Does The ECBs Decarbonisation Policy on Corporate Bond Holdings Allow a Lower Cost of Green Financing?*

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ABSTRACT

This paper examines whether the ECB announcement on 19 September 2022, which outlines the details of the central bank's plan to gradually decarbonise its corporate bond holdings, resulted in a decrease in the cost of financing for eligible green bonds. To conduct this analysis, we followed the framework provided by Eliet-Doillet and Maino (2022) and used panel data from 3 January 2022 until 2 April 2024, based on the bonds of the ECB's Corporate Sector Purchase Programme portfolio. We adjusted the model with the inclusion of macroeconomic variables, such as inflation and interest rates, to account for the inherent volatility that arose during the studied period; we employed a Difference-in-Differences analysis. Our findings indicate that this announcement did not have a statistically significant impact on eligible green bonds. Instead, as expected, inflation and interest rates had highly statistically significant impacts on the cost of financing for green and conventional bonds.

Keywords: Central Banks; Climate Change; Cost of Financing; Green Bonds; Unconventional Monetary Policy.
JEL Codes: E52, E58, G12, Q54, Q58

I. Introduction

CLIMATE-RELATED and Environmental (C&E) issues represent one of the primary concerns of the general population due to their numerous negative consequences (Dalen & Henkens, 2021). Thus, humankind faces one of the most difficult challenges in the fight against climate change, with the global average temperature rising, as well as an increase in natural hazards and extreme natural events. Whether through

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physical or transition risks, climate change presents a threat to the global economy (European Central Bank, 2021), with severe implications for the stability of the global financial system due to its impacts on economic outcomes, resources, and a wider range of activities involving the three major sectors of an economy (Batten, 2018).

Although politicians are the primary actors in the fight against global warming, there is a growing consensus that central banks must increase their efforts, as it is likely that climate change will affect price stability, overall financial stability, and banking supervision, all of which are areas of competence for central banks (Schnabel, 2021). In this context, the European Union (EU) has emerged as the international leader in climate change policies through its main institutions – the European Commission, European Council, Council of the EU, and the European Parliament (Wurzel & Connelly, 2011). More recently, the European Central Bank (ECB) completed its first monetary policy strategy review in nearly two decades, further confirming the ECB's strong commitment to incorporating climate change considerations into its monetary policy framework (Schnabel, 2021).

The abovementioned review included a new form of 'green' quantitative easing (QE), which is defined as a tilting of the portfolio held by a central bank towards the green sector (Abiry et al., 2022), representing a departure from the 'market-neutral' principle that has been a longstanding guideline for the ECB's Asset Purchase Programmes (APPs), and simultaneously, transitioning to a 'market-efficiency' principle, addressing externalities such as climate change, without prejudice to price stability (Schnabel, 2021). This approach was designed to decrease the cost of financing of green investments compared to their brown counterparts. In turn, investors could select green investments that would reduce the consumption of non-renewable energies and the overall level of carbon emissions (Aloui et al., 2023). Consequently, the lower cost of green financing enabled firms to opt for these investments (Bremus et al., 2021). In this regard, green bonds can be defined as "fixed income securities which finance investments with environmental or climate-related benefits" (Ehlers & Packer, 2017, p. 89).

Although initially issued in 2007, in its early stages the green bond market was largely driven by supranational issuers such as the European Investment Bank (EIB) (Cortellini & Panetta, 2021), as corporate green bonds were relatively insignificant prior to 2013 (see Figure 1), only becoming popular in recent years (Flammer, 2021). Even so, some authors argue that, as it is a relatively new concept, there is no commonly agreed-upon definition for green bonds (Fatica et al., 2021).

Based on the announcement published by the ECB on the 19th of September 2022, which details how the central bank aims to gradually decarbonise its corporate bond holdings, and following a similar methodology applied by Eliet-Doillet and Maino (2022), this paper aims to investigate whether this announcement led to a decrease in the cost of bond financing for green projects/firms vis-à-vis conventional/brown bonds, with a clear focus on the ECB's Corporate Sector Purchase Programme (CSPP) portfolio, facilitating an examination of the effectiveness of the ECB's unconventional monetary policy in supporting the scaling up of green finance after this announcement.

This study contributes to the literature in two ways. Firstly, we analyse the impact of the ECB's announcement, which operationalised the tilting framework to be applied

to the central bank's corporate bond holdings, representing a significant milestone of the ECB's climate action plan (European Central Bank, 2022).

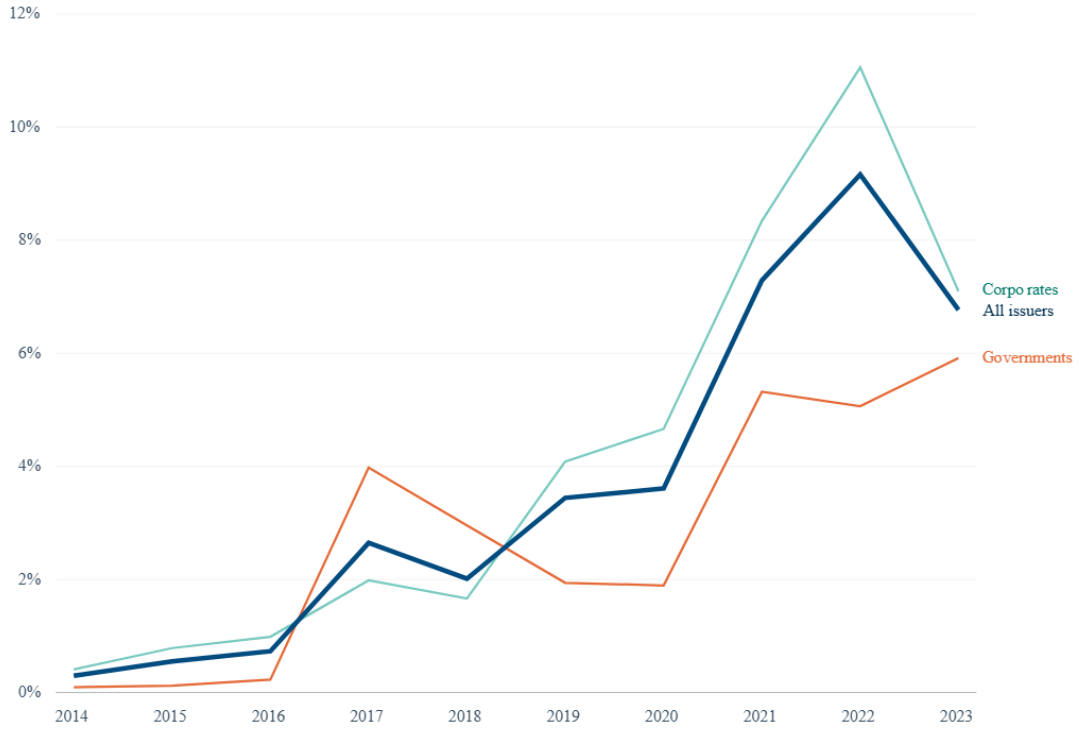

Figure 1
Green bonds as a percentage of total bonds issued by corporations (green line), by governments (orange line), and by both corporations and governments (blue line) in the EU-27, 2014-2023. (Source: European Environment Agency, 2024)

Secondly, the period of the analysis captures the most recent period of higher volatility of interest rates and inflation, with successive rate hikes by the central bank, at the fastest pace ever recorded by the ECB (Lagarde, 2024), as well as a discontinuation of CSPP reinvestments. One must emphasise that this represents a significant change in the macro environment when compared to other similar studies whose analyses refer to a period of lower volatility.

Results show that, in the period of study, there is statistically significant evidence of lower cost of financing for green bonds when compared to eligible conventional bonds. Results remain robust after controlling for inflation and key interest rates, as well as clustering at bond level and utilising median regression.

The paper is organised in the following manner: We begin by describing the data and demonstrating the methodology. Next, we detail and discuss the empirical results. The paper ends by presenting our main conclusions.

II. Literature Review

Considering this relatively underdeveloped field of research, one must highlight that there has been some literature emerging that has examined the pricing differentials

between green and conventional bonds or the impact that the central banks' policies can have on climate change. Within the nature of our research, our paper is closely related to the cost of financing companies, namely the differential of yields between conventional and green labels, which present a panoply of results, depending on the sample and period studied.

From one perspective, Hachenberg and Schiereck (2018) use i-spreads to differentiate between conventional and green bonds, as this approach has the advantage of separating the interest and credit part of the yield. In their findings, they find limited evidence of price differentials between the two for the period of October 2015 to March 2016. Authors such as Fatica et al. (2021) found that companies with high environmental performance benefit from a lower cost of debt, and in addition to that, green bonds with an external review compare positively vis-à-vis 'self-labelled' green bonds, although their main conclusion was that there is no evidence of pricing benefits for green bonds against their conventional counterparts. Kumar (2022) provided a full appraisal of the topic from a variety of perspectives drawn from the existing literature, leading to the conclusion that there are no significant differences in yields between conventional and green bonds.

On the other hand, from a sample starting in July 2013 and ending in December 2017, Zerbib (2019) demonstrates evidence of a low but significant yield differential between green and conventional bonds through the comparison of green bonds and an equivalent synthetic non-green bond via a matching method. Using the same methodology but for a different sample, Gianfrate and Peri (2019) show that green bonds can represent an effective way to achieve a lower cost of capital, whereas Löffler et al. (2021) clearly conclude the existence of a "greenium", achieving estimation results of statistically significant 15-20 bps lower yields in green bonds compared to conventional bonds.

We research the link to the other strand of literature we propose to study, namely the one that considers the role of central banks. Considering that the primary mandate of central banks is generally to ensure price stability, and in the case of the ECB, including support to the general economic policies of the EU, without prejudicing its primary objective, the ECB's Monetary Policy Strategy Review (MPSR) in 2021 was quite significant, including new secondary goals, such as climate change. This represented a significant change, as previously there was firm consensus that climate risk should not play any role in the central bank's monetary policy operations (Weder di Mauro et al., 2021). Notwithstanding, climate risk is relevant for monetary policy, as it is likely to "increasingly affect the frequency and amplitude of supply price shocks, business cycles, risk and volatility" (Krogstrup & Oman, 2019, p. 30)

In view of this, several authors are pushing for central banks to implement policies that have a direct impact on climate change, as the overall literature is positive towards these actions (European Central Bank, 2021). For instance, Hilmi et al. (2021) came forward with a general panel model to test the hypothesis of QE's impact on environmental policy objectives, with the goal to evaluate whether modifications on the ECB's QE policy variables would affect the environmental performance for countries in the Eurozone, upon concluding that there seems to be a direct synergy between monetary and environmental policies.

Bremus et al. (2021) were pioneers in analysing the implications of central bank APPs

on yields in the green bonds market, through a difference-in-differences approach, while exploiting exogenous variables such as the ECB's announcements of the CSPP in 2016 and the Pandemic Emergency Purchase Programme (PEPP) in 2020, having determined that the ECB's APPs are efficient policies for a transition towards a low-carbon economy, as the ECB's corporate bond purchases were effective at improving financing conditions for issuers of eligible green assets. Similarly, Eliet-Doillet and Maino (2022) examined whether the Monetary Policy Strategy Review (MPSR) led to a decreased cost of financing for green bonds, while concluding that ECB-eligible green bonds reacted with a statistically significant reduction in average Yield-to-Maturities when compared to ECB-eligible conventional bonds.

While not directly related to our focus, the contributions of Dafermos et al. (2018) are crucial for the literature. In their study, they used a stock-flow-fund ecological macroeconomic model to study the interaction between climate change and financial stability. This led to the evidence that climate change can lead to a portfolio reallocation that can cause a gradual decline in the price of corporate bonds. Within their model, they assess whether a green corporate QE programme can reduce the risks imposed on the financial system by climate change, and the results show that it can reduce climate-induced financial instability and combat global warming.

Similarly to Dafermos et al. (2018), Ferrari and Valerio (2020) provide a first attempt to model green QE programmes in a standard macroeconomic framework like dynamic stochastic general equilibrium (DSGE) models. Their results emphasise that green QE is able to reduce greenhouse gas (GHG) emissions, although with limited effects in reducing the stock of pollution, ultimately leading to a positive but small gain derived from such programmes.

III. Data and Methodology

Our sample is composed of all the unique corporate bond holdings held by the ECB from 3 January 2022 to 2 April 2024, in its CSPP portfolio. This choice is driven by the fact that the sample focuses solely on instruments eligible for CSPP, i.e., (i) have a minimum rating of BBB- or equivalent; (ii) are denominated in euros; (iii) are issued by a non-bank corporation; (iv) are issued by a corporation established in the euro area defined by the country where the issuer is incorporated; and (v) have a minimum maturity of six months and a maximum remaining maturity of 30 years (Bremus et al., 2021). Additionally, this timeframe allows periods of different monetary policy stances to be captured, both in conventional and non-conventional bonds, considering the volatility of interest rates and the tilting applied to the CSPP portfolio, respectively.

