Unintended Benefits of Sustainability-linked Loans

Sustainability-linked Loans and Financial Performance

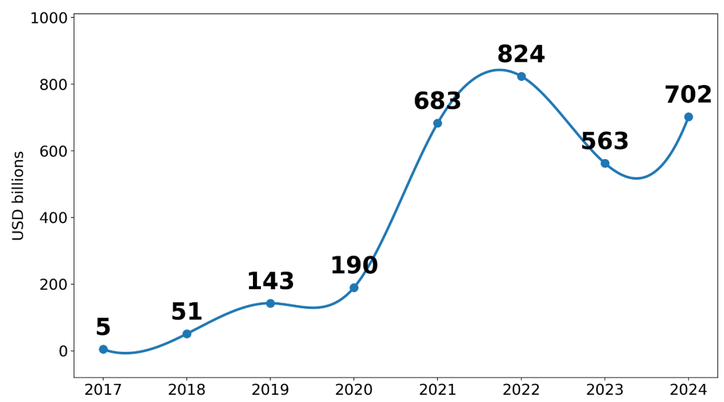
Yuxin Luo
Boston University

Motivation & Background

Sustainability-linked loan (SLL): new type of debt instruments
- Motivate firms to improve ESG performance

Key feature: interest rate linked to borrowers' ESG performance
- Targets on measurable activities (e.g., waste reduction, job satisfactions)
- Verification: lower interest rate if ESG improvement targets are met

Fast growing market: global SLL issuance in 2024 is $700 billion



Question:

1. How do SLLs affect borrowers' financial performance?
- Improving ESG performance may incur high costs
- Low interest rates and loans large enough to affect financial status

2. What are mechanisms driving financial performance changes?
- Low interest payment from SLL reduce borrowers' financing cost
- ESG improvement attracts ESG investors, boosting financial performance

Model

Two representative firms with same characteristics
- Firm 1 borrows conventional loan without ESG terms
- Firm 2 borrows SLL
- Operating profits: $\pi(X_t) = (1-\tau)K^{\alpha}(X_t - c)$
- Productivity process: $dX_t = \mu X_t dt + \sigma X_t dZ_t$
- Boundary conditions: $E(X_d) = 0$: Equity value is zero when default
  $E'(X_d) = 0$: Firm chooses optimal default

Conventional loan

Equity value:

$$E(X_t) = \begin{cases} \underbrace{\frac{(1-\tau)K^{\alpha}X_t}{r-\mu}}_{\text{Future cash flow}} - \underbrace{\frac{(1-\tau)c}{r}}_{\text{Debt payment}} + \underbrace{A_0 X_t^{v_1}}_{\text{Default option}} & \text{if } X_t \geq X_d, \\ 0, & \text{if } X_t < X_d. \end{cases}$$

(X_d: default boundary)

Sustainability-linked loan
- Coupon reduction ω if meeting target
- Effort κ (operating cost) to meet target
- Monitoring cost γ paid by borrower before verification
- Trade-off between extra cost (κ, γ) and lower coupon (ω)
- Before verification: reduced interest rates
- After verification: if missing the target: coupon reduction ω disappears
  if meeting the target: coupon reduction ω remains

Equity value

$$E_0 = \int_0^{t_1} e^{-rs} S(s) \Big[(1-\tau)\big((1-\kappa)K^{\alpha}\mathbb{E}[X_s] - (c-\omega)\big) - \gamma \tfrac{c}{r} \Big] ds + e^{-rt_1} S(t_1) \Big[(1-p)\,\mathbb{E}[E_1(X_{t_1}) \mid t_1 < t_\tau] + p\,\mathbb{E}[E_2(X_{t_1}) \mid t_1 < t_\tau] \Big]$$

(t1: verification time)

Solution
- Maximize equity value, subject to boundary conditions.

Empirical Evidence

1. SLL Borrowers are more likely to be upgraded in credit ratings

$\Delta Rating_i = a + b\ SLL_i + c\ Controls_i + e_i$

i: deal, *SLL*: indicator of whether the deal is sustainability-linked
ΔRating: changes in borrowers' credit ratings after borrowing

Dep. Var.	Credit rating change				
	ALL deals				New deals
	(1)	(2)	(3)	(4)	(5)
SLL	0.069*** (2.61)	0.082*** (3.12)	0.047* (1.74)	0.066** (2.01)	0.082** (2.07)
N	5,479	5,428	5,427	4,740	2,443
R^2	0.002	0.023	0.070	0.487	0.598
Controls	N	Y	Y	Y	Y
Borrowing Year FE	N	N	Y	Y	Y
Borrower Industry FE	N	N	Y	N	N
Borrower FE	N	N	N	Y	Y

Identification: IV using EU Taxonomy (2020 EU sustainability regulation)
- Banks are required to disclose their sustainable asset ratio
- Banks face pressure from investors and governments to offer SLLs

Instrumental Variable:
- **Loans from EU**: EU loan × After EU taxonomy
- **Loans with more EU lenders**: EU lender × After EU taxonomy
- Similar results using the above IV.

2. SLL Borrowers experience better stock performance

$Abnormal\ returns_i = a + b\ SLL_i + c\ Controls_i + e_i$

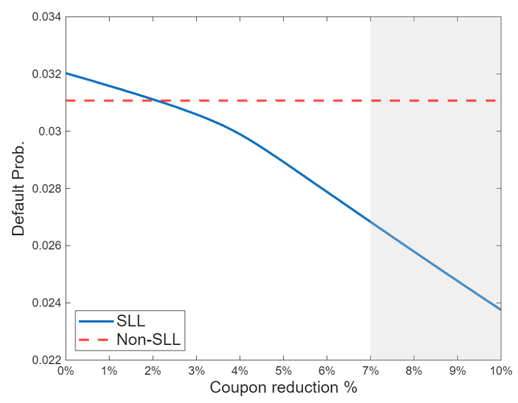
Dep. Var.	Post borrowing abnormal returns in the following year		
Baseline portfolio	Market portfolio	FF6 portfolio	FF25 portfolio
	(1)	(2)	(3)
SLL	0.049** (2.26)	0.049** (2.12)	0.051** (2.21)
N	5,155	4,282	4,282
R^2	0.148	0.074	0.088
Controls	Y	Y	Y
Borrowing Year FE	Y	Y	Y
Borrower Industry FE	Y	Y	Y

- Stock returns are 5% higher in the following year for SLL borrowers
- No major changes in institutional holdings

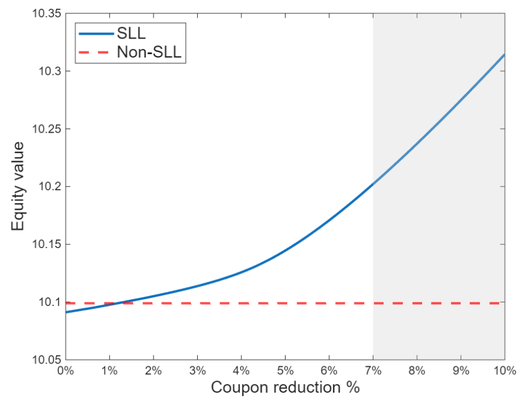
Calibration & Implication

Calibration
- Match leverage ratio in real data (30%-40%)
- Match probability of meeting targets: 61-86% (Feldhutter et al., 2024)

Implications



Credit Risk



Equity Value

- SLL borrowers have lower default risk
- Financial benefits are much larger than cost to meet targets
- SLL borrowers have higher equity returns

Concluding Remarks

Firms' financial performance improve after borrowing SLLs
- More likely to get higher credit ratings; Better long-run stock performance

SLLs borrowers have significant lower financing cost
- Reduce overall debt financing cost significantly ⇒ financing cost channel

Contact

Yuxin Luo (PhD Candidate in Finance): yuxinluo@bu.edu

All comments are welcome!

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