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Cojoianu, T., Collins, E., Hoepner, A., Magill, D., O'Neill, T., & Schneider, F. (2020). In the Name of COVID-19: Is the ECB Fuelling the Climate Crisis? *Environmental and Resource Economics*, 76, 447-517.
<https://doi.org/10.1007/s10640-020-00493-2>

Published in:
Environmental and Resource Economics

Document Version:
Peer reviewed version

Queen's University Belfast - Research Portal:
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In the name of COVID-19: is the ECB fuelling the climate crisis?

Cojoianu, T.F.^{a,b}, Collins, E.^c, Hoepner, A.G.F.^{a,d,e}, Magill, D.^c, O'Neill, T.^c, Schneider, F.I.^a

^a Michael Smurfit Graduate Business School & UCD Lochlann Quinn School of Business, University College Dublin, Carysfort Avenue, Blackrock, Co. Dublin, Ireland.

^b School of Geography and the Environment, Oxford University, South Parks Road, OX 1 3QY UK.

^c InfluenceMap, 40 Bermondsey Street, London, SE1 3UD, UK

^d European Commission Technical Expert Group on Sustainable Finance, Brussels, Belgium.

^e Stockholm School of Economics, Mistra Financial Systems (MFS), Stockholm, Sweden.

Abstract

We offer preliminary evidence drawing on a novel dataset of corporate bonds issued in the European energy sector since January 2020 in combination with the European Central Bank's (ECB) purchases under the Pandemic Emergency Purchase Programme (PEPP) in response to COVID-19. We show that the likelihood of a European energy company bond to be bought as part of the ECB's programme increases with the greenhouse gas (GHG) intensity of the bond issuing firm. We also find weaker evidence that the ECB's PEPP portfolio during the pandemic is likely to become tilted towards companies with anti-climate lobbying activities and companies with less transparent greenhouse gas (GHG) emissions disclosure. Our findings imply that, at later stages of the COVID-19 recovery, an in-depth analysis maybe necessary to understand if and if yes, why the ECB fuelled the climate crisis.

Keywords: green economic recovery, climate finance, fossil fuels, green central banking.

JEL Codes: Q50; Q58

Acknowledgements

We are very grateful to the editor, Prof. Ingmar Schumacher for the careful guidance and suggestions towards improving our paper. We acknowledge that this work has been supported by funding from the IRC and the EU Horizon 2020 Marie Skłodowska-Curie grant agreement No. 713279 (CLNE/2018/202), Science Foundation Ireland's AI for Societal Good Challenge, the International Network for Sustainable Financial Policy Insights, Research and Exchange (INSPIRE), ClimateWorks Foundation, ClimateKIC and Mistra Financial Systems. Authors are listed alphabetically. All remaining errors are our own.

1 Introduction

The current global greenhouse gas (GHG) emissions trajectory indicates that the world is likely to experience catastrophic consequences due to climate change, unless swift action is taken towards funding green solutions and the defunding of fossil fuel activities (IPCC 2018). While there is an extensive academic literature on the links between environmental and fiscal policies and the low carbon energy transition (Aghion et al. 2016; Ambec et al. 2013; Cojoianu et al. 2020), as well as on optimal environmental policies in times of economic downturns (van den Bijgaart and Smulders 2018), we know less about what the role of central banks is in promoting a green economic recovery and how monetary policy objectives interact with climate change mitigation objectives in the short and long term (Battiston and Monasterolo 2019; Matikainen et al. 2017).

Given the ambition of the European Union to become a net zero carbon economy by 2050 and the numerous calls to avoid the bailout and stimulus packages towards fossil fuel companies (Hepburn *et al.*, 2020), we examine whether the features of the European Central Bank's (ECB) €1,350 billion Pandemic Emergency Purchase Programme (PEPP) encourages the resilience of the incumbent fossil fuel sector, or whether it promotes the growth of the emerging low carbon energy sector during the COVID-19 pandemic and beyond.

