Financial engineering approaches for a management-fashion leader at ESG integration

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Introduction

Gap in the literature and our research question

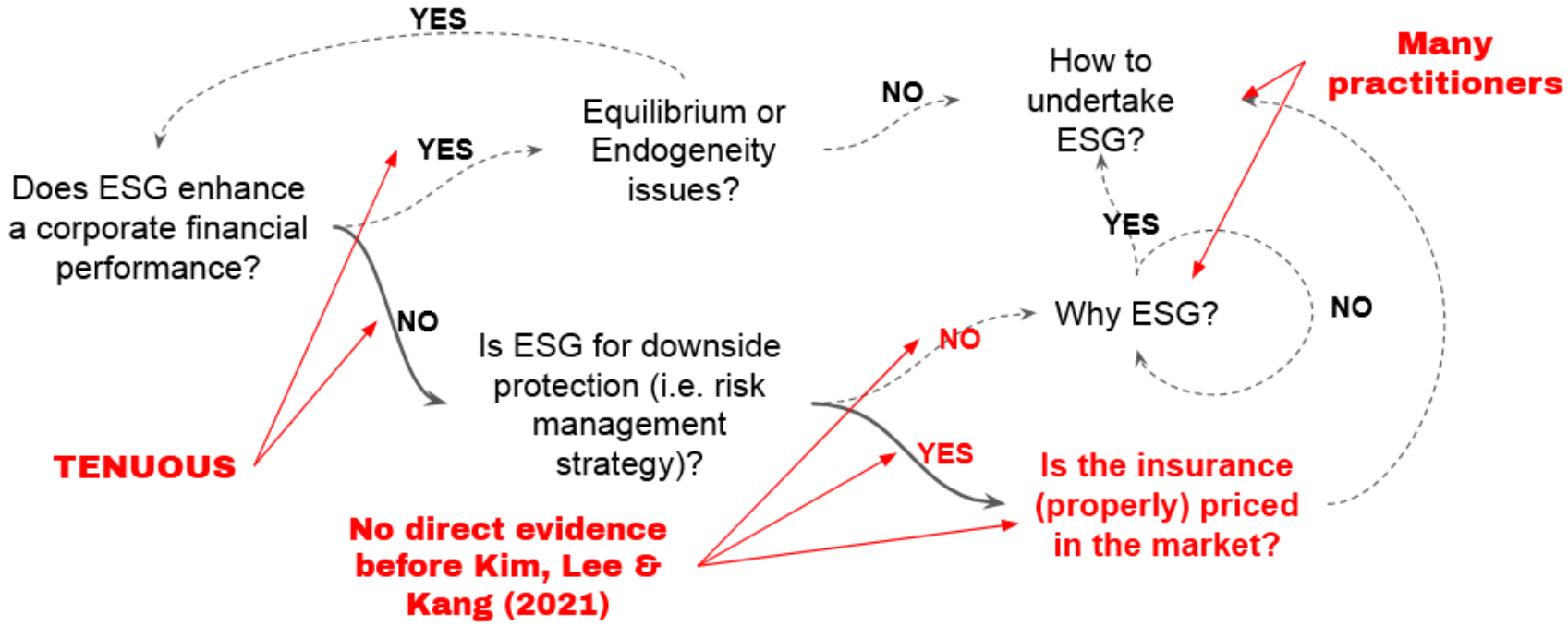


Table 3. The effect of Environmental, Social or Governance scores on bond returns.