From 3 January 2022 to 2 April 2024, the ECB's CSPP portfolio included 682 unique securities. Each corporate holding's identifier (ISIN) was retrieved from the historical list available in the National Bank of Belgium's repository (CSV format). Using these ISINs, daily Mid Yield-To-Maturity data for the same period was extracted from the Bloomberg fixed income database. Bonds lacking yield data were excluded, resulting in a final sample of 562 unique bonds, of which green bonds were identified using Bloomberg's "Green Bond" indicator. A panel dataset was then constructed, with each

bond (identified by its ISIN) forming the cross-section and daily observations (excluding weekends), producing 329,894 observations. Due to some bonds being issued after the start date, yield data was not available for all entries. At the same time, there were firms that did not disclose (or without reliable estimates) on variables SCOPE1, SCOPE2 or SCOPE3. Consequently, the number of usable observations for regression analysis was reduced to 300,812.

We can separate the variables of our database in two ways: one set of variables will be utilised only for the purpose of descriptive statistics, while the other set will be utilised for the econometric approach. Starting with the former, the variables Scope 1 emissions, Scope 2 emissions and Scope 3 emissions (SCOPE1, SCOPE2 and SCOPE3, respectively) were collected from Bloomberg's fixed income database, where SCOPE1 represents the direct greenhouse gas (GHG) emissions from sources that are owned or controlled by the company, SCOPE2 refers to indirect GHG emissions from purchased heat and electricity and SCOPE3 relates to emissions from the supply chain and other sources not controlled by the company (Cohen et al., 2023). To differentiate economic functions or business characteristics, the variable Industry_Sector was collected from Bloomberg's Industry Classification System. For the variables utilised in the model, YTM refers to the daily mid yield-to-maturity of each bond, whereas Inflation and Euribor_3m were collected from the ECB Data Portal to assess the inflation in the Eurozone and to act as a proxy for the interest rate level for the latter, and Post_Green represents an interaction term to refer to the YTM of a green bond after the 19 September 2022.

In the analysis carried out, it was observed that some variables present a high level of correlation, such as SCOPE1 with SCOPE2, and SCOPE2 with SCOPE3, which is expected considering the nature of their definition and relation. There is also a significant inverse correlation between the variables Inflation and Euribor_3m, i.e., an increase in the proxy for interest rate is correlated with a decrease in inflation and vice versa, which is also in line with economic literature. One must highlight that there is a medium level of correlation between Euribor_3m and YTM, although this is also expected considering that higher levels of interest rate increase the cost of financing of a security. A few variables present a higher level of correlation considering the construction of their variables, such as Post_Green and GreenBond.

Table I shows the descriptive statistics of our sample, while Table II allows for a differentiation between green and conventional bonds. Table III presents the number of conventional and green bonds decomposed at the industry level. The sample is tilted towards conventional bonds, as only approximately 14% of the sample is composed of green bonds. Conventional bonds clearly present higher levels of Scope 1, 2 and 3 emissions, whereas green bonds show, on average, a higher cost of financing vis-à-vis their conventional counterparts. The high level of standard deviation of the YTM in conventional bonds emphasises the need to winsorise the outlier values of the series. Furthermore, concerning the industry sector of the CSPP's holdings, conventional bonds are leaning towards Consumer and Non-Cyclical sectors, while green bonds are mostly split between the Utility and Financial sectors.

Table 1: Descriptive statistics.
556 Observations. Negative values are indicated in parenthesis. *M*: mean; *Min*: Minimum; *Med*: Median; *Max*: Maximum.

Metric	*M*	*SD*	*Min*	*p25*	*Med*	*p75*	*Max*
Scope 1 Emissions	5829.27	19381.36	0.01	23.05	152.71	1177.33	140910.30
Scope 2 Emissions	841.43	1697.8	0.01	20.11	175.93	487.63	7821.54
Scope 3 Emissions	52093.44	122493.88	0.70	355.88	4707.90	39853.24	550498.90
Emissions per Capita-Country	8.22	3.65	3.69	5.00	7.79	8.85	14.44
CDP Climate Change Score	5.36	2.80	0.00	5.00	6.00	7.00	8.00
Coupon	1.67	1.21	0.00	0.75	1.38	2.25	7.75
Amount Issued (in Million USD)	677.0	292.0	100.0	500.0	600.0	750.0	3000.0
Yield-to-Maturity	3.40	3.36	-30.60	2.68	3.46	3.96	79.00

Table 2: Descriptive statistics per type of bond.
78 Observations. Negative values are indicated in parenthesis. *M*: mean; *Min*: Minimum; *Med*: Median; *Max*: Maximum.
Panel A — Green Bonds

Metric	*M*	*SD*	*Min*	*p25*	*Med*	*p75*	*Max*
Scope 1 Emissions	445.08	1147.22	0.93	19.86	27.39	125.51	4275.80
Scope 2 Emissions	710.56	767.24	0.01	20.11	287.700	1516.74	2358.04
Scope 3 Emissions	4811.12	19043.40	2.45	4.23	523.7	2962.54	161447.40
Emissions per Capita-Country	8.00	2.75	3.69	7.72	7.79	7.79	14.44
CDP Climate Change Score	3.08	3.47	0.00	0.00	0.00	6.00	8.00
Coupon	1.70	1.24	0.13	0.63	1.44	2.25	4.88
Amount Issued (in Million USD)	621.0	200.0	300.0	500.0	525.0	750.0	1250.0
Yield-to-Maturity	3.80	1.70	-1.92	2.96	3.55	4.22	12.04

Panel B — Conventional Bonds

Metric	*M*	*SD*	*Min*	*p25*	*Med*	*p75*	*Max*
Scope 1 Emissions	6709.70	20768.52	0.01	23.06	240.61	1360.04	140910.3
Scope 2 Emissions	862.83	1803.99	0.01	23.0	170.0	431.35	7821.54
Scope 3 Emissions	59825.14	130283.1	0.7	465.97	7092.99	52130.0	550498.9
Emissions per Capita-Country	8.25	3.78	3.69	5.0	7.79	12.26	14.44
CDP Climate Change Score	5.74	2.49	0.00	6.00	7.00	7.00	8.00
Coupon	1.67	1.21	0.00	0.75	1.38	2.25	7.75
Amount Issued (in Million USD)	686.00	303.00	100.0	500.0	600.00	750.00	3000.00
Yield-to-Maturity	3.33	3.54	-30.6	2.6	3.44	3.94	78.9

Table 3: Number of Conventional and Green Bonds per Industry Sector.

Industry Sector	# Conventional Bonds	# Green Bonds
Basic Materials	20	0
Communications	32	3
Consumer, Cyclical	39	2
Consumer, Non-Cyclical	184	7
Energy	29	0
Financial	60	21
Industrial	66	5
Technology	7	1
Utilities	8	39

Regarding the methodology, we largely follow the hypothesis conveyed by Eliet-Doillet and Maino (2022), namely in relation to the development of a model to test the impact of bond price reactions, which involves conducting an econometric approach through a Difference-in-Differences (DiD) analysis, as per the following regression specification:

$$YTM_{it} = \beta_0 + \beta_1(greenbond * post)_{it} + \Gamma_w + \mu_i + \epsilon_{it} \quad (1)$$

Based on a panel dataset, eligible green bonds in the CSPP portfolio represent our treatment group, while our control group consists of eligible conventional bonds also present in our sample. As such, YTM represents the mid Yield-to-Maturity of bond i on day t, greenbond is a binary variable equal to 1 if it refers to an eligible green bond. Since our focus is the announcement of the ECB, which operationalised the tilting framework to be applied to the central bank's corporate bond holdings on 19 September 2022, the post variable is binary, equal to 1 if the observation is after that date. Similarly to Eliet-Doillet and Maino (2022) and Bremus et al. (2021), we included week-fixed effects, designated by Γ, while at the same time we winsorised YTM at the first and ninety-ninth percentiles, considering the high standard deviation observed in conventional bonds as per Table I. We expect that the differential between ECB-eligible green bonds and ECB-eligible conventional bonds will be reduced.

V. Results and Discussion

The results reject the hypothesis that the ECB announcement decreases Yield-to-Maturities for ECB-eligible green bonds relative to ECB-eligible conventional bonds. In fact, the ECB announcement increased the Yield-to-Maturities for ECB-eligible green bonds vis-à-vis the conventional counterparts. Although the coefficient is highly statistically significant, the equation likely suffers from omitted variables, which is logical considering the period of our sample. The methodology adopted by Eliet-Doillet and Maino (2022) was conveyed for a period where the ECB's interest rate was virtually zero and with relatively low inflation compared to our period of study.

Table 4: Results of regression (1) – Initial Methodology - Fixed-Effects Model.
Dependent variable: YTM.

Variable	Coefficient
post_green	1.459**
	(0.614)
Observations	300,812
Number of groups	556
Median Regression	Yes
Bond FE	Yes
Week FE	Yes

Consequently, and considering the macroeconomic context at hand, we propose including the variables "Euribor_3m" and "Inflation", to act as a proxy for the interest

rate level and inflation in the Eurozone, respectively. In addition to that, we also propose including the variables "week" and "week2" to test for a linear time trend and a quadratic time trend, respectively. Due to the presence of extreme outliers in the dependent variable, the models will be estimated using median (quantile) regression, which is robust to such outliers. The regression is as follows:

$$YTM_{it} = \beta_0 + \beta_1(greenbond * post)_{it} + \beta_2(euribor_{3m}) + \beta_3(inflation) + \beta_4(week) + \beta_5(week2) + \mu_i + \epsilon_{it} \quad (2)$$

Our hypothesis was formally tested in Table V, and we find that, following the ECB announcement of 19 September 2022, the effect is not statistically significant at any conventional levels. In addition to that, the 95% confidence interval includes the value 0, further indicating a lack of statistical significance. These findings suggest that the announcement did not lead to a decrease in the cost of financing for green bonds vis-à-vis conventional bonds. This clearly goes against the results of authors such as Bremus et al. (2021) and Eliet-Doillet and Maino (2022), who were pioneers of the initial model we used.

On the other hand, our proxy for interest rate and inflation has positive statistically significant effects, with "Euribor_3m" representing the strongest effect on YTM (approximately 66 bps), which is an expected relationship considering the environment of high interest rates. The variable "Inflation" follows, with an effect of circa 19 bps on YTM. The time-identifying variables "week" and "week2" are also statistically significant, demonstrating that there are temporal patterns in our sample. However, as abovementioned, since the time-identifying variables demonstrate a severe level of correlation, we will refrain from analysing their linearity or quadratic trends on the dependent variable. These results indicate that the volatility of interest rates and inflation had much more impact on the variation of Yield-to-Maturity for both green and conventional bonds when compared to the ECB's announcement of 19 September 2022.

Despite winsorization, the presence of extreme outliers in the dependent variable resulted in further robustness checks, and as such, the model was re-estimated through a median regression ("Median XTQReg"), while also clustering at bond level considering the presence of autocorrelation. Although the overall results are similar, the main variable of this study became statistically significant at all conventional levels. Considering this robust approach, the hypothesis of this study became validated – the ECB announcement decreased Yield-to-Maturities for ECB-eligible green bonds relative to ECB-eligible conventional bonds. Nonetheless, even under this approach, the stronger effects are observed within the proxies for interest rate and inflation.

Table 5: Results of Regression (2) – Final Methodology - Fixed-Effects Model.

Dependent variable: YTM. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. *Note*: Adjusted Standard Errors - vce(robust); Bootstrapped SEs (200 reps).

Variable	Coefficient	Coefficient (Median XTQReg)
post_green	-0.116 (0.110)	-0.111*** (0.010)
week	0.036*** (0.001)	0.036*** (0.001)
week2	-0.001*** 0.000	-0.001*** (0.000)
euribor_3m	0.654*** 0.014	0.658*** (0.001)
inflation	0.186 0.001	0.190*** (0.001)
Observations	304,636	300,812
Number of groups	562	556
Median Regression	No	Yes
Bond FE	No	Yes

V. Conclusions

Through this research, we provided insights into how central banks can use their unconventional monetary policy to advance the fight against climate change. Centred on the ECB's announcement of 19 September 2022, which detailed the central bank's plan to gradually decarbonise its corporate bond holdings, we used the framework developed by Eliet-Doillet and Maino (2022) to assess whether the announcement commanded a decrease in the cost of financing for green bonds compared to their counterparts. Unlike Eliet-Doillet and Maino (2022), our sample consists solely of bonds held by the ECB in its CSPP.

Our initial findings revealed that the announcement caused a positive yield differential between green and conventional bonds, a result that was deemed fairly unconventional. Such outcomes led us to believe that the model suffered from omitted variables. As our period of study, which began on 3 January 2022 to 2 April 2024, included the period of higher volatility of interest rates and inflation, we decided to develop an enhanced model with the inclusion of these macroeconomic variables. To handle extreme outliers, we re-estimated the model using median regression and clustered at the bond level to account for autocorrelation.

We found that (i) eligible green bonds did present a statistically significant reduction in Yield-to-Maturities when compared to eligible conventional bonds; (ii) even so, interest rate and inflation had comparatively higher statistically significant positive effects on the Yield-to-Maturities. Additionally, we find that there are temporal patterns in our data based on the combination of linear and quadratic time-identifying variables utilised in our regression. The results obtained show a relatively weak link between the unconventional monetary policy of the ECB and its impact on the green bond market. This may be related to the fact that the primary objective of the ECB is price stability, and in periods of higher inflation, secondary objectives might be set aside. This could also be

the result of the short time span between the ECB's green policy announcement and the period in which we conducted the analysis.

We must clearly emphasise that our work comes with significant limitations, starting with the sample, which is tilted towards eligible bonds for the CSPP portfolio, limiting the generalisation of our results to the green bond market, leading to potential sample selection bias, as it may exclude relevant non-eligible bonds. Additionally, it is debatable if the ECB's announcement of 19 September 2022 acts as a reasonable enough exogenous shock, especially when compared to the Monetary Strategy Policy Review. It is also important to address that market participants may have anticipated the announcement. Although we have taken the necessary steps to cover the analytical limitations, our final model contains non-BLUE estimators, and our period of study comes with a high level of volatility of interest and inflation rates.

While our study provides valuable insights into the yield differentials of green bonds vis-à-vis conventional bonds following the central bank's action, to fully understand the differences between both and in order to generalise its results to the bond market, further research on this topic should include a sample with a longer period, as well as the consideration of eligible and non-eligible bonds, with an additional control group composed of bonds outside the scope of the ECB market.

Conflicts of Interest: The authors declare no conflict of interest.

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ANNEX I – Variables Definition

Source: Bloomberg. Variable ID was collected from the Bank of Belgium, Euribor_3m from the Bank of Finland and Inflation was collected from the ECB Data Portal.

Variable	Description
SCOPE1	Scope 1 greenhouse gas (GHG) in thousands of metric tonnes, if available, otherwise direct carbon dioxide (CO2) emissions, otherwise estimated Scope 1 emissions based on Bloomberg's proprietary model or an industry intensity model
SCOPE2	Scope 2 greenhouse gas (GHG) in thousands of metric tonnes, if available, otherwise indirect carbon dioxide (CO2) emissions, otherwise estimated Scope 2 emissions based on Bloomberg's proprietary model or an industry intensity model
SCOPE3	Scope 3 greenhouse gas (GHG) in thousands of metric tonnes, if available, otherwise estimated Scope 3 emissions based on Bloomberg's proprietary model or an industry intensity implied model
GreenBond	Indicates if the net proceeds of the fixed income instrument will be applied toward green projects or activities that promote climate change mitigation or adaptation, or other environmental sustainability purposes
Industry_Sector	Legacy BICS (Bloomberg Industry Classification System) level I classification of the security based on its business or economic function and characteristics
EmissionsPerCapita_Country	Emissions of carbon dioxide (CO2) per capita for the relevant country. Relates to the security's country of risk, not the security itself
CDP_Climate_Score	CDP's Climate Change Score reflects the level of company commitment to climate change mitigation, adaptation, and transparency. CDP scores companies that respond on time to the questionnaire sent on behalf of an investor request
CPN	Interest rate of the security on the identified date
AmountIssued	Cumulative amount issued from the original security pricing date through to the current date for debt securities. The amount will include taps/increases or reopening
YTM	Daily mid Yield-to-Maturity of each holding on the identified date
ID	Identifier of the ISIN of each holding
Maturity	The legal final maturity of the bond as stated in the official documentation
Post	Equal to 1 if after 19 September 2022
Week	Week identifier of the period of study. Incorporated to test for a linear time trend
Week2	Week identifier squared in order to test for a quadratic time trend
Post_Green	Equal to 1 if after 19 September 2022 and if it is a green bond
Euribor_3m	3 Months Euribor Rate (historical data) to act as a proxy for the interest rate levels
Inflation	Inflation in the Eurozone