We draw on a novel dataset of corporate bonds issued in the European energy sector between 1st January 2020 and 19th June 2020 in combination with the European Central Bank's purchases under the Pandemic Emergency Purchase Programme (PEPP) in response to COVID-19. We show that the likelihood of an energy company bond to be bought as part of the ECB's programme increases with the GHG intensity of the bond issuing firm. We also find weaker evidence that the ECB's PEPP portfolio during the pandemic is likely to become tilted towards companies with anti-climate lobbying activities and companies with less transparent GHG emissions disclosure in the event of increased euro-denominated bond issuances in the following months, or re-denominations of non-euro bonds already issued by European energy companies.

2 Policy background: climate change and the ECB

Many central banks remain of the view that central bank interventions should be market-neutral and not discriminate between sectors in the low carbon energy transition (Matikainen et al. 2017). That does not mean, however, that the aim of central banks to remain sector neutral is achievable in practice, as the implementation of ECB's post-2008 quantitative easing shows that assets purchased by central banks to stimulate overall economic growth are benefitting more from the policy than assets which are not purchased by the bank (Haldane et al. 2016; Matikainen et al. 2017). This means that the choice of asset class through which asset purchasing programs are implemented matters. This is particularly important in the low carbon economy context, as the fossil fuel energy sector is largely financed through bonds and syndicated bank loans (Cojoianu et al. 2019), whereas much of the emerging clean technology companies are financed through private equity, equity issuances and asset financing (Cojoianu et al. 2020; Gaddy et al. 2017).

Given that the ECB has chosen to enact its asset purchasing program post-2008 crisis predominantly through bonds, this has been shown to favour the incumbent fossil fuel industry (Battiston and Monasterolo 2019; Matikainen et al. 2017), as 62% of ECB's corporate bond purchases (out of a total of €82 billion) are in GHG intensive sectors - though they make up only 18% of the Eurozone area economy and produce 59% of GHG emissions.

The criteria for the corporate bonds bought under the PEPP are that: i) the company must be incorporated in the Eurozone and its bond issuance denominated in Euro, ii) the firm cannot be a financial corporation (or a credit institution supervised by the ECB), iii) it cannot be a public entity, iv) the bond issuance has to be endorsed by one positive credit rating by an external credit assessment institution accepted within the Eurosystem credit assessment framework and v) have a maximum maturity of up to 31 years, and a minimum maturity of 6 months.

3 Data and methodology

In order to understand whether the ECB's bond buying activity during the COVID-19 pandemic has been tilted towards less transparent, more fossil fuel intensive as well as anti-climate lobbying European energy companies, we undertake the following steps. First, we collect all the bonds issued by European energy companies during the period 1st January 2020 to 19th of June 2020 from Bloomberg. These span the following energy subsectors as classified by BICS (Bloomberg Industry Classification System): power generation, renewable energy, integrated oil & gas companies, oil & gas exploration and production, oil & gas services and utilities. This results in 159 bonds. We then match each bond with ECB's bondholding portfolio¹, the borrower's record on pro / anti-climate lobbying from InfluenceMap, the GHG intensity of the borrower (collected from Bloomberg and measured as thousands tCO₂-e / million EUR revenue) and the GHG reporting completeness of the borrower (which is assessed by Bloomberg and quantified as 1 if the company is transparent about the organisational boundary it chooses to quantify its GHG emissions and 0 otherwise, Bloomberg terminal code ES074). We further collect the borrower's revenue (million EUR), bond amount issued (million EUR) and coupon rate for each bond, also from Bloomberg. Our resulting dataset with complete data across all variables of interest is comprised of a cross-section of 68 bonds issued across several currencies, and 52 euro-denominated bonds.

