

# Session One:

# Introduction to ESG Finance

CU SEAS IEOR 4723:  
Financial Eng. for ESG Finance

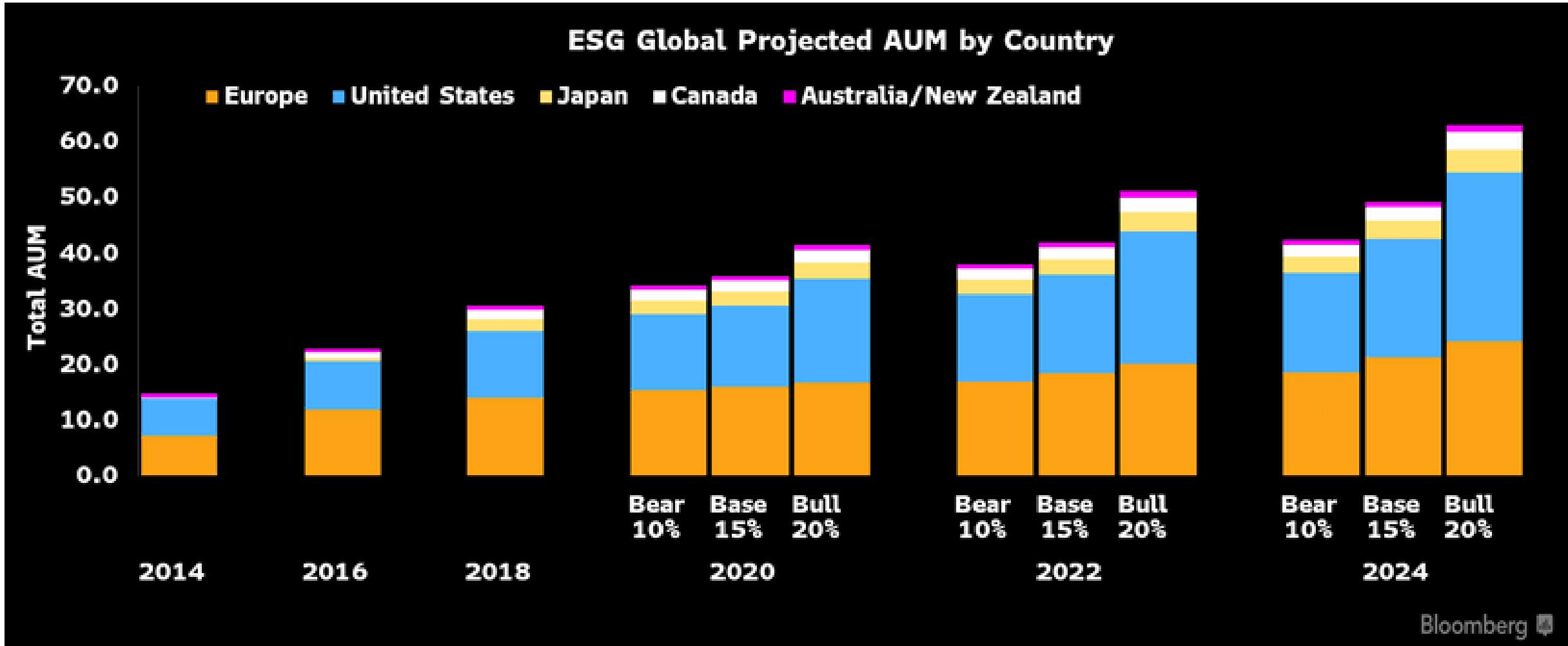


**1.1**

*ESG is not a niche strategy anymore*

# ESG Investments are no longer a niche category at \$50 trln

*Global ESG assets are on track to exceed \$53 trillion by 2025, representing more than a third of the \$140.5 trillion in projected total assets under management<sup>(1)</sup>*



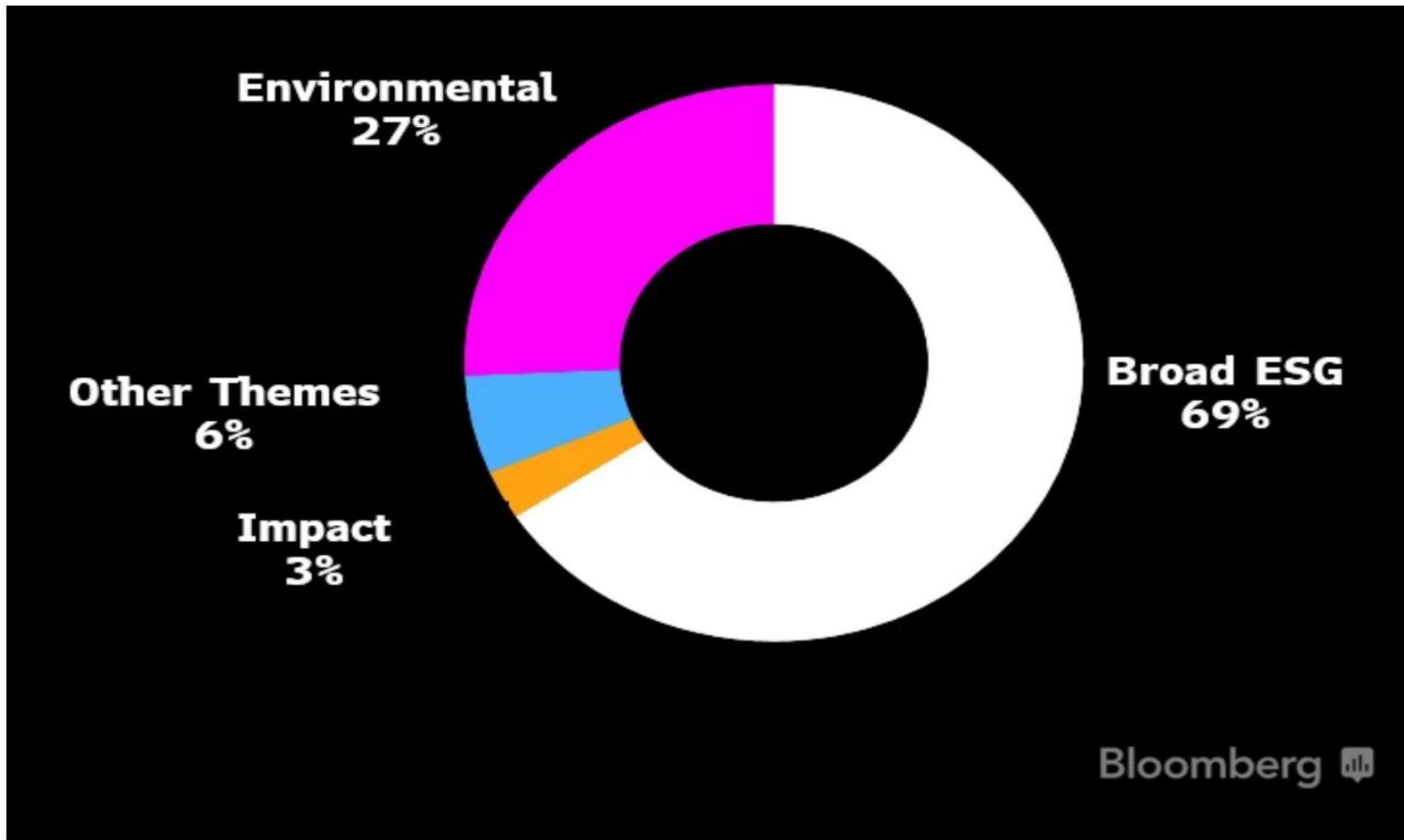
Note: (1) assumes 15% growth, half the pace in 2020-2021

Source: Bloomberg

Development of the ESG market in EMEA provides hints for what to expect globally

*EMEA is the global leader in ESG adoption that accounts for approx. half of global ESG assets*

**European 3Q sustainable funds launch per theme**

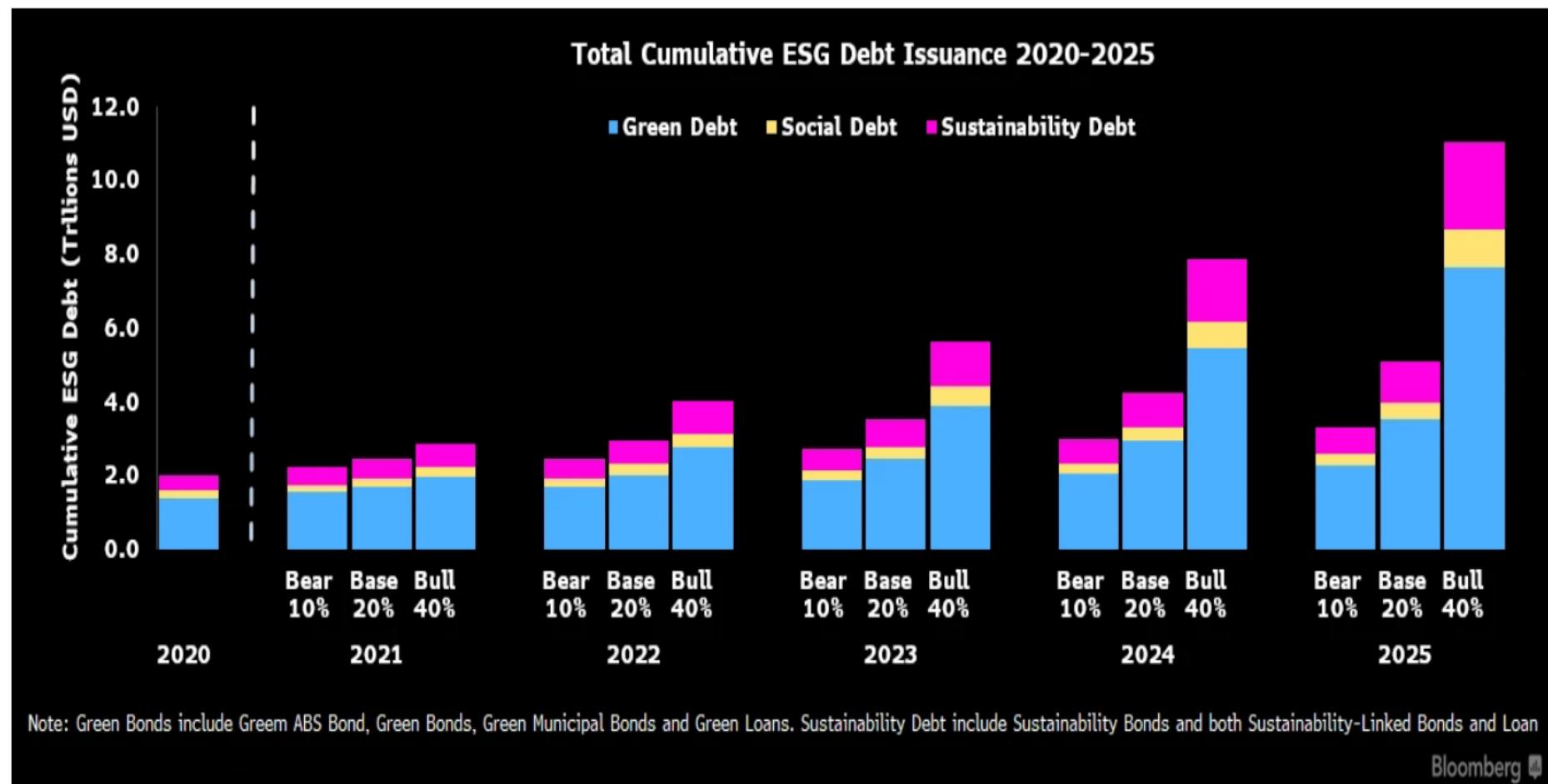


Source: Bloomberg

# Beyond ESG equity investments, ESG debt markets are poised for explosive growth

## ESG debt issuance 2020-25 forecast

*ESG debt markets are poised for explosive growth. Green, social and sustainability bonds may exceed \$2 trln in cumulative issuance in 2021*



Source: Bloomberg



## 1.2

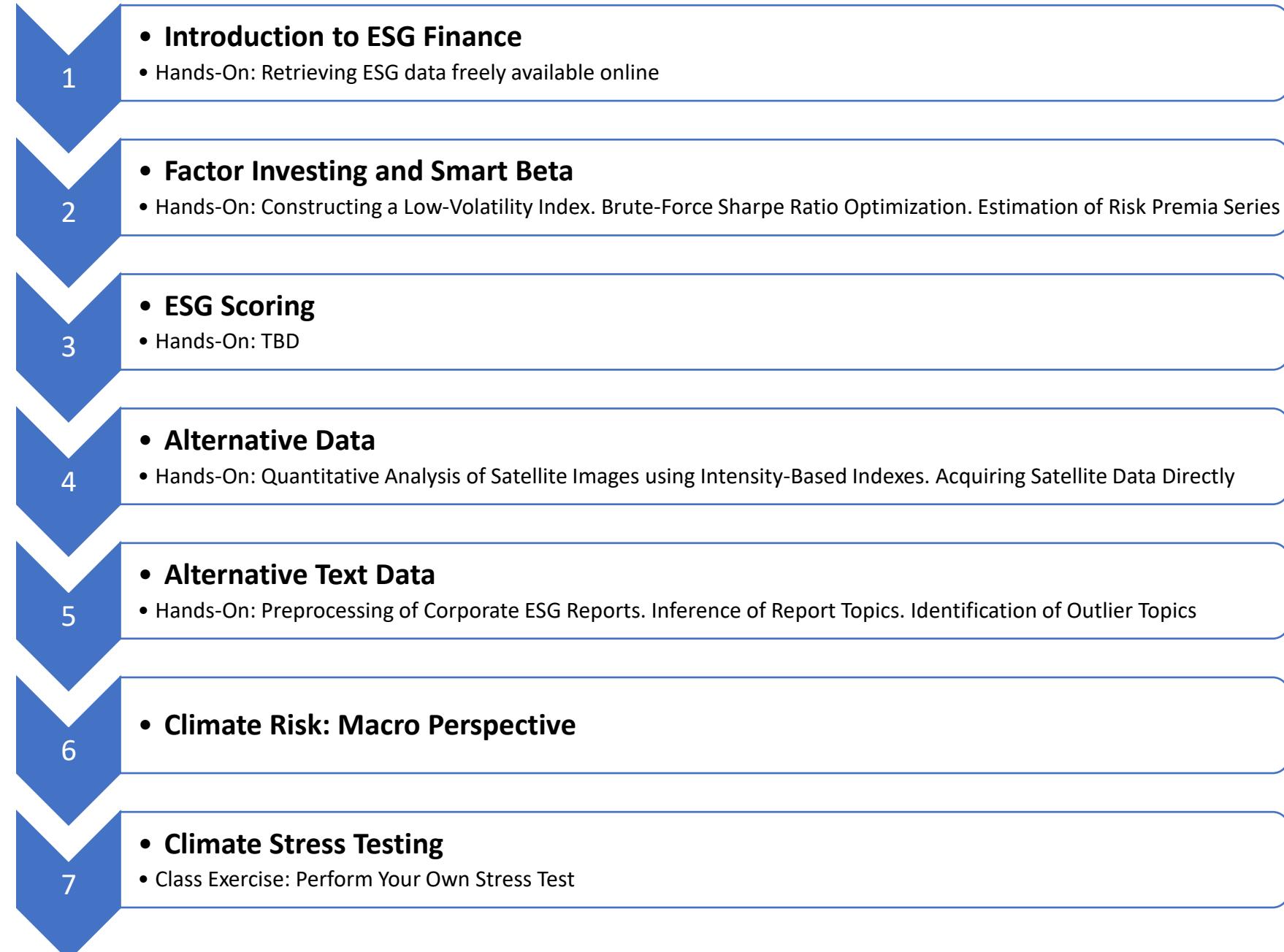
*IEOR 4723 course in a nutshell: expanding ESG Finance will require new skills from quant analysts*

# IEOR 4723: Financial Engineering for ESG Finance Class

*Seven lecture sessions: each has a theoretical part, followed by a hands-on demo in Jupyter*

*We will also have a guest speaker (logistics to be worked out)*

*Important: order and topics themselves are tentative and subject to change/rearrangement*



# Session Two: Factor Investing and Smart Beta

*We introduce factor investing and most commonly accepted risk factors. We also discuss the basics of index construction*

Factor groups	What it is
<b>Value</b> Relatively inexpensive stocks	Captures excess returns to stocks that have low prices relative to their fundamental value
<b>Low size (small cap)</b> smaller companies	Captures excess returns of smaller firms (by market capitalization) relative to their larger counterparts
<b>Momentum</b> rising stocks	Reflects excess returns to stocks with stronger past performance
<b>Low volatility</b> lower risk stocks	Captures excess returns to stocks with lower than average volatility, beta, and/or idiosyncratic risk
<b>Dividend yield</b> cash flow paid out	Captures excess returns to stocks that have higher-than-average dividend yields
<b>Quality</b> sound balance sheet stocks	Captures excess returns to stocks that are characterized by low debt, stable earnings growth, and other “quality” metrics
<b>Growth</b> Measure of change in sales and earnings	Measures company growth prospects using historical earnings, sales and predicted earnings
<b>Liquidity</b> Size-adjusted trading volume	Captures common variations in stock trading volumes relative to available shares trading

Source: MSCI

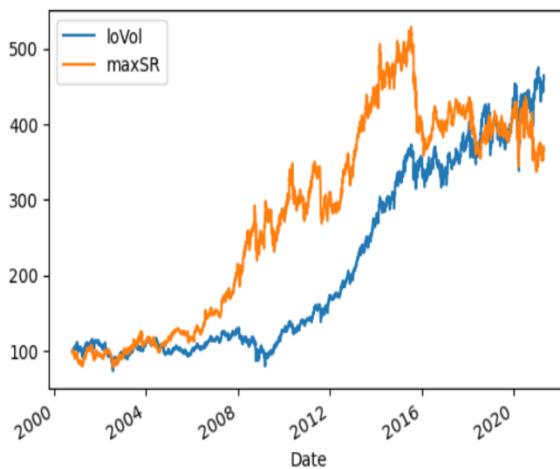
# Hands-On: Constructing a Low-Volatility Index. Brute-Force Sharpe Ratio Optimization. Estimation of Risk Premia Series

*We will work through a Jupyter notebook step-by-step, culminating in constructing several simple indexes and deriving time series for major risk factors*

## Low-volatility vs maximum SR index

```
In [107]: #dfRets.join(dfW0, rsuffix="_w").join(tsIndex0.rename("tsIndex0")).to_csv("2.csv")
pd.merge(tsIndex.rename("loVol"), tsIndex0.rename("maxSR"), left_index=True, right_index=True).plot()
```

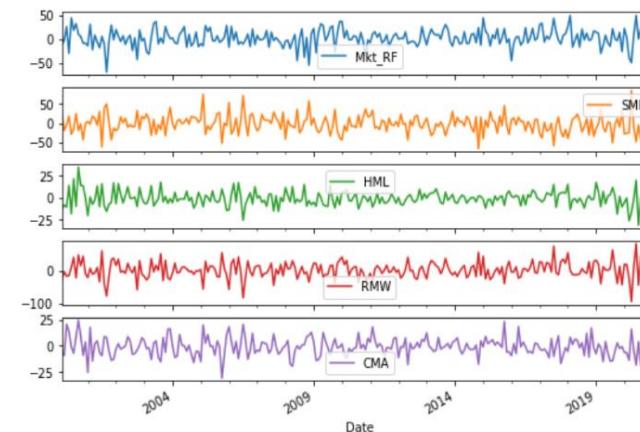
```
Out[107]: <AxesSubplot:xlabel='Date'>
```



## Major risk factors: Broad market, Size, Value, Growth, Operating Profitability

```
In [31]: res3 = res2.T.iloc[:,1:]
res3.plot(subplots=True)
```

```
Out[31]: array([<AxesSubplot:xlabel='Date'>, <AxesSubplot:xlabel='Date'>,
   <AxesSubplot:xlabel='Date'>, <AxesSubplot:xlabel='Date'>,
   <AxesSubplot:xlabel='Date'>], dtype=object)
```



# Session Three: ESG Scoring

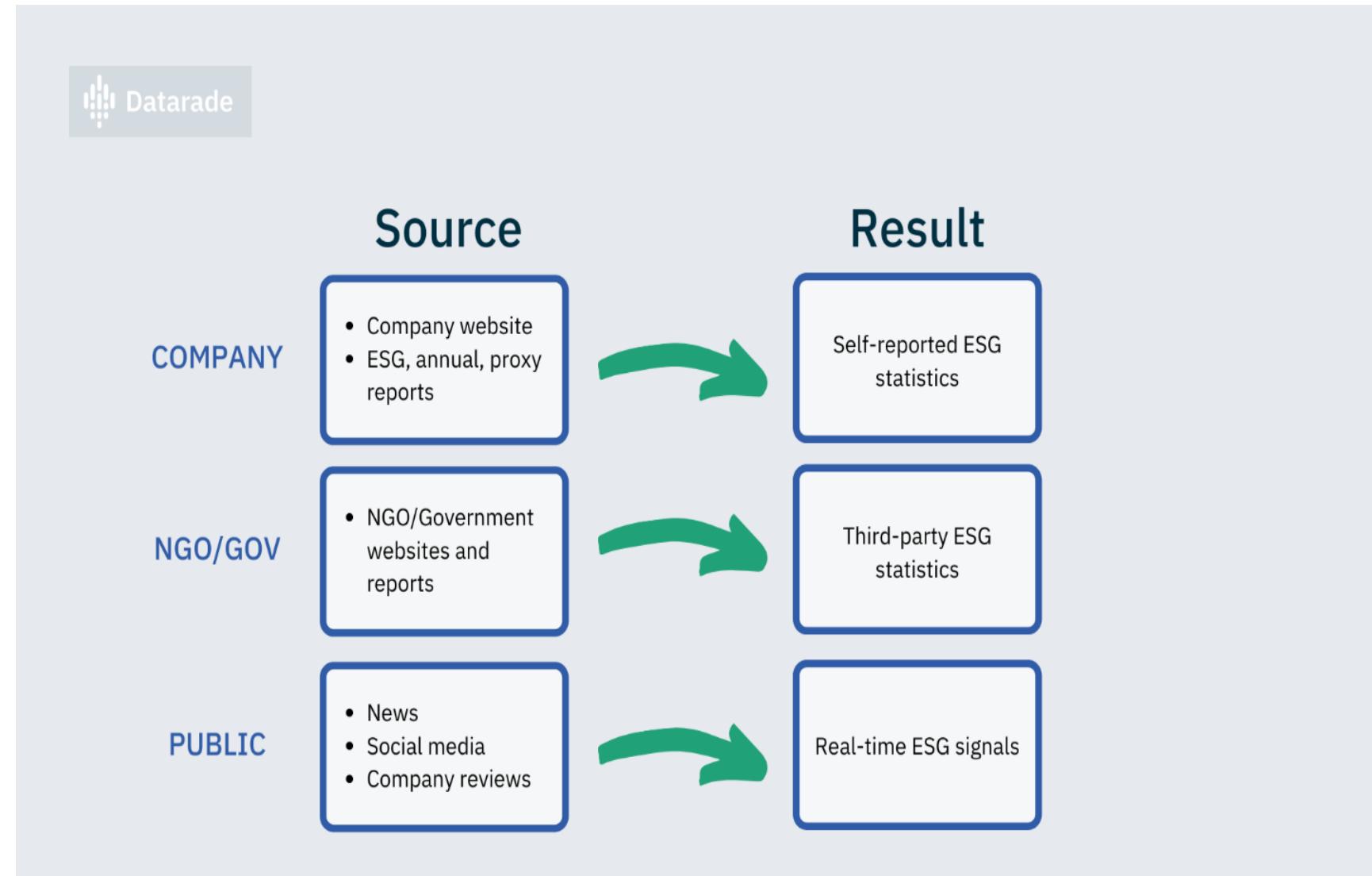
We will discuss *ESG scoring models*, particularly regression tree-based models

## MSCI ESG Rating Process Diagram



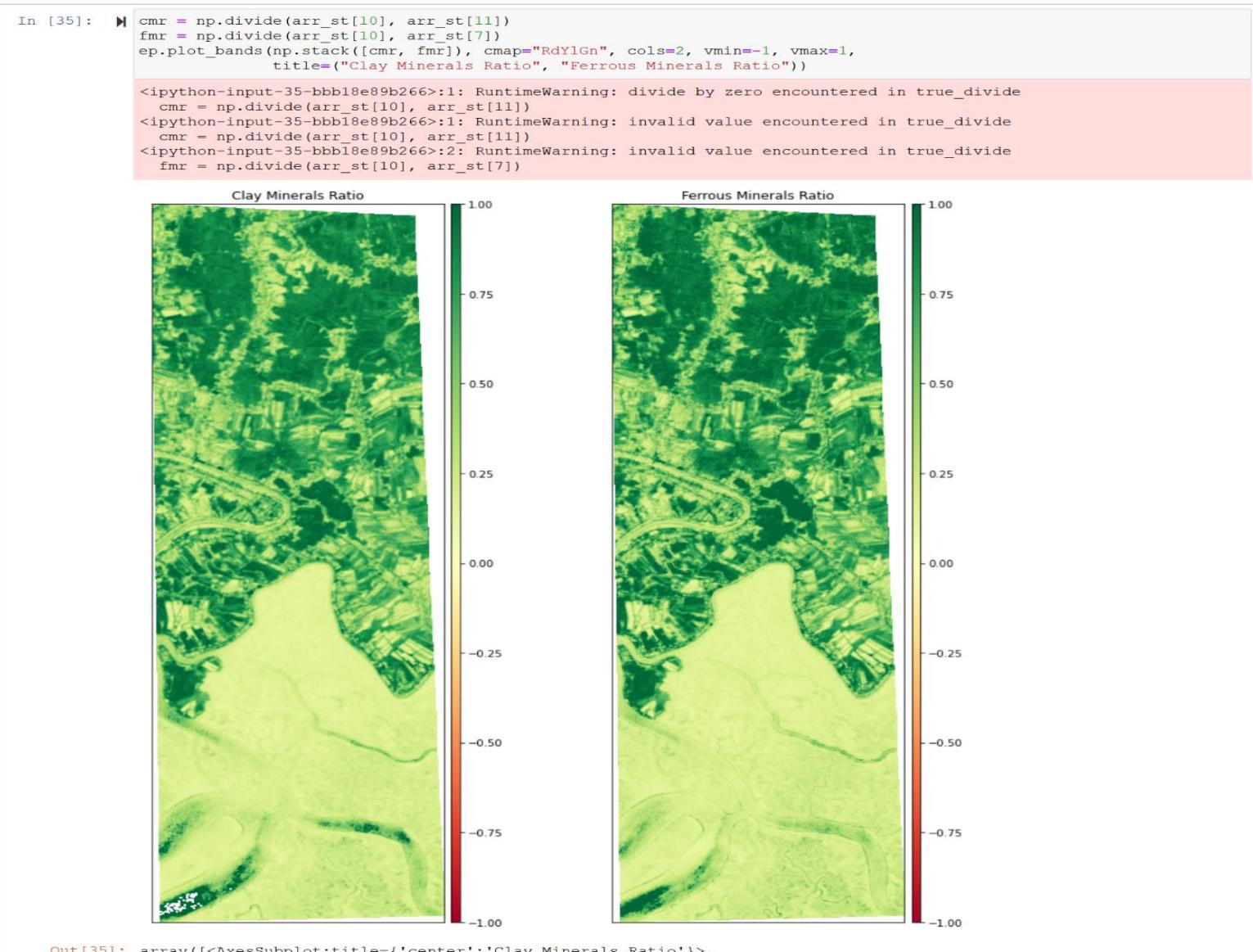
# Session Four: Alternative Data

*ESG Finance relies heavily on unstructured or “alternative” data, because traditional structured sources are still very inconsistent. We discuss alternative data types, their sourcing and handling*



# Hands-On: Quantitative Analysis of Satellite Images using Intensity-Based Indexes. Acquiring Satellite Data Directly

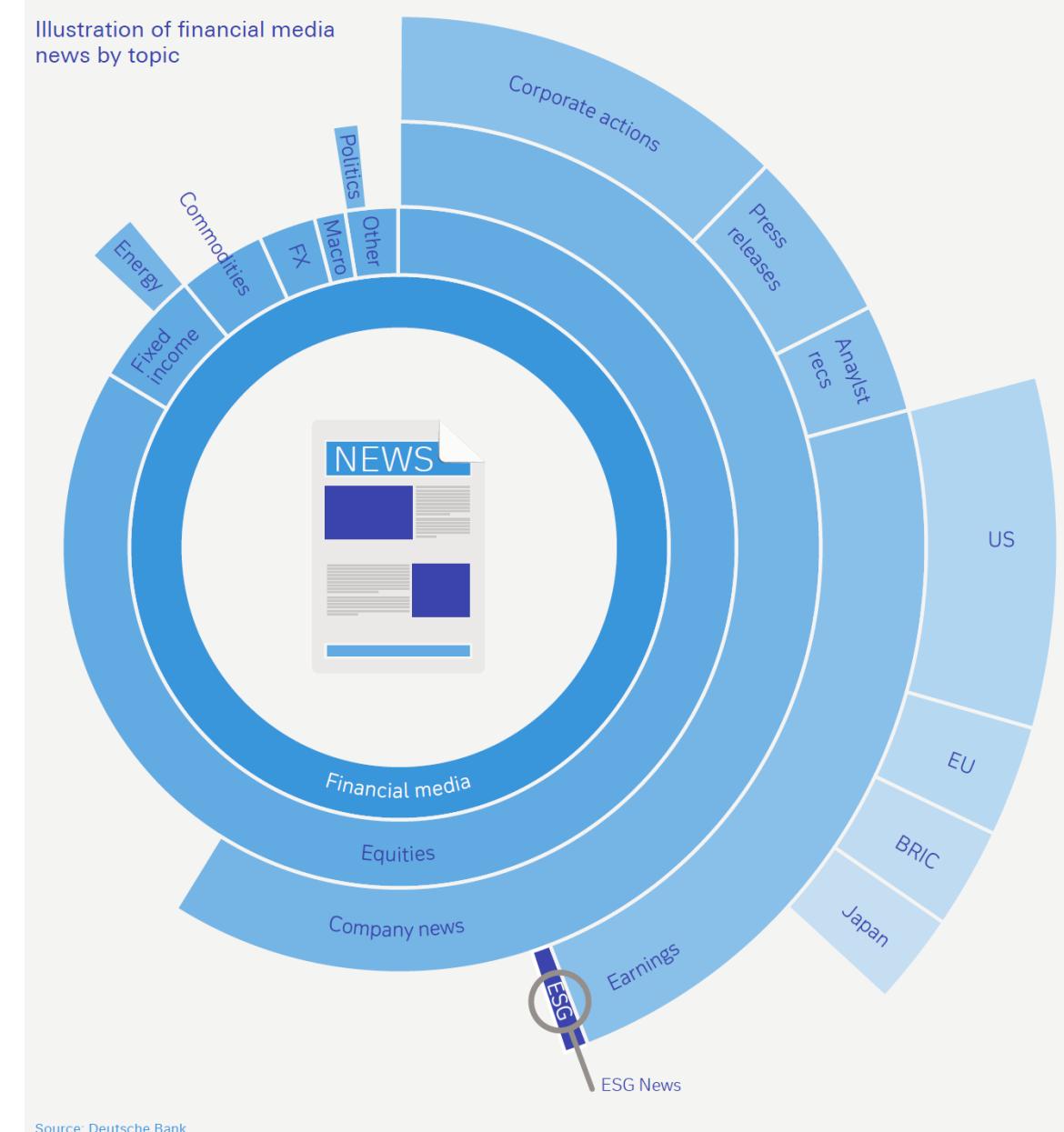
*We will work through a Jupyter notebook  
step-by-step, retrieving satellite imagery and  
applying simple quantification methods to it*



# Session Five: Alternative Text Data

*The amount of available text data is massive, which makes it very impractical or even impossible to process it manually.*

*Often, information relevant to ESG is dispersed among a wide corpus of texts: on average only 2% of the financial news are ESG-related*



# Hands-On: Preprocessing of Corporate ESG Reports. Inference of Report Topics. Identification of Outlier Topics

*This exercise introduces a variety of relevant NLP topics, such as Latent Dirichlet Allocation*

**Example: generate word clouds for each topic and plot them in a 3x3 grid**

```
In [73]: def produceWordCloud(model, tf_feature_names, index):
    imp_words_topic = ""
    vocab_comp = zip(tf_feature_names, model.components_[index])

    sorted_words = sorted(vocab_comp, key=lambda x: x[1], reverse=True)[:50]
    for word in sorted_words:
        imp_words_topic += " " + word[0]

    return wordcloud.WordCloud(background_color="white", width=600, height=600, contour_width=3,
                               contour_color="steelblue").generate(imp_words_topic)
```

```
In [74]: nTopics = len(lda.components_)
fig = plt.figure(figsize=(20, 20 * nTopics / 3))
for ii, topic in enumerate(lda.components_):
    ax = fig.add_subplot(nTopics, 3, ii + 1)
    ax.set_title(topicNames[ii], fontsize=20)
    ax.axis('off')
    ax.imshow(produceWordCloud(lda, featureNames, ii))
```

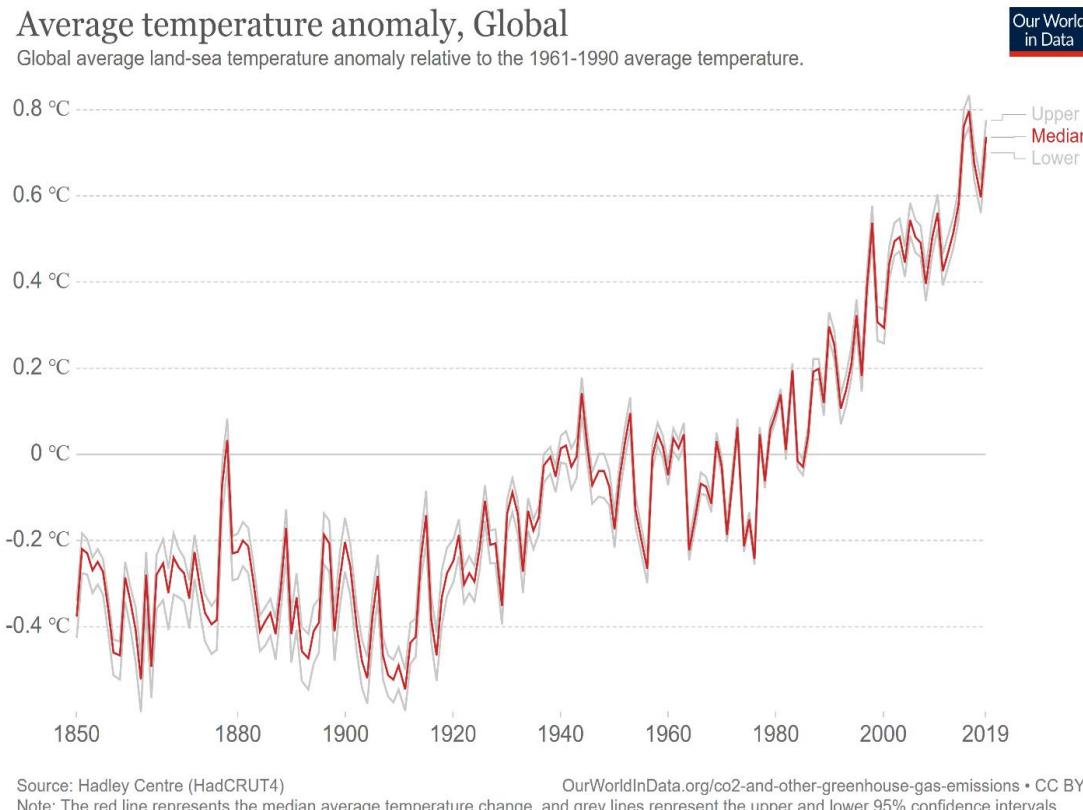
**The output of this snippet is beautiful greenish art:**



# Session Six: Climate Risk: Macro Perspective

*Environmental (particularly climate) concerns are prominent, especially for banks. European regulators are ramping up climate risk supervision. Only a matter of time until U.S. regulators do the same*

## Human-induced climate change is an empirical fact



## ECB and BoE have introduced climate stress tests this year

Financial regulators with significant involvