The skin-in-the-game bond

A novel sustainable capital instrument

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Outline of the presentation

Motivation

Introduction

The **skin-in-the-game** bond is a **sustainable capital** instrument.

Sustainable investing refers to the process of taking due account of environmental (E), but also social (S) and corporate governance (G) considerations in investment decision-making [1].

A person having **skin-in-the-game** is directly involved in and affected by an action and its negative consequences, especially financially [2].

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A person having **skin-in-the-game** is directly involved in and affected by an action and its negative consequences, especially financially [2].

$\longrightarrow$ Lack of skin-in-the-game may cause moral hazard.
e.g. 2008 financial crisis, Deepwater Horizon oil spill ...

Sustainable investing: green, social and sustainability bonds

> Green, social and sustainability bonds are issued with the purpose of financing resp. a green project, social project or combination of both [3].
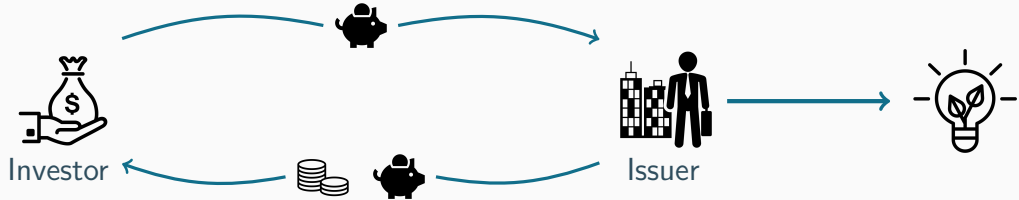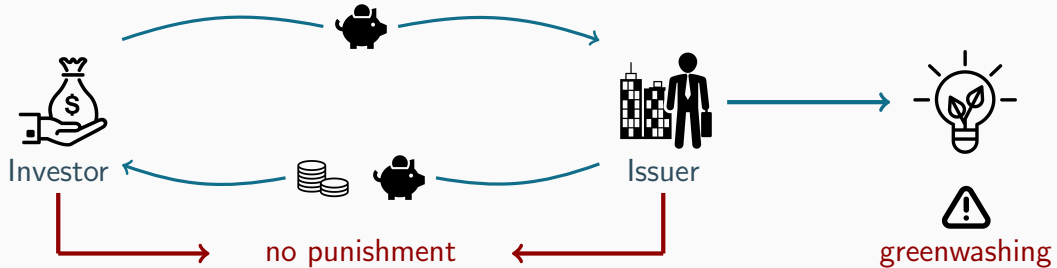
Sustainable investing: green, social and sustainability bonds

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Both issuer and investor do not have skin-in-the-game.

Sustainable investing: sustainability-linked bonds

Sustainability-linked bonds have varying financial characteristics, depending on whether the issuer achieves predefined sustainability objectives [4].

Example - energy company **Enel** [5]

- Bonds were first issued in September 2019.
- Sustainable targets related to greenhouse gas emission and renewable energy.
- The bond's coupon increases if Enel fails to reach the sustainable targets.

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- ▸ Sustainable targets related to greenhouse gas emission and renewable energy.
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$\longrightarrow$ The **issuer** has skin-in-the-game.

$\longrightarrow$ The **investor** has no skin-in-the-game.

Sustainable investing: skin-in-the-game bond

Which parties do have skin-in-the-game in sustainable investing?

	Issuer	Investor
Green, Social or Sustainability bond	✗	✗
Sustainability-linked bond	✓	✗
Skin-in-the-game bond	✓	✓

The skin-in-the-game bond is built on the principle that both parties, issuer and investor, should have skin-in-the-game and suffer if sustainability promises are not delivered.