Our **dependent variable** quantifies the likelihood that the bond of a European energy company is bought by the ECB during the first five months of 2020 and coded as 1 if it has been bought by the ECB, and 0 if it has not. For our model, we employ a binary logistic regression model with robust standard errors. The full model specification is the following, where ε_i is the stochastic error:

$$ECB\ Bond_i = \beta_0 + \beta_1 * Pro - Climate\ Lobbying\ Activities\ Score_i + \beta_2 * GHG\ Emissions\ Intensity_i + \beta_3 * GHG\ Reporting\ Completeness_i + \beta_4 * Borrower\ Revenue_i + \beta_5 * Bond\ Issuance\ Amount_i + \beta_6 * Bond\ Coupon\ Rate_i + \varepsilon_i$$

4 Results and discussion

We show that after controlling for the revenue of the issuer, the bond amount raised and the rate of the coupon, the ECB is statistically significantly more likely to buy the bonds of more greenhouse gas intensive European energy companies (Models 1-4, Table 1). On average, a one standard deviation increase in the GHG intensity of an energy company results in a 147% increase in the likelihood that its bonds are bought by the ECB ($\beta=0.907$, $p<0.01$, odds ratio: 2.47, Model 3).

When we consider only Euro denominated bonds (Models 2 and 3), which are directly under the remit of the ECB, GHG disclosure completeness and pro-climate lobbying are statistically insignificant, yet negative, which suggests that the ECB may be likely to tilt its portfolio towards companies with poorer GHG emission disclosures and less responsible climate lobbying activities. Subsequently, we include the bonds issued by European energy companies in denominations other than euro, to account for potential sample selection bias due to the choice of energy companies to abstain from issuing euro denominated bonds as they may have received discouraging signals from the ECB. In other words, analysing the bond issuance of European energy companies in all currencies considers signals that the ECB may have given to the energy companies prior to issuance, while analysing only euro denominated bonds only considers the observable decision of the ECB to purchase the bonds of specific energy companies post issuance. When we do so (Model 4), it emerges that considering the entire universe of bonds issued by European energy companies, the ECB's portfolio is tilted not only to those energy companies that are more GHG intensive, but also to companies which are less transparent on their GHG Performance as well as those companies who are more likely to oppose progressive climate action. Having established statistical significance, we investigate the economic and statistical relevance (Brooks et al. 2019). Inspecting the economic relevance of the GHG intensity

¹ <https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html>

variable in model 3, we find GHG intensity to have the largest marginal effects. In terms of statistical relevance, we find GHG Intensity to have by far the largest Shapley R-squared value, contributing more than 50% to the overall explanatory power of model 3. In conclusion, the importance of GHG intensity is underlined by its marginal economic effects and its statistical relevance, as it explains more variation in the dependent variable on its own than all other variables taken together. We also conduct further robustness tests controlling for bond maturity, bond rating and interactions of key variables and find our results to remain statistically significant²

[Insert Table 1 here]

In conclusion, drawing on a novel dataset of corporate bonds issued in the European energy sector since January 2020 and the database of ECB's purchases under the PEPP in response to COVID-19, we find evidence that the likelihood for a bond to be bought by the ECB increases with the greenhouse gas intensity of the bond issuing firm. We also find weaker evidence that the ECB's PEPP portfolio during the pandemic is likely to become tilted towards companies with anti-climate lobbying activities and companies with less transparent GHG emissions disclosure.

Our findings imply that, at later stages of the COVID-19 recovery, an in-depth analysis maybe necessary to understand if, and if yes, why the ECB fuelled the climate crisis. Even if one accepts that fossil fuel companies were eligible for PEPP, then our preliminary evidence still raises the significant questions, why the ECB was more likely to directly finance those fossil fuel firms that are likely more harmful to the planet (i.e. have a higher GHG intensity)?

² These robustness tests as well as more descriptive statistics are available in the Online Appendix.

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Figures and tables

Table 1: Main statistical models. Likelihood of bond issuance to be bought by ECB. Data from Bloomberg, ECB & InfluenceMap (Logit model).