	Dependent Variable:			
	(1)	(2)	(3)	(4)
ENV	−0.081 **	−0.258 ***	−0.322 **	−0.319 **
	(0.037)	(0.085)	(0.150)	(0.154)
SOC	−0.009	−0.023	0.052	0.002
	(0.038)	(0.041)	(0.163)	(0.231)
GOV	0.119 **	0.110 **	0.110 **	0.311
	(0.048)	(0.045)	(0.045)	(0.338)
log_size	0.295 **	0.150 ***	0.185 ***	0.315
	(0.122)	(0.024)	(0.059)	(0.201)
rating	−0.008 **	−0.012 **	−0.015 **	−0.015 ***
	(0.003)	(0.006)	(0.006)	(0.005)
size_ENV		0.012 ***	0.019 *	0.019 *
		(0.004)	(0.010)	(0.011)
rating_ENV		0.0002	−0.0002	−0.0002
		(0.0003)	(0.0005)	(0.0005)
size_SOC			−0.010	−0.007
			(0.013)	(0.017)
rating_SOC			0.001	0.001
			(0.001)	(0.001)
size_GOV				−0.014
				(0.023)
rating_GOV				0.00001
				(0.001)
Constant	−0.0003	0.002 ***	0.002 ***	0.0001
	(0.002)	(0.001)	(0.001)	(0.002)

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

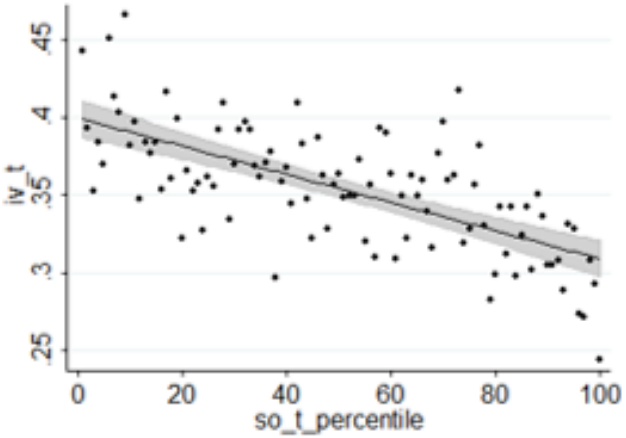
ESG and Derivatives

Sources of the risk management benefits of ESG

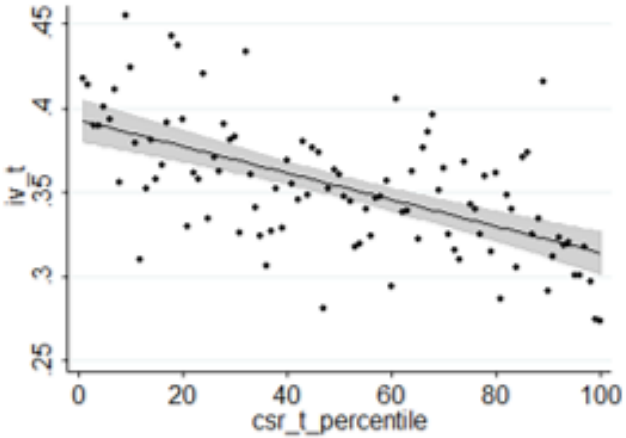
Identify	Help with **identifying** sources of risks (scanning capabilities) (Matten and Moon, 2008; Garriga and Melé)
Prevent	**Prevent** risks from occurring: reduce exposure, enhance stakeholder-influencing capability (Barnett 2007), social capital
Mitigate	**Mitigate** damages from realized risks (e.g. moral capital; Godfrey 2005). Focus of existing 'ex-post' literature.
Innovate	Turn uncertainty into **opportunities** for joint value creation (Knight 1921; strategic CSR, CSV)

Concurrent between CSR and implied volatility

This figure illustrates the relationship between the CSR variables and implied volatility using two-way scatterplots of the mean implied volatility for each CSR variable percentile. The figure summarizes the concurrent relationship by plotting the mean implied volatility in month *t* for each CSR variable percentile in month *t*.



(a) *so*(*t*) percentile and *iv*(*t*)



(b) *csr*(*t*) percentile and *iv*(*t*)

Source: Kim, S., Lee, G., & Kang, H. G. (2021). Risk management and corporate social responsibility. *Strategic Management Journal*, 42(1), 202-230.

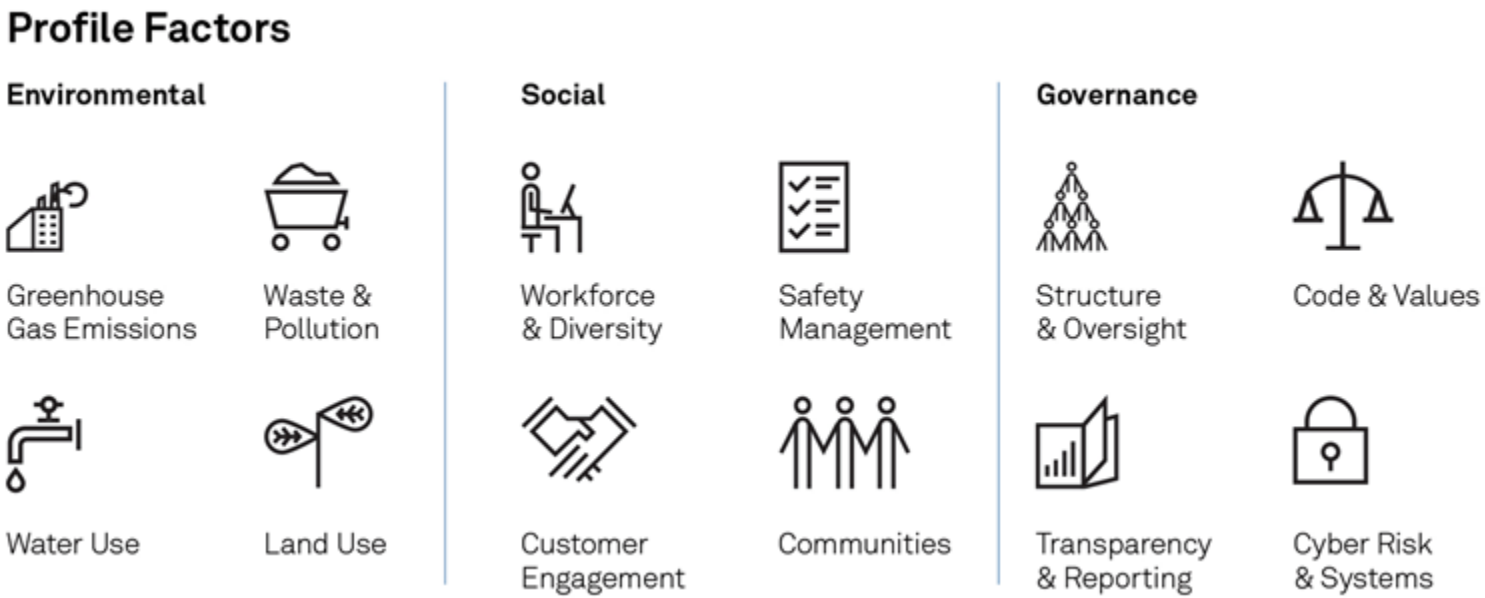
ESG Integration and Financial Engineering

What is ESG integration?

- "the **explicit and systematic** inclusion of ESG issues in investment analysis and investment decisions." (source: UN-PRI)

- "using ESG factors to evaluate companies and countries on how far advanced they are with sustainability. Once enough data has been acquired on these three metrics, they can be **integrated into the investment process** when deciding what equities or bonds to buy." (source: Robeco)

ESG Criteria - **corporations**



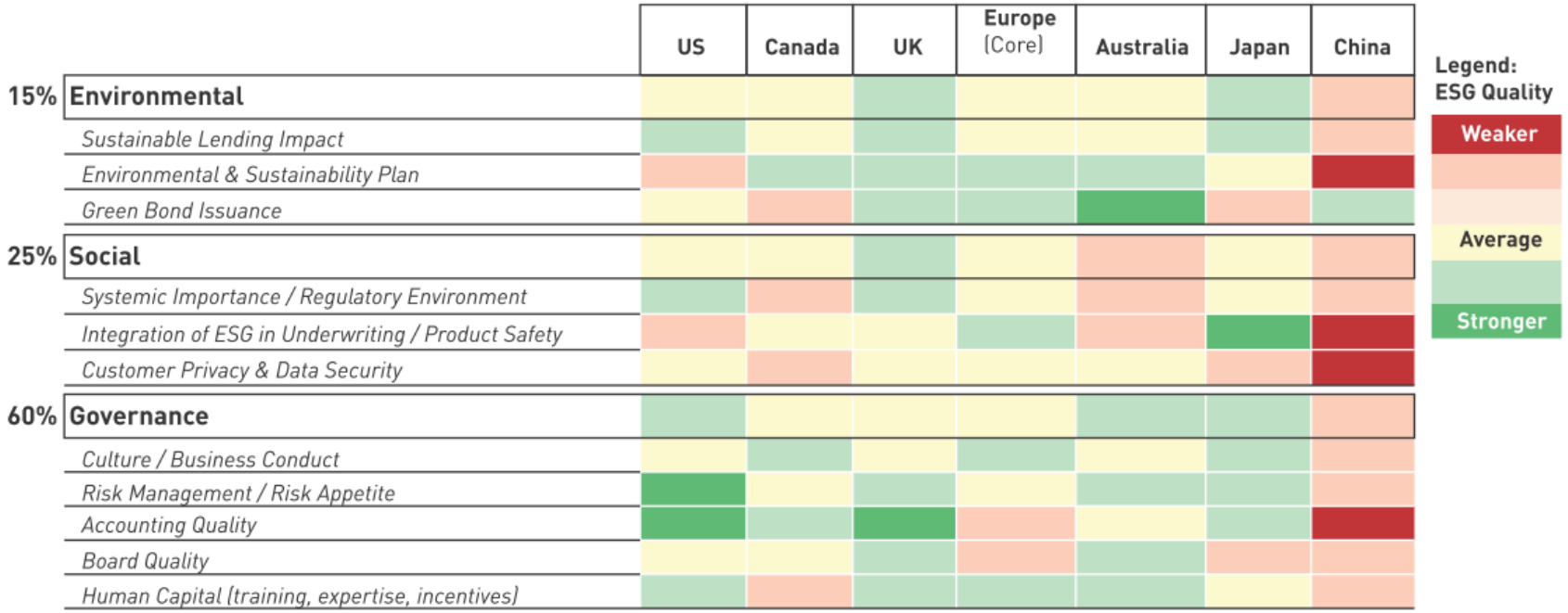
(Source: S&P Global)

ESG Criteria - sovereigns

Figure 1: Variables included in ESG sovereign score

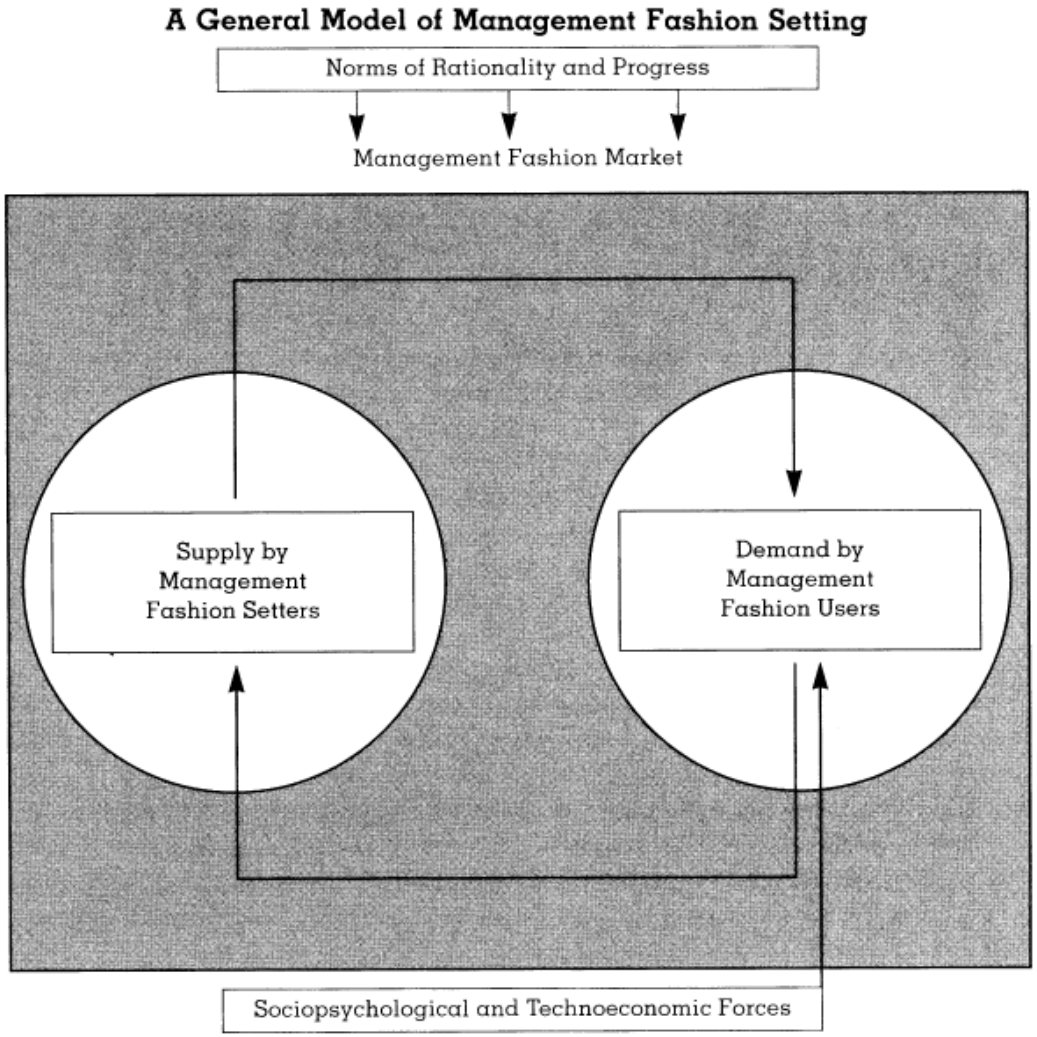
Source: PIMCO

ESG integration case to analyze bank-issued bonds



Source: PIMCO

How to integrate ESG? Management fashion, not management fads!

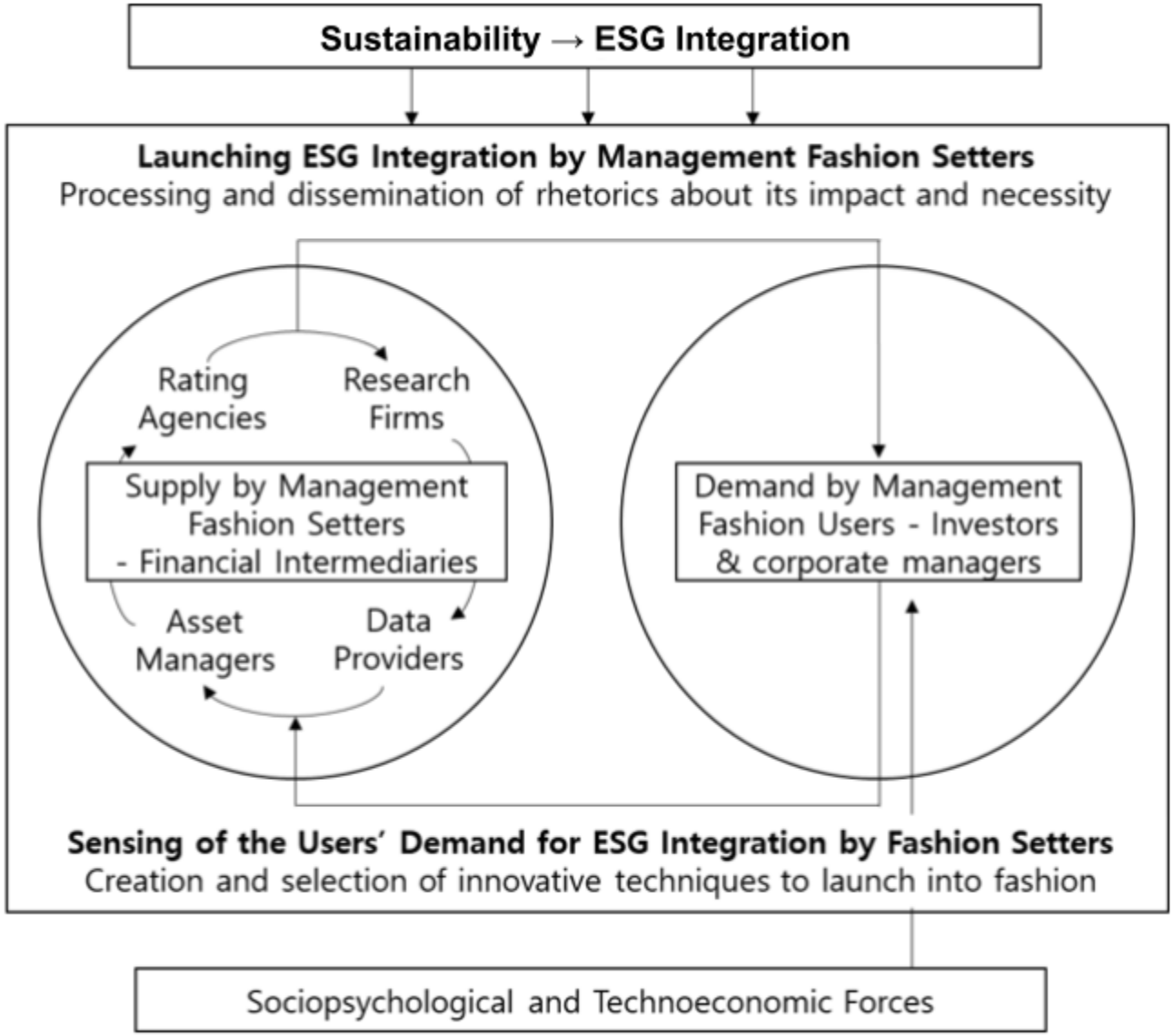


I define management fashion setting as the process by which management fashion setters continuously redefine both theirs and fashion followers' collective beliefs about which management techniques lead rational management progress. (Abrahamson 1996).

FIGURE 1. ESG Integration as the New Management Fashion in the Financial Sector

The Management Fashion Theory (Abrahamson, 1991, 1996)

- Management fashion users: end-investors and corporations (i.e. pension funds and life insurance companies)
- Management fashion setters: financial service providers (i.e. rating agencies, asset managers, consultants, and research firms)
- The management fashion users form a demand for an unprecedented strategy
- Such a demand induces the management fashion setters to create innovative strategies, selecting one to process, and disseminating it
- **Rhetorics** by the fashion setters (see Table 2) for the acceptance of the strategy by the fashion users


Sustainability → ESG Integration
Launching ESG Integration by Management Fashion Setters
Processing and dissemination of rhetorics about its impact and necessity
Rating Agencies
Research Firms
Supply by Management Fashion Setters - Financial Intermediaries
Asset Managers
Data Providers
Demand by Management Fashion Users - Investors & corporate managers
Sensing of the Users' Demand for ESG Integration by Fashion Setters
Creation and selection of innovative techniques to launch into fashion
Sociopsychological and Technoeconomic Forces

However, this management fashion may become a management fad that passes shortly without much efficacy if certain problems are not solved.

"*In truth, sustainable investing boils down to little more than marketing hype, PR spin and disingenuous promises from the investment community*" -- Tariq Fancy, a former chief investment officer of Sustainable Investing at BlackRock, https://www.usatoday.com/story/opinion/2021/03/16/wall-street-esg-sustainable-investing-greenwashing-column/6948923002/

La mode se démode, le style jamais - Coco Chanel

Data and Method

- Theory-building paper with a proposition (Eisenhardt,1989)
- Multicase qualitative research (Volmar & Eisenhardt, 2020)
    - Appropriate to answer the question of "how"
    - Using interviews to find out the problems perceived by the practitioners at the frontline (Eisenhardt & Graebner, 2007)
- Sample data: interviews, archival and live materials
    - Interviewees and other data sources (see Table 1)
    - Interview questions (see Appendix I)
- The underlying theory: Management fashion (Abrahamson, 1991, 1996)

Table 1. The Description of Qualitative Data Sources

Company name	Business Type	Informant
S&P Global Incorporation	A global credit rating agency	Director
KIS Rating	A local credit rating agency	VP, Directors
PineBridge Investments	A global asset management firm	Managing Director
Company "S"	A global asset management firm	Managing Director
Barings	A global asset management firm	Director
Macquarie Asset Management	A global asset management firm	Director
Company "W"	A local asset management firm	Director, VP, Associate VP
Kyobo Life Insurance	A life insurance company	Executive
Who's Good	AI-driven ESG research and data provider	CEO, Founder
VAIV Company	AI API developer	EVP, Co-founder
Company "H"	AI API developer	Founder
Refinitiv	A global financial data provider	NA
CFA Institute	A global, not-for-profit investment organization	NA
BrightTALK	A media company (Webinar)	NA
The Economist	A media company (Newspaper)	NA
Bloomberg	A media company	NA
Various others	Newspapers, corporate sites	NA

TABLE 2. Examples of ESG Rhetoric Disseminated by Fashion Setters.

Description	Reference
"Investment-Led, Expert Driven" "Better-informed investment decisions and strengthened risk management"	JPMorgan Asset Management (2020)
"The best signal of bottom-line risk" "Good" companies enjoy lower funding cost." "ESG controversies can cost a lot."	Bank of America Securities (2020)
"Companies with strong ESG profiles may be better positioned for future challenges and experience fewer instances of bribery, corruption, and fraud."	MSCI, Corporate website
"ESG risks and opportunities impact and shape our operations and business activity" "To integrate ESG in the financial markets...promotes sustainable investment and businesses worldwide."	S&P Global (2019). "Accelerating ESG Progress in the World"
"Big Smoke, Small Fire." "Eventually everyone will be an ESG investor."	Morningstar (June 9, 2020). "The Only Way to ESG"
"ESG is an integral component of prudent risk management."	Amundi Asset Management (2020).
"The integration of ESG risks and opportunities into investment analysis is relevant for most, if not all, investors."	OECD (2020)
"More thorough consideration of ESG factors by financial professionals can improve the fundamental analysis they undertake and ultimately the investment choices they make."	CFA Institute, Corporate website
"ESG integration...involves taking ESG factors into account in the investment process (though the way investment firms do this in practice varies widely)" "ESG is Risk Management, Not an Asset Class	The Economist (April 17, 2018), Wall Street Journal (June 29, 2020)

TABLE 3. The identification of the four problems in current ESG integration

The Problems	Description of the Causes
Credibility	- Unreliable data due to companies' voluntary submission of data - Unreliable methods due to no common standard or ESG criteria
Incentives	- No incentive alignment for the managers, - Unclear financial and non-financial benefits
Time uncertainties	- Investment: shortening of investment horizon to realize the financial benefits of ESG integration that require long-term investment - Tenure: short tenure of the managers to realize the managerial benefits from ESG integration that takes a long time
Access	- Fixed income investors: no direct ownership of the companies - Less developed markets: weaker demand for the strategy - Passive investors

The existing literature

The existing studies show,

- how to strategize the use of technologies for enhanced strategic performance (Hoppe, 2002; Zahra & Covin, 1993)
- the relation between technologies and sustainable competitive advantages (Miles & Snow, 1978; Porter, 1985)

A few investigates using artificial intelligence for ESG integration.

- Textual analysis using ESG-related financial news flow has superior predictability power on stock volatility (Guo, 2020).
- The use of big data is found to eliminate self-reporting biases while uncovering hidden signals for ESG scores that the traditional method cannot achieve (Smeuninx, De Clerck, & Aerts, 2020).
- The readability formulae and natural language processing (NLP)-based analysis partly solve the issue of using difficult language in sustainability reporting (Antoncic, 2020).

Our Propositions

1. **Since AI combined with NLP (natural language processing) complements humans in collecting and analyzing big data with less human errors, it enhances objectivity and transparency of the data and evaluating methods for ESG integration.**

2. **Since AI combined with RPA (robotic process automation; eg, auto reports) reduces documentation, administration costs and risk-management costs, the incentives managers less affect ESG integration.**

3. **Since AI combined with ABM (agent-based modelling) reduces time to integrate and evaluate ESG through simulation, it facilitates relevant investment despite the short-termism by corporate managers and investors.**

4. **Since AI combined with IoE (internet of everything) or blockchain technologies enables active monitoring and evaluation of ESG matters, it induces passive managers to integrate ESG into financial decision-making more actively.**

Handa Partners (2017-2021) → Quantit

1. 기업의 사회적 가치에 대한 오피니언 사전 구축
2. 자연어 처리 플랫폼을 이용한 사회적 가치 지수
3. 산출된 사회적 가치를 기반으로 한 기업 분류

CEO/Founder, Who's Good

"I learned that companies were focused on getting higher ESG scores, and consulting firms offered them model answers for the surveys, instead of guiding them how to integrate ESG in their decision making."

"Sustainability reports written this way cannot tell us which companies truly care for ESG and which only pretend. We really needed more objective, raw data for accurate analysis of the companies' ESG status."

"**Using AI technologies and big public data**, we minimize human errors and provide real-time ESG data to investors. AI technologies such as **machine learning (ML) and natural language processing (NLP)** including sentiment analysis will change the ESG landscape by ensuring greatly enhanced objectivity and transparency of the underlying data."

A fintech, Worldwide Generation (WWG) created a monitoring and marketplace ecosystem platform using blockchain technology called G17Eco. It is a “monitoring, reporting and verification tool (Corporate website)” that helps stakeholders in collection, processing, dissemination and aggregation of sustainability data. Using a data bot, it claims, "all stakeholders can map, monitor, measure, manage and market their individual, organization or nation's contribution to the SDGs.” In addition, satellite imagery is a useful tool for monitoring climate activities.

⇒ Resolve incentives and ownership problem

Carbon Delta, a climate fintech recently acquired by MSCI, produces climate data using satellite imagery, quantifies it and incorporates it in Climate Value-at-Risk (CVaR) for investors to protect assets from negative outcomes of climate change and to find new opportunities in low carbon fields.

MSCI ESG Research's

Climate Value-at-Risk

Climate Value-at-Risk (Climate VaR) is designed to provide a forward-looking and return-based valuation assessment to measure climate related risks and opportunities in an investment portfolio. The fully quantitative model offers deep insights into how climate change could affect company valuations.

Modeling approach

Impact modeling

Cost / profit calculation

Security valuation

Portfolio aggregation

Overall findings

- ESG integration is the new management fashion in the financial industry.
- Yet, it faces critical problems that need to be solved to avoid becoming a management fad, instead of a fashion.
- Four problems are: the lack of credibility in data and methods, the lack of incentive, the lack of time, and the lack of ownership.
- We posit that the solution is to actively use emerging technologies, especially artificial intelligence, for ESG integration.

Future research

- Financial Engineers as the leader of the ESG management fashion leader
- Bridge and arbitrage two separate risk management approaches at management literature and financial engineering/insurance
- Generate recommendations on how to use the combination of machine-learning and financial engineering for ESG
- Propose management fashions for post-ESG

END