

Decoding Corporate Green Bonds: What Issuers Do With the Money and Their Real Impact

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Motivations

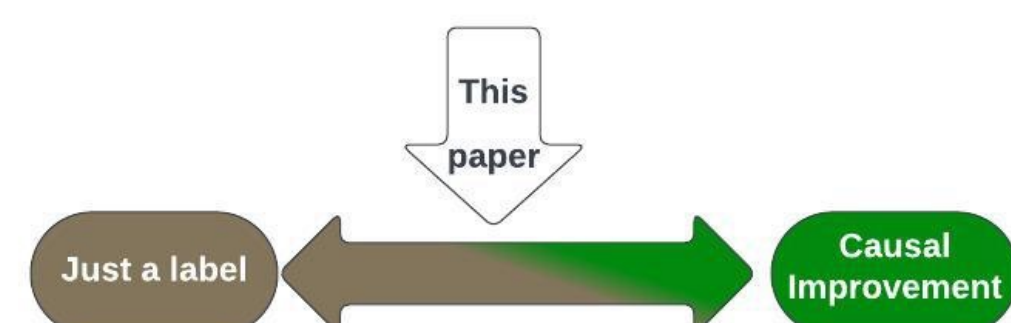
- Green bonds are the **most popular and mature climate financial instruments**. It reached \$2 trillion issuance in 2022.
- However, they lack regulatory oversight despite increasing attention from policymakers.
- There have been longstanding **concerns on the fungibility and additionality** of green bonds, i.e. whether green bonds are used for green activities and whether those activities would be funded regardless of the green bonds.
- This paper studies the use and the real impact of corporate green bonds.

Green bonds in a nutshell

- Green bonds are debt instruments designed exclusively to finance **climate-friendly projects**.
- Green commitments are not covered by bond covenants → **no green default**.
- Green bonds' repayments are backed by firm-level cashflows.
- Green bonds' allocations are not specified ex-ante.
- The terms of green bonds are not linked to the issuer's environmental performance.

Conclusions

- **Distinct Motivation for Green Bonds:** Green bonds are more than just conventional bonds wearing a green label; they represent a genuine commitment to environmental progress.
- **Impact on Emissions:** Although green bonds contribute to the reduction of greenhouse gas emissions, it's likely that such reductions would occur even without the financing from green bonds.
- **Compliance Through Market Mechanisms:** Green bonds serve as a credible signal to investors about a firm's environmental commitment, only after a successful first issuance.
- Market dynamics do not adequately support entities that could make significant marginal improvements, like oil and gas companies. There is a need for green financial instruments with clearer regulations and enforcement.



Summary

Research questions: What do issuers do with green bond proceeds? What are their real impacts? What stops issuers from exploiting the lack of legal enforcement?

Results: Green bonds are used differently from conventional bonds. Issuing green bond is a credible signal of green commitment, but only after the first issuance. Repeated game serves as a market mechanism to enforce compliance. There is a reduction in green house gas emissions, but this reduction is not causally linked to the issuance of green bonds.

