. For example, the ECOBAR score of 9 is equivalent to the north-west partition of the matrix (scores 3 and 3). The number -35% in that cell relates to the carbon-efficient index adjusting the weight to 65% of the market-value weight in the standard index.

Figure 9. Mapping S&P carbon-efficient index weighting factors and ECOBAR equivalent scores. Source: S&P Dow Jones Indices and the author.

		Sector Ranking Adjustment Factor		
		High-carbon	Mid-Carbon	Low-Carbon
Issuer Ranking	Quantile Adjustment Factor / ECOBAR C&R scores	3	2	1
	High-carbon	-35% (9)	-25% (6)	15% (3)
	Mid-Carbon	-25% (6)	0% (4)	25% (2)
	Low-Carbon	-15% (3)	25% (2)	35% (0/1)

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