Dependent variable: ECB = 1 (if bond is purchased by ECB) ECB = 0 (otherwise)	Model 1	Model 2	Model 3	Model 4	Marginal Effects (at mean) Bond Denomination EUR	Shapley pseudo R-squared decomposition by factor
	Bond Denomination EUR	Bond Denomination EUR	Bond Denomination EUR	Bond Denomination All currencies		
Pro-Climate Lobbying Activities Score			-0.475 (0.388)	-0.935** (0.455)	-0.101 (0.082)	10.92%
GHG Disclosure Completeness		-0.706 (0.857)	-0.820 (0.919)	-1.616*** (0.601)	-0.175 (0.188)	1.97%
GHG Intensity	0.983*** (0.281)	1.067*** (0.311)	0.907*** (0.292)	0.983*** (0.294)	0.193*** (0.067)	51.86%
Revenue	-0.608** (0.244)	-0.606** (0.246)	-0.750*** (0.264)	-0.702*** (0.204)	-0.160*** (0.053)	15.05%
Bond Issuance Amount	0.428 (0.584)	0.519 (0.647)	0.217 (0.700)	-0.217 (0.413)	0.046 (0.148)	3.21%
Bond Issuance Coupon Rate	-0.578 (0.444)	-0.643 (0.468)	-0.822 (0.514)	-1.523*** (0.444)	-0.175 (0.109)	16.99%
Constant	0.379 (0.321)	0.464 (0.363)	0.511 (0.380)	0.236 (0.362)		
Observations	52	52	49	68	49	49
Pseudo R-squared	0.163	0.169	0.177	0.348	0.177	0.177 (100%)
Log-likelihood	-28.56	-28.36	-26.04	-30.66	-26.04	-26.04

Significance levels: $p < 0.01^{***}$, $p < 0.05^{**}$, $p < 0.1^*$. All variables are standardised (mean = 0 and standard deviation = 1), with the exception of GHG Disclosure Completeness, which takes the value 1 if Scope 1 GHG emissions reporting is transparently reported and 0 otherwise (based on the ES074 score compiled by Bloomberg). Hence the coefficients can be interpreted as a one standard deviation change in the independent variable is related to a β change in the log odds ratio (or e^β change in the odds ratio) of the dependent variable. The marginal effects show the coefficient at a one standard deviation increase around the mean of the specific independent variable (as variables are standardised). The Shapley R-squared decomposition shows the relative statistical explanatory power of each independent variable.

Online Appendix Only

Extended descriptive analysis

The European energy sector fundraised over €94 billion from bond investors during the January to May 2020 period. Over 50% of this amount went to the oil & gas sector, 34% to utilities, 8% to power generation and only 6% to renewable energy companies (see Fig. OA.1). A large proportion of this debt has been issued in April and May 2020, when perhaps companies expected the liquidity gain and the lowering of their credit risk if their bonds are bought by the ECB, who made the PEPP public on 18th of March 2020.

For the oil and gas sector, the largest proportion of its newly issued debt matures between 2030 and 2040 (c. €22 billion), with the 2020 -2030 and beyond 2040 periods accounting for c. €18 billion and €6.5 billion respectively (see Fig. OA.2). This is very important as none of this debt, part of which was bought by the ECB, is contingent on the energy companies reducing their GHG footprint, ceasing their anti- climate lobbying activities or reporting their GHG emissions more accurately.

Figure OA. 1: Bond issuance by European energy companies Jan – May 2020. Data from Bloomberg. Source: Authors.

Figure OA.2: Maturities of European energy company bonds issued between Jan – May 2020. Data from Bloomberg. Source: Authors

Further robustness tests

Table OA.1: Further robustness tests – controlling for bond maturity and bond rating.

Dependent variable: ECB = 1 (if bond is purchased by ECB) ECB = 0 (otherwise)	Robustness test Controlling for Bond Rating (Bond Denomination EUR)	Robustness test Controlling for Bond Maturity (Bond Denomination EUR)
Pro-Climate Lobbying Activities Score	-1.057 (1.145)	-0.338 (0.379)
GHG Disclosure Completeness	-7.012** (3.559)	-0.822 (0.968)
GHG Intensity	1.337** (0.581)	1.077*** (0.376)
Revenue	-1.953*** (0.640)	-1.020** (0.400)
Bond Issuance Amount	-0.756 (1.259)	-0.075 (0.717)
Bond Issuance Coupon Rate	-0.518 (1.216)	0.321 (0.833)
Bond Maturity		-0.453 (0.403)
Bond Rating Control	YES	No
Observations	34	47
Pseudo R-squared	0.263	0.208
Log-likelihood	-16.67	-23.30

Significance levels: $p < 0.01^{***}$, $p < 0.05^{**}$, $p < 0.1^*$. All variables are standardized (mean = 0 and standard deviation = 1), with the exception of GHG Disclosure Completeness, which takes the value 1 if Scope 1 GHG emissions reporting is transparently reported and 0 otherwise (based on the ES074 score compiled by Bloomberg). Hence the coefficients can be interpreted as a one standard deviation change in the independent variable is related to a β change in the log odds ratio (or e^β change in the odds ratio) of the dependent variable. The marginal effects show the coefficient at a one standard deviation increase around the mean of the specific independent variable (as variables are standardised).

Table OA.2: Marginal effects at mean for independent and control variables (logit model)

Dependent variable: ECB = 1 (if bond is purchased by ECB) ECB = 0 (otherwise)	Marginal Effects (at mean)	Marginal Effects (at mean)
	Bond Denomination EUR	Bond Denomination All currencies
Pro-Climate Lobbying Activities Score	-0.101 (0.082)	-0.229** (0.111)
GHG Disclosure Completeness	-0.175 (0.188)	-0.396*** (0.152)
GHG Intensity	0.193*** (0.067)	0.240*** (0.071)
Revenue	-0.160*** (0.053)	-0.172*** (0.052)
Bond Issuance Amount	0.046 (0.148)	-0.053 (0.101)
Bond Issuance Coupon Rate	-0.175 (0.109)	-0.373*** (0.112)
Observations	49	68
Pseudo R-squared	0.177	0.348
Log-likelihood	-26.04	-30.66

Significance levels: $p < 0.01^{***}$, $p < 0.05^{**}$, $p < 0.1^{*}$. All variables are standardised (mean = 0 and standard deviation = 1), with the exception of GHG Disclosure Completeness, which takes the value 1 if Scope 1 GHG emissions reporting is transparently reported and 0 otherwise (based on the ES074 score compiled by Bloomberg). Hence the coefficients can be interpreted as a one standard deviation change in the independent variable is related to a β change in the log odds ratio (or e^{β} change in the odds ratio) of the dependent variable. The marginal effects show the coefficient at a one standard deviation increase around the mean of the specific independent variable (as variables are standardised).

Table OA.3: Shapley Pseudo R-squared decomposition by variable

Factor	Shapley Value	Per cent estimate (out of total R-squared)
Pro-Climate Lobbying Activities Score	0.019	10.92%
GHG Disclosure Completeness	0.003	1.97%
GHG Intensity	0.091	51.86%
Revenue	0.027	15.05%
Bond Issuance Amount	0.005	3.21%
Bond Issuance Coupon Rate	0.030	16.99%
Total	0.177	100%

Note: Computed using the Shapley2 package in Stata. Shapley values show the average improvement in the explanatory power of the model by including a particular variable. The per cent estimates show the relative importance of each variable in the explanatory power of the model.

Table OA.4: GHG intensity – revenue interaction effects robustness test.

Dependent variable: ECB = 1 (if bond is purchased by ECB) ECB = 0 (otherwise)	GHG Intensity – Revenue Interaction Bond Denomination All Currencies
Pro-Climate Lobbying Activities Score	-1.012** (0.465)
GHG Disclosure Completeness	-1.913** (0.812)
GHG Intensity	0.768* (0.401)
Revenue	0.639* (0.350)
GHG Intensity x Revenue	0.001 (0.032)
Bond Issuance Amount	-0.483 (0.349)
Bond Issuance Coupon Rate	-1.805*** (0.528)
Constant	-5.836* (3.261)
Observations	68
Pseudo R-squared	0.368
Log-likelihood	-29.70

Significance levels: $p < 0.01^{***}$, $p < 0.05^{**}$, $p < 0.1^*$. Given that GHG intensity is defined as Absolute GHG Emissions / Revenue, interacting it with the Revenue variable results in the Absolute GHG Emissions effect, which in this case is not statistically significant.

Table OA.5: Correlation matrix.