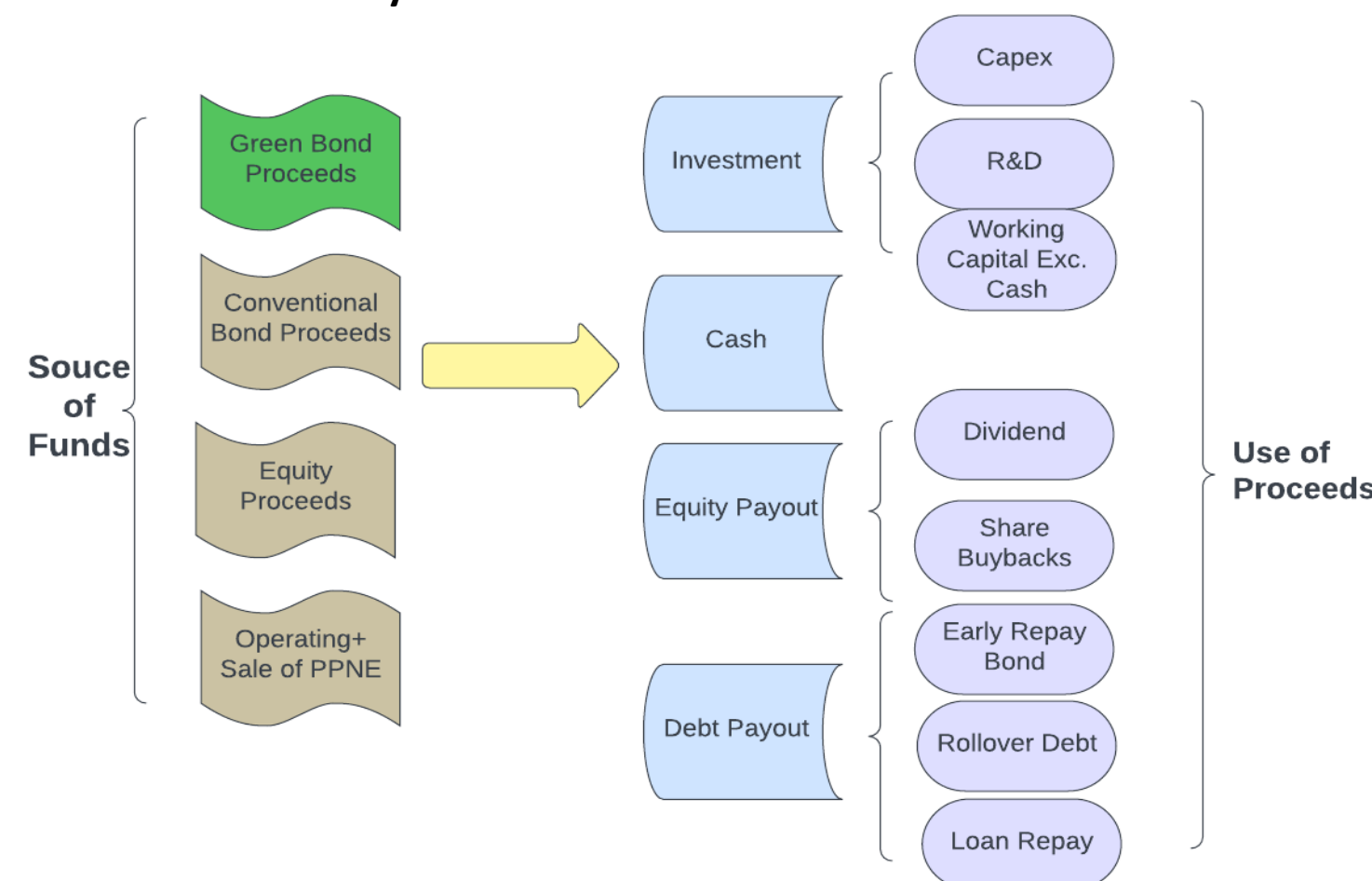
Contributions: This paper is among the first to provide evidence on the use of green bond proceeds and their real impact, especially in the corporate sector. It helps understand the impact of climate financial instrument on the transition towards a greener economy.

What do issuers do with the money?

Empirically, the actual uses of bond proceeds are not observable. There is no consistent reporting, and it is impossible to track the funds flow within a firm. To answer this question,

- Compile a novel global dataset on the source and use of all possible source of funding and use of funding of green bond issuers
- Employ cash identity

Cash flow identity



For each \$1 source of funds, it should show in the use of proceeds. In a regression specification, β_1 (β_2) captures the increase in each use of proceeds for \$1 green (conventional) bond proceeds. I extend this tests on up to **three (6-months) periods** after the issuance.

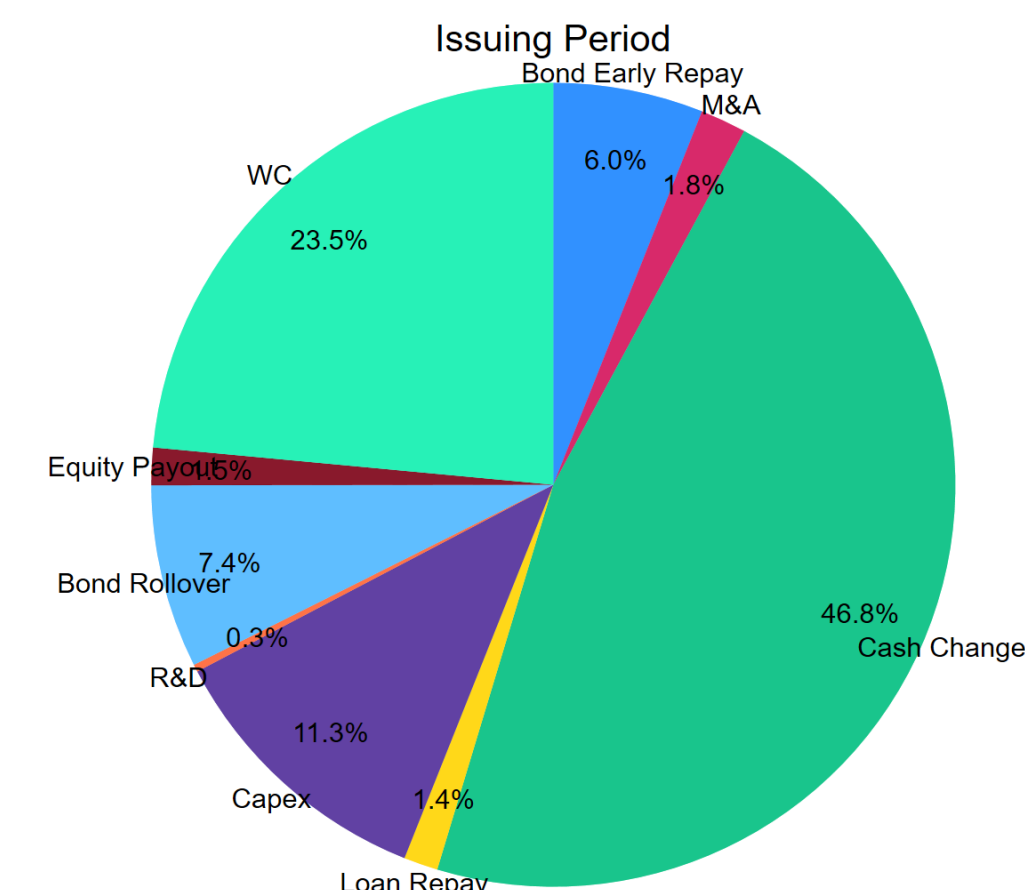
$$Y_{i,t} = \beta_1 \left[\frac{\text{Green Bond Proceeds}_{i,t}}{\text{Total Asset}_{i,0}} \right] + \beta_2 \left[\frac{\text{Conventional Bond Proceeds}_{i,t}}{\text{Total Asset}_{i,0}} \right] + \left[\frac{\text{Other Funds}_{i,t}}{\text{Total Asset}_{i,0}} \right] + \text{Leverage}_{i,t} + \text{Tobin's } Q_{i,t} + \text{Size}_{i,t} + \text{Firm Fixed Effect} + \text{Year Fixed Effect} + \epsilon_{i,t}$$

Where $Y_{i,t} = (V_{i,t} - V_{i,0}) / \text{Total Asset}_0$ for $V_{i,t} = \text{cash}$, working capital, and total asset, and $Y_{i,t} = V_{i,t} / \text{Total Asset}_0$ for $V_{i,t} = \text{early repayment}$, debt rollover, loan repayment, capital expenditure, equity payout, mergers and acquisitions (M&A), and research and development (R&D).

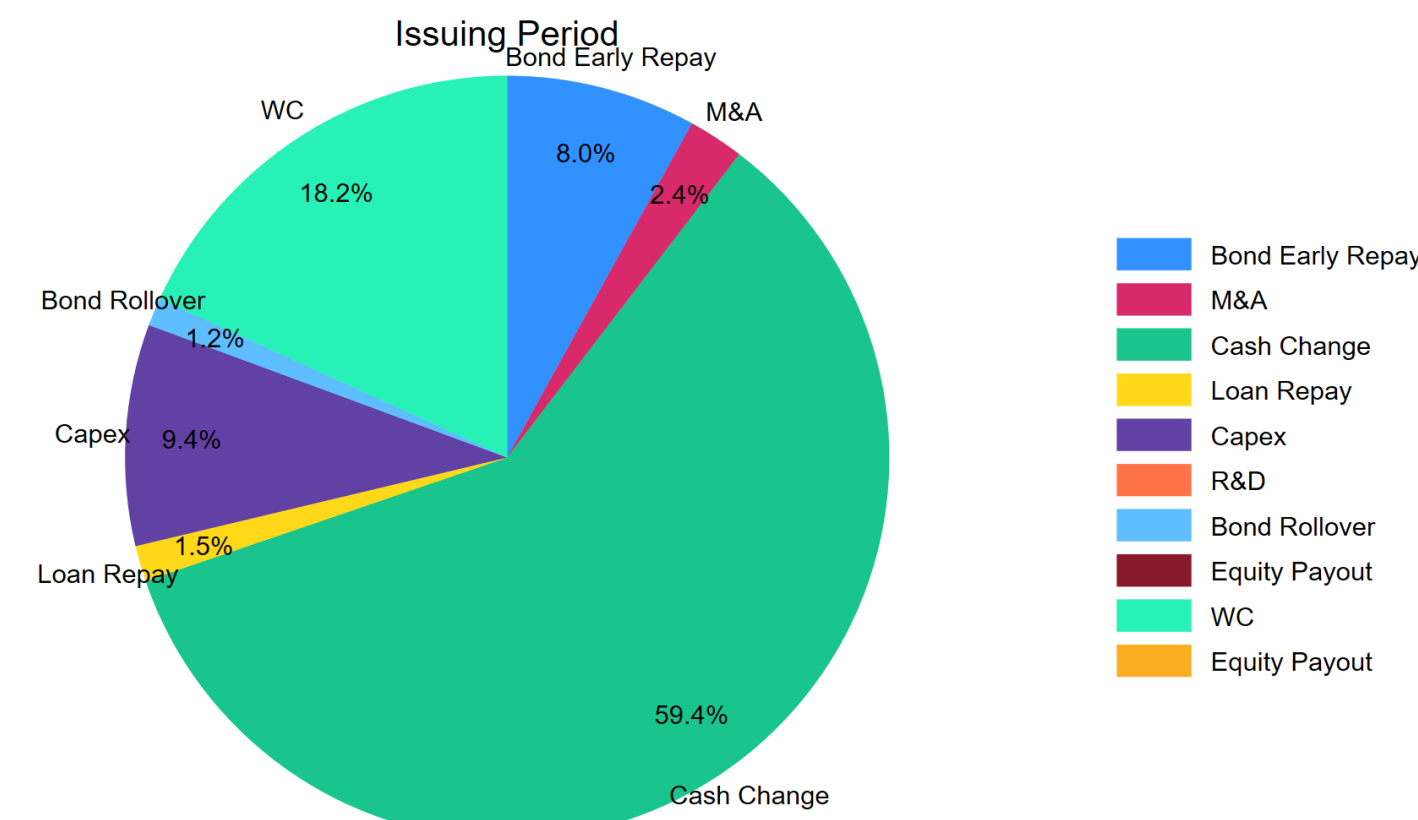
Comparing to convention bonds, the green bond issuers use green bonds proceeds differently:

- Stay in cash longer → **takes time to find projects**
- Not used for shareholder payouts
- Less used for debt rollover
- Equally used in capital investments
- Repeat issuers **allocate faster**, refinance more, and invest more in capital investments
- **Distinct motivation** for issuing green bonds in contrast to conventional bonds

Use of Conventional Bond Proceeds



Use of Green Bond Proceeds



Pie charts for use of proceeds in the issuing 6-month fiscal period

What are their real impact?

I employ a DiD framework to identify the impact of the first green bond issuance on green-house-gas (GHG) intensity. The first difference is between green bond issuers and firms who never issue green bonds and are in the same country-industry pairs. The second difference is before and after the first issuance of green bonds. There is an 8% reduction in GHG intensity comparing to non-issuers after the first issuance of green bond. However, this reduction disappears after using the interaction of market level greenium and firm size to instrument for the decision to issue green bond. These improvements are not causally attributed to green bond issuance and are likely due to green initiatives that would have been funded regardless.

	(1)	(2)	(3)
	Log(GHG/TA)	First-Stage	Second-Stage
VARIABLES		Post xTreatment	Log(GHG/TA)
Greenium x Size		-0.0573*** (0.016)	
Size	-0.484*** (0.0601)	0.0390 (0.0276)	-0.416*** (0.0777)
Leverage	0.00114** (0.000454)	-0.000213 (0.000161)	0.000991** (0.000479)
Post xTreatment	-0.0834* (0.0491)		-0.771 (0.687)
Public Awareness		-2.033* (1.214)	2.739 (2.689)
Divestiture	-0.0511** (0.0207)	0.00873 (0.0115)	0.00976 (0.0220)
Constant	1.538*** (0.542)		
Observations	6,233	4,845	4,845
R-squared	0.956		0.005
Kleibergen-Paap rk Wald F		12.786	
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

What stops issuers from exploiting the lack of legal enforcement?

	CAR	Standard Error	T-stat	P-value
Panel A: All				
[0, 0]	0.08%	0.07%	1.15	0.25
[-1, 1]	0.14%	0.12%	1.11	0.27
[-2, 2]	0.15%	0.16%	0.95	0.34
[-3, 3]	0.09%	0.19%	0.50	0.62
[-4, 4]	0.15%	0.22%	0.70	0.48
[-5, 5]	0.19%	0.24%	0.7720	0.44
Panel B: First-Time				
[0, 0]	0.01%	0.12%	0.12	0.90
[-1, 1]	-0.05%	0.18%	-0.30	0.77
[-2, 2]	0.11%	0.24%	0.46	0.64
[-3, 3]	0.07%	0.28%	0.27	0.79
[-4, 4]	0.20%	0.32%	0.60	0.55
[-5, 5]	0.13%	0.36%	0.35	0.73
Panel C: Non-first				
[0, 0]	0.15%	0.09%	1.57	0.12
[-1, 1]	0.32%**	0.16%	1.97	0.04
[-2, 2]	0.19%	0.21%	0.90	0.37
[-3, 3]	0.11%	0.25%	0.45	0.66
[-4, 4]	0.11%	0.29%	0.39	0.70
[-5, 5]	0.11%	0.32%	0.76	0.45

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Stock market reactions to the issuance of green bonds

- Issuing green bonds serve as credible signals to investors to indicate a firm's commitment to environmental objectives, but only the second and subsequent issuances are credible.
- This is evidenced by the positive stock market reaction only after the first issuance.
- It confirms the mechanism of a **repeated game in enforcing compliance**.