The Alpha and Beta of ESG Investing

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Amundi quantitative research on ESG and climate risks

Joint research projects between Mohamed Ben Slimane, Leila Bennani, Théo Le Guenedal, Frédéric Lepetit, Thierry Roncalli, Takaya Sekine and Peter Tankov

- The Alpha and Beta of ESG Investing
- How ESG Investing Has Impacted the Asset Pricing of the Stock Market
- Economic Modeling of Climate Risks
- The Stock-Bond Puzzle of ESG Investing (*forthcoming*)
- Financial Modeling of Climate Risks (*forthcoming*)

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What is the challenge?

"There is no Plan B, because there is no Planet B"

Ban Ki-moon, UN Secretary-General, September 2014

Is it a question of climate-related issues?

In fact, it is more an economic growth issue[2]

"The Golden Rule of Accumulation: A Fable for Growthmen"

Edmund Phelps, *American Economic Review*, 1961
Nobel Prize in Economics, 2006

[2] The interconnectedness of E, S and G: Economy, Sustainability and Growth

Academic findings

- Relationship between shareholder rights and "*higher firm value, higher profits, higher sales growth, lower capital expenditures, and [...] fewer corporate acquisitions*" (Gompers *et al.*, 2003)
- Positive relation between high corporate social responsibility and low cost of equity capital (El Ghoul *et al.*, 2011): "*Employee Relations, Environmental Policies, Product Strategies lower the firms' cost of equity*"
- Corporate financial performance is a U-shape function of corporate social performance (Barnett and Salomon, 2012)
- Cultural differences explain the diversity and differences in intentions ('Value' or 'Values' oriented) of the currently available ESG data (Eccles and Stroehle, 2018)
- Negative/neutral impact: Schröder (2007), Hong and Kacperczyk (2009)

Mixed results

Scoring system

Table: An example of ESG criteria

Environmental	Social	Governance
Emission & energy use	Employment conditions	Board independence
Water	Community involvement	Audit and control
Green cars*	Access to medicine*	Remuneration
Green financing*	Digital device*	Shareholder' rights

Source: Amundi ESG Research.

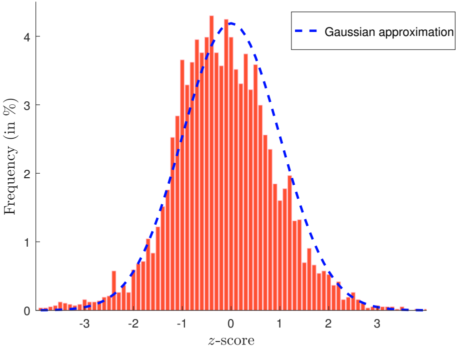
$\Rightarrow$ Weighting schemes depend on sectors

$^{(\star)}$means a specific criterion (related to one or several sectors)

Scoring system

- Sector-neutral
- z-score profile (Gaussian mapping) $\Leftrightarrow$ ESG ratings

Figure: Distribution of the ESG scores (December 2018)



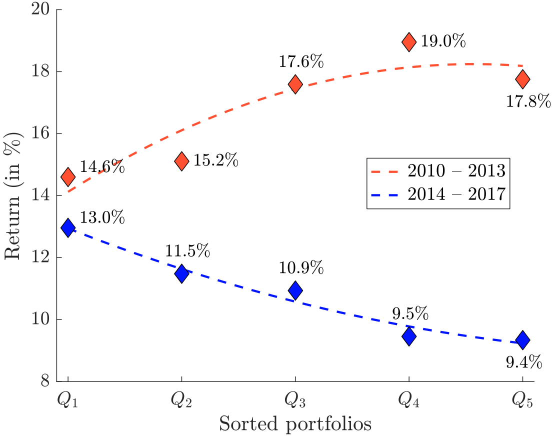
Sorted portfolio methodology

Sorted-portfolio approach

- Sorted-based approach of Fama-French (1992)
- At each rebalancing date t, we rank the stocks according to their Amundi **ESG** z-score $s_{i,t}$
- We form the five quintile portfolios Q_i for $i = 1, \ldots, 5$
- The portfolio Q_i is invested during the period $]t, t+1]$:
  - Q_1 corresponds to the best-in-class portfolio (best scores)
  - Q_5 corresponds to the worst-in-class portfolio (worst scores)
- Quarterly rebalancing
- Universe: MSCI World Index
- Equally-weighted and sector-neutral portfolio (and region-neutral for the global universe)

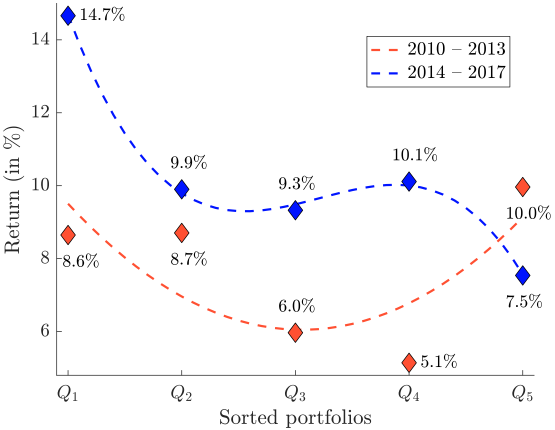
North America

Figure: Annualized return of **ESG** sorted portfolios (North America)



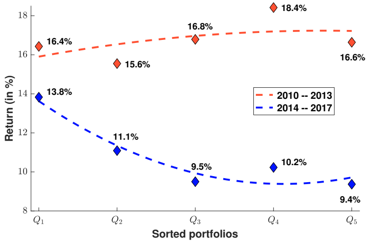
Eurozone

Figure: Annualized return of **ESG** sorted portfolios (Eurozone)

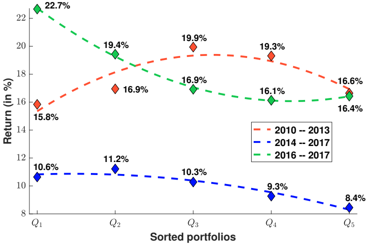


North America

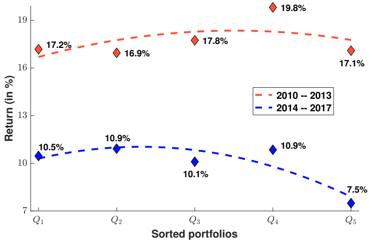
Environmental



Social

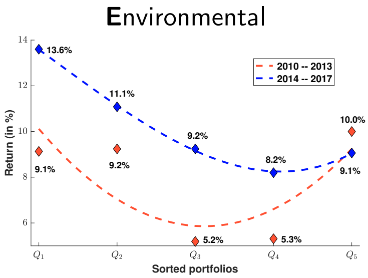


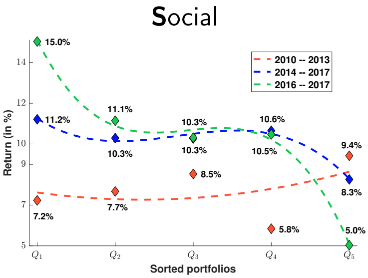
Governance

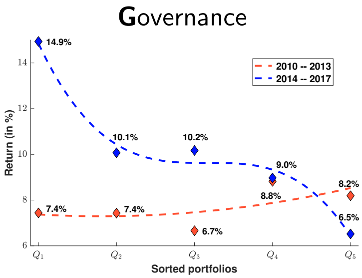


$\Rightarrow$ **E** is the winning pillar

Eurozone







$\Rightarrow$ **G** is the winning pillar

Summary

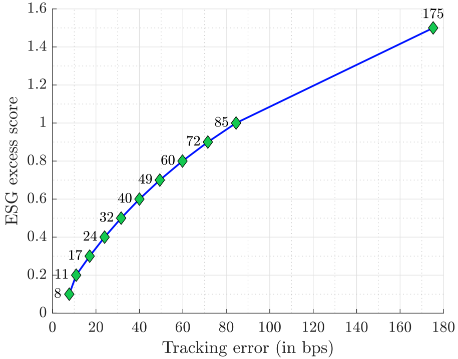
- ESG investing begins to be rewarded by the market, but there is a strong heterogeneity among regions:

Before 2014					
Factor	North America	Eurozone	Europe ex-EMU	Japan	Global DM
ESG	−−	−	**0**	+	**0**
E	−	**0**	+	−	**0**
S	−	−	**0**	−	−
G	−	**0**	+	**0**	+
Since 2014					
Factor	North America	Eurozone	Europe ex-EMU	Japan	Global DM
ESG	++	++	**0**	−	+
E	++	++	−	+	++
S	+	+	**0**	**0**	+
G	+	++	**0**	+	++

- ESG & ~~long-term~~ tail risk management: not yet confirmed!
- **S** is the New Black?

Arbitrage between ESG and TE

Figure: Efficient frontier of **ESG** optimized portfolios (Global DM)

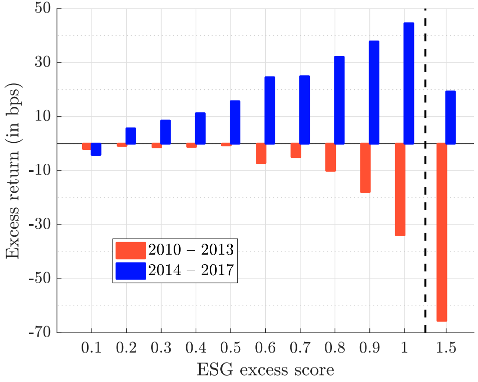


There is no free lunch

ESG investing implies to take a tracking-error risk!

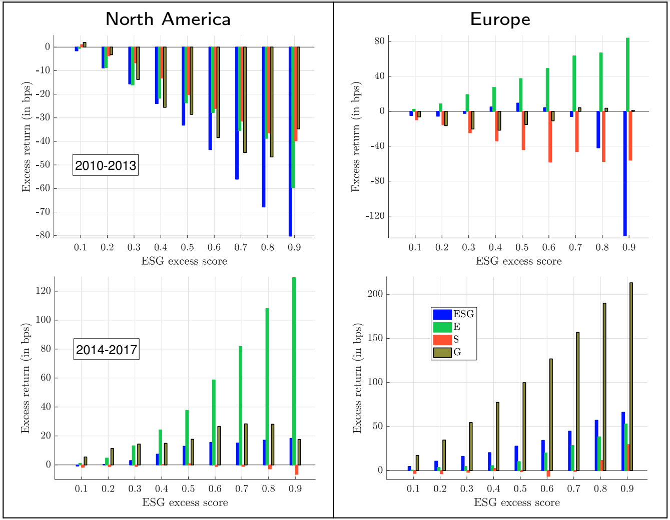
Performance of optimized portfolios

Figure: Annualized excess return of **ESG** optimized portfolios (Global DM)



ESG investing & diversification: Mind the gap

Performance of optimized portfolios



- Negative impact of **E**, **S**, **G** and **ESG** in North America before 2014
- Negative impact of **S** and **ESG** in Europe before 2014
- Positive impact in North America and Europe since 2014 (except **S**)

Summary

- Similar results than those obtained with ESG active management
- ESG investing requires to take tracking-error risk $\Rightarrow$ Current SAA policies are not adapted
- **G** generates more tracking error than **E** and **S** ($\approx \times 1.5$)
- Impact of ESG on the diversification (stock picking $\neq$ optimized index portfolios)

Single-factor model

Table: Results of cross-section regressions with long-only risk factors (average R^2)

Factor	North America		Eurozone	
	2010 – 2013	2014 – 2017	2010 – 2013	2014 – 2017
Market	40.8%	26.2%	42.8%	37.7%
Size	39.3%	23.6%	37.1%	20.9%
Value	38.9%	24.4%	41.6%	35.2%
Momentum	39.6%	23.8%	40.8%	35.8%
Low-volatility	35.8%	22.2%	38.7%	34.9%
Quality	39.1%	24.1%	42.4%	36.5%
ESG	40.1%	25.1%	42.6%	37.3%

- Specific risk has increased during the period 2014 – 2017
- Since 2014, we find that:
  - ESG $\succ$ Value $\succ$ Quality $\succ$ Momentum $\succ \ldots$ (North America)
  - ESG $\succ$ Quality $\succ$ Momentum $\succ$ Value $\succ \ldots$ (Eurozone)

Multi-factor model

Table: Results of cross-section regressions with long-only risk factors (average R^2)

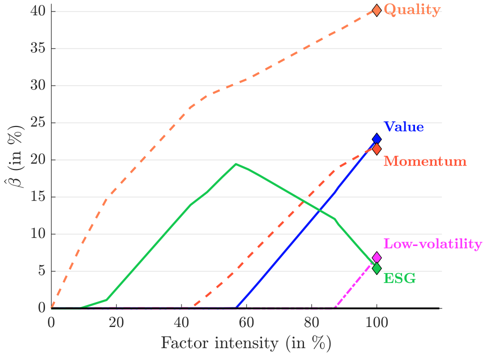
Factor	North America		Eurozone	
	2010 – 2013	2014 – 2017	2010 – 2013	2014 – 2017
Market	40.8%	26.2%	42.8%	37.7%
5F model	46.1%	35.4%	49.5%	45.3%
6F model (5F + ESG)	46.7%	36.8%	50.1%	46.0%

***p-value statistic for the MSCI Index (time-series, 2014 – 2017):

- 6F = ~~Size~~, Value, Momentum, Low-volatility, Quality, ~~ESG~~ (North America)
- 6F = Size, Value, Momentum, ~~Low-volatility~~, Quality, ESG (Eurozone)

Factor selection

Figure: Factor picking (North America, 2014 – 2017)

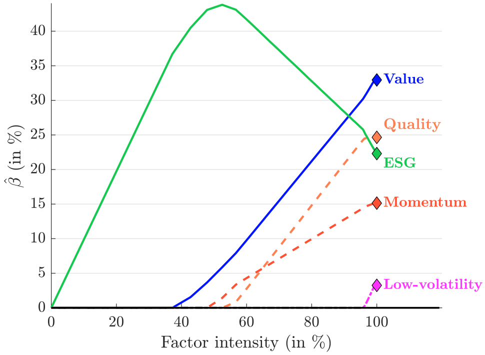


- Active management $\neq$ factor investing
- ESG does really matter for active management!
- The **ESG-Value** puzzle!

Quality $\succ$ ESG $\succ$ Momentum $\succ$ Value $\succ$ Low-volatility **BUT...**

Factor selection

Figure: Factor picking (Eurozone, 2014 – 2017)



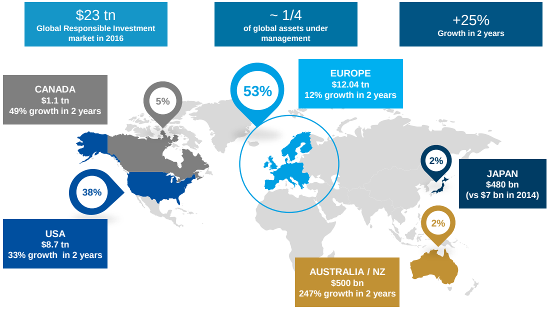
- Active management $\neq$ factor investing
- ESG does really matter for both!
- The **ESG-Quality** puzzle!

ESG $\succ$ Value $\succ$ Momentum $\succ$ Quality $\succ$ Low-volatility **BUT...**

Summary

- ESG remains an alpha strategy in North America
- ESG becomes a beta strategy (= risk factor) in Europe?

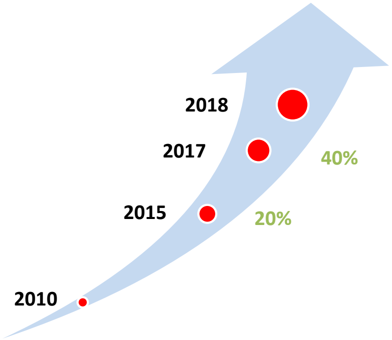
Figure: The market of ESG investing in 2016



Source: Global Sustainable Investment Alliance (2017).

The steamroller of ESG for institutional investors

Figure: Frequency of institutional RFPs that require ESG filters



Source: Based on RFPs received at Amundi.

- In some countries, 100% of RFPs require ESG filters
- For some institutional investors, 100% of RFPs require ESG filters (public, para-public and insurance investors)
- For some strategies, 100% of RFPs require ESG filters (index tracking)

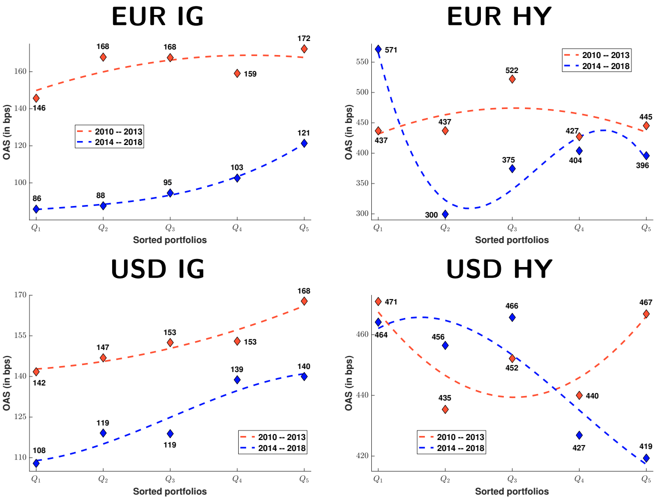
Why is ESG investing different in bond markets?

- Two effects for explaining price formation process
  - Intrinsic effect (asset selection: risks & return opportunities)
  - External effect (investment flows: supply/demand balance)
- bonds $\neq$ stocks
- Supply/demand imbalance $\Rightarrow$ structure of credit spreads

Preliminary results from Ben Slimane *et al.* (2019)

- IG + HY
- EUR and USD denominated
- January 2010 – November 2018
- 26 400 bonds issued by 5 130 firms

Preliminary results from Ben Slimane *et al.* (2019)



Spread correction is then essential when implementing ESG in the bond market

Preliminary results from Ben Slimane *et al.* (2019)

Crifo-Diaye-Oueghlissi model (2017)

We retain as dependent variable the log of the yield spread (OAS) of the i^{th} security:

$$\begin{aligned}\ln OAS_{i,t} &= \alpha_t + \beta_s s_{i,t} + \beta_{sub} SUB_{i,t} + \beta_{MD} MD_{i,t} \\ &\quad + \sum_{j=1}^{N_{cat}} \beta_{CRT_j} CRT_{j,i,t} + \sum_{j=1}^{N_{sect}} \beta_{SEC_j} SEC_{j,i,t} + \varepsilon_{i,t}\end{aligned}$$

where:

- $s_{i,t}$ is the ESG z-score
- $SUB_{i,t}$ is a dummy variable accounting for subordination
- $CRT_{j,i,t}$ are dummies for categories of ratings
- $SEC_{j,i,t}$ are dummies for sectors
- $MD_{i,t}$ is the modified duration

Preliminary results from Ben Slimane *et al.* (2019)

We test the assumption: $\beta_s < 0$

Preliminary results

- EUR $\succ$ USD
- IG $\succ$ HY
- Strong differences between sectors: (Banking, Basic materials, Insurance, Consumer goods) $\neq$ (Communication, Consumer cyclical, Utilities, Energy)
- 2014-2018 $\succ$ 2010-2013

The misunderstanding

- Markowitz, H. (1952), Portfolio Selection, *Journal of Finance*, 7(1), pp. 77-91.
- Modigliani, F., and Miller, M.H. (1958), The Cost of Capital, Corporation Finance and the Theory of Investment, *American Economic Review*, 48(3), pp. 261-297.

⇒ Two misunderstandings:

1. Capital allocation & asset allocation
2. Cost of capital & asset (stock/bond) return

Spillover effects of ESG between bond and stock markets

Spillover

$$\text{ESG} \Rightarrow \text{Cost-of-capital} \nearrow \Rightarrow \text{Profitability} \searrow \Rightarrow \text{Stock prices}$$

- Bond market $\Rightarrow$ stock market
- Stock market $\not\Rightarrow$ bond market (?)
- On the importance of lead/lag effects!

ESG investing and impact on corporate governance are then more correlated in the bond market than in the stock market

$$\text{Stakeholder} \neq \text{Shareholder}$$

Epilogue

Keynes

"*In the long run, we are all dead*"

John Maynard Keynes[a], *A Tract on Monetary Reform*, 1923.

[a] "*Men will not always die quietly*", *The Economic Consequences of the Peace*, 1919.

Carney

"*The Tragedy of the Horizon*"
"*The Tragedy of the Commons*"

Mark Carney, Chairman of the Financial Stability Board, 2015

⇒ Back to the Golden Rule and the Fable for Growthmen...

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