Variables	Mean	St. Dev.	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)
(1) Pro-Climate Lobbying Activities Score	57.7	14.7	32.04	89.62	1.000					
(2) GHG Disclosure Completeness	0.19	0.39	0	1	-0.145	1.000				
(3) GHG Intensity	20.11	29.78	0.001	119.78	-0.156	0.097	1.000			
(4) Revenue	281631	1371548	0	7659623	-0.261**	-0.088	-0.149	1.000		
(5) Bond Issuance Amount	781	435.96	5	2500	-0.406***	0.244**	0.261**	0.321***	1.000	
(6) Bond Issuance Coupon Rate	1.79	1.19	0	6.75	-0.304***	0.160	-0.051	0.263**	0.441***	1.000

InfluenceMap Climate Lobbying Score Methodology

The lobbying scores as used in the model were calculated by InfluenceMap using the following methodology, also outlined on the InfluenceMap website.³ The top 100 of the Forbes Global 2000 (not including state owned enterprises and financial companies) were selected as well as external influencers identified. 'Influencers' are a selection of the most powerful organizations representing corporations around the world. Influence likely extends beyond the activities normally associated with the word "lobbying" (e.g. donations to clearly motivated political actors) and includes the domination of the public discourse on climate change science and policy via their hugely powerful and funded messaging tools (e.g. advertising, PR, social media, access to influential meetings) as well as the use of influencers like trade associations and advocacy groups. Climate-focused organizations were excluded to avoid preferential selection. The process of climate change policy is broken down into four distinct categories as formulation of climate change policy commences with scientific research that then enters the policy arena, leading to the implementation of legislation, standards and fiscal measures. In parallel, many legislative and fiscal interventions are in place or are being proposed at various levels of government. Corporations have been interacting with policymakers at all levels and stages of the policy formulation process, using various methods to exert influence. The queries introduced by InfluenceMap cover all of these stages and are divided into two main categories: Transparency and performance.

In total, a series of twelve queries is applied across all data sources, constructing a matrix of queries against data sources for each organization. While this matrix presents an opportunity for a maximum of 96 - i.e. 12 x 8 - scoring opportunities per organization, in practice this will be less due to the NA (not applicable) and NS (not scored) cells for a particular organization's matrix. Data originating from the last two years is considered while priority is given to more recent evidence.

Relative weightings are assigned to each query/data cell relative to the overall organizational score. A generic weighting matrix is applied to all sectors, yet certain sectors will have a sector specific weighting matrix emphasizing its legislative priorities (e.g. the automotive sector will be weighted more for its influence over GHG emissions standards than energy policy). The weightings are devised from InfluenceMap's independent research and in consultation with advisors and external experts.

The matrix of data source/query produces five possible outcomes with scores ranging from (-2) to (+2) depending on an organization's transparency around particular regulations, their expression of support (or non-support), and the corresponding strength of their engagement with this regulation. As well as its organizational score, the final rating for a corporation will be impacted by the relationships (R1, R2, R3, etc.) it holds with external agents exerting influence over climate policy, such as trade associations, chambers of commerce and think tanks. Therefore, in addition to its organizational score, a corporation will have a relationship score which is defined as a reflection back onto the corporation on the influence exerted by its influencers. The influencers will themselves have organizational scores, computed in the same manner as for the corporations. To account for the nature of a corporation's relationship with an influencer a strength factor is applied to the relationship (1 = a weak relationship, 10 = a strong relationship).

The relative weighting as a metric of the level of influence exerted by the influencer with which the corporation holds a relationship is defined comparing to those of other influencers in the global policy arena. Levels of influence against each other are rated on a scale of 1 to 10 (with 10 being very important as an influencer of climate policy).

The overall rating is obtained by computing the weighted average of the two individual scores, organizational and relationship score. The weighting factor is between 0 and 1 and determined using an algorithm that incorporates both strength and relative weight of the corporation and also the number of relationships. This avoids a small sample of relationships to unduly impact the overall rating for a corporation.

³ <https://influencemap.org/site/data/000/286/Methodology.pdf>