Features of the
Skin-in-the-game Bond

The design of the skin-in-the-game bond
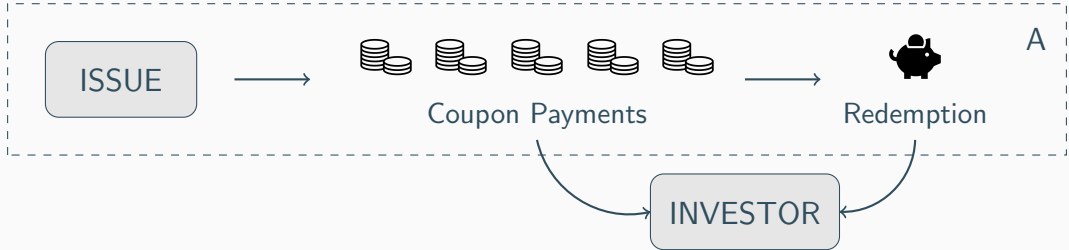
	Contingent Convertible [6]
Issuer	financial institution
Benchmark	related to the capital level
Trigger event	benchmark below a fixed threshold
Trigger consequence	(part of) the face value is withheld
Withheld part	to the issuer

The design of the skin-in-the-game bond

|	**Contingent Convertible** [6]	**Skin-in-the-game Bond**
Issuer	financial institution	company in any sector
Benchmark	related to the capital level	related to the broad concept of sustainability (E,S,G)
Trigger event	benchmark below a fixed threshold	
Trigger consequence	(part of) the face value is withheld	
Withheld part	to the issuer	to an external fund

Scenario A: **no trigger** event.

The skin-in-the-game bond's life cycle

Scenario A: **no trigger** event.

ISSUE ⟶ Coupon Payments ⟶ Redemption

A
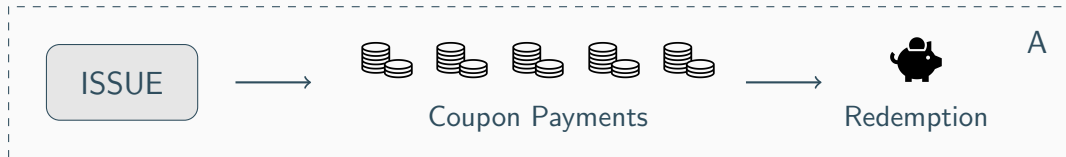
Scenario B: **trigger** event.

INVESTOR ⟷ FUND

ISSUE ⟶ Trigger

split between

B
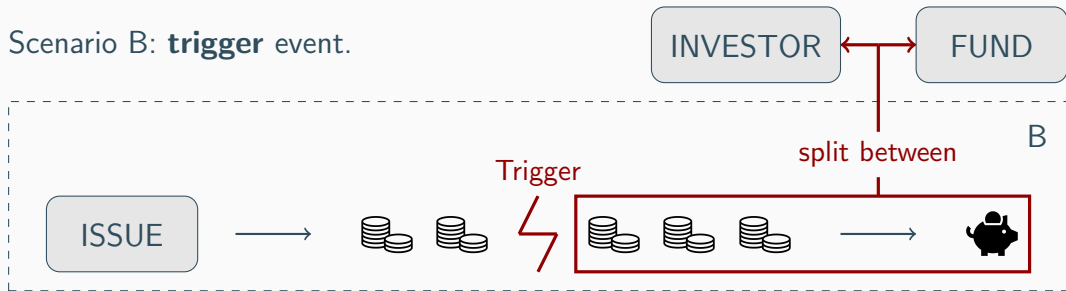
Advantages

1. The **investor** has skin-in-the-game.
   - speculate on meeting the E, S and/or G related goals
   - cash-in an above risk-free coupon

2. The **issuer** has skin-in-the-game.
   - clear market driven incentive to optimize the level of the benchmark
   - excessive risk-taking and mismanagement are immediately punished
     - cost of capital increases
     - reputational risk

3. External **fund** makes sure that issuer is not exempt from payment and it may be used to cover costs related to trigger event.
     e.g. oil spill, nuclear event ...

Valuation of the Skin-in-the-game Bond

The valuation of a skin-in-the-game bond

Standard corporate bond

- subject to the issuer's bankruptcy risk
- offers a **yield** $c = r + c_s$, with r the risk-free rate and c_s the credit spread

Skin-in-the-game bond

- trigger characteristic increases the probability for the investor to suffer a loss on the invested amount
- to compensate, a higher **yield** $c = r + c_s + t_s$ is offered, with t_s the trigger spread

The valuation of a skin-in-the-game bond

The **price** P of the bond is determined as

$$P = \sum_{t=1}^{T} \frac{\mathbb{E}_{\mathcal{Q}}[C_t]}{(1 + r + c_s)^t} := N,$$

with T the maturity, C_t the cash-flow at time t, $\mathcal{Q}$ the pricing measure, and N the notional.

$\mathbb{E}_{\mathcal{Q}}[C_t]$ depends on the **trigger probability** PT_t and the trigger spread t_s:

$$\mathbb{E}_{\mathcal{Q}}[C_t] = PT_t \cdot 0 + (1 - PT_t) \cdot c \cdot N = (1 - PT_t) \cdot (r + c_s + t_s) \cdot N.$$

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$\longrightarrow$ If we estimate PT_t, we can **calculate** t_s, assuming r, c_s known.

Data Example

The ESG skin-in-the-game bond

The ESG skin-in-the-game bond uses the **ESG rating of a company**, provided by a particular rating agency[1], **as the benchmark** underlying the trigger mechanism of the bond.

- The trigger probability is determined by the probability that the issuing firm's ESG rating drops to or below the trigger level.

- Historical ESG data from **Sustainalytics** is used to estimate the trigger probability.

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[1]Due to the differences across the ratings published by various ESG rating providers, the ESG skin-in-the-game bond should merely be seen as an illustrative example [7].

ESG skin-in-the-game bond characteristics

The trigger spread depends on the bond's characteristics. We look at a specific example.

Characteristics	Bond-specific values
issuer	public firm in communication services sector
risk-free rate r	0.010
credit spread c_s	0.025
duration	5 years
notional N	100
coupon frequency	annual
initial rating	A
trigger level	BB
trigger penalty	permanent coupon loss

The trigger probability (1)

We exploit the literature on credit ratings [8, 9] to estimate trigger probabilities.

Step 1 Transform the raw ratings (between 0 and 100) into **ESG rating categories** [10].

Rating category	C	CCC	B	BB	BBB	A	AAA
Raw score	0-48	48-54	54-61	61-69	69-74	74-79	79-100

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Step 2 Under the time-homogeneous, first-order Markov assumption, estimate a **transition probability matrix**, per company type and sector.

The trigger probability (2)

One-year transition matrix for a public firm in the communication services sector.

	C	CCC	B	BB	BBB	A	AAA
C	0.53213	0.18029	0.22725	0.05577	0.00409	0.00042	0.00005
CCC	0.12705	0.47922	0.30573	0.08110	0.00618	0.00065	0.00007
B	0.06587	0.10967	0.51331	0.27567	0.03119	0.00379	0.00050
BB	0.00884	0.02761	0.12200	0.67539	0.14099	0.02163	0.00355
BBB	0.00089	0.00364	0.01845	0.19021	0.62482	0.13169	0.03031
A	0.00009	0.00048	0.00263	0.03941	0.25367	0.58823	0.11549
AAA	0.00002	0.00012	0.00064	0.01078	0.08476	0.19875	0.70492

Step 3 Calculate the **trigger probability** based on transition probability matrix.

e.g. $PT_1 = 0.03941 + 0.00263 + 0.00048 + 0.00009 = 0.04261$.

The trigger probability (3)

Step 4 Transform $\mathcal{P}$ to $\mathcal{Q}$.

- ▸ transition probabilities based on historical data are under measure $\mathcal{P}$
- ▸ pricing requires probabilities under pricing measure $\mathcal{Q}$
- ▸ use transformation from Cariboni et al. [11]

	Year 1	Year 2	Year 3	Year 4	Year 5
$PT^{\mathcal{P}}$	0.04261	0.12309	0.20974	0.29175	0.36613
$PT^{\mathcal{Q}}$	0.10174	0.21241	0.30324	0.37521	0.43258

The trigger probability (4)

Calculate the **trigger spread**.

$$P = \sum_{t=1}^{T} \frac{\mathbb{E}_{\mathcal{Q}}[C_t]}{(1 + r + c_s)^t}$$
$$= \frac{0.89826cN}{1.035} + \frac{0.78759cN}{1.035^2} + \frac{0.69676cN}{1.0356^3} + \frac{0.62479cN}{1.035^4} + \frac{0.56742cN + N}{1.035^4}$$
$$= N = 100.$$

We find $c = 0.048567$, with $r = 0.010$, and $c_s = 0.025$, this results in

$$t_s = \mathbf{0.013567.}$$

Discussion on the trigger spread

Trigger spread (bps) for a 5-year ESG skin-in-the-game bond with annual coupon payment, permanent coupon loss, and trigger level (column). The issuer has initial rating (row).

	C	CCC	B	BB	BBB	A
CCC	173					
B	107	223				
BB	40	90	228			
BBB	15	35	84	300		
A	6	16	39	136	424	
AAA	4	8	21	75	222	459

Conclusion

We argue for the **skin-in-the-game bond** as a sustainable capital instrument with an embedded financial penalty related to E, S and/or G promises.

1. clear incentives to the **issuer** to reduce excessive risk-taking, reach sustainability goals and bring transparency
2. mechanism for **investors** to gain above risk-free returns in compensation for clearly upfront specified risks

$\longrightarrow$ skin-in-the-game is enforced and moral hazard risk is reduced

Thank you!

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📄 **https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3827001**

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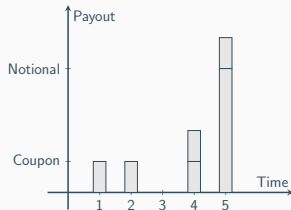
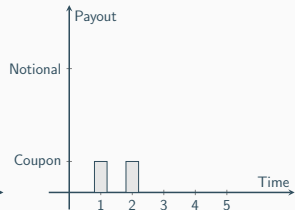# Additional information

Examples of trigger penalties
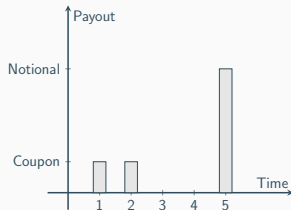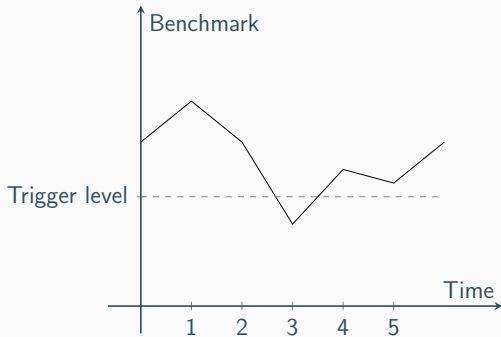
permanent coupon loss
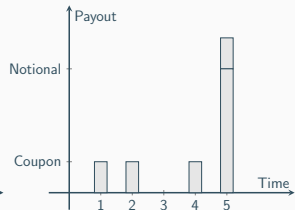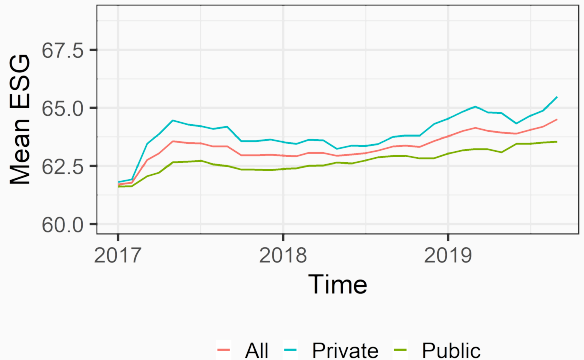
temporary coupon loss

coupon withholding

full write-down

Data is provided by **Sustainalytics**.

- ▸ monthly data between January 2017 and September 2019
- ▸ companies are subdivided into public or private and grouped into 11 sectors
- ▸ ESG score between 0 and 100, higher score means better ESG practice

Discussion on the trigger spread (2)

- The trigger penalty has a large impact on the trigger spread.
  - smallest spreads for a temporary coupon loss and coupon withholding penalty
  - largest spreads for a full write-down penalty

- Calculations are done for an average company within a specific sector. In reality, market mechanism will charge different yields for different companies.
  - lower yield if it is likely that promises are fulfilled
  - higher yield if it is likely that promises turn out differently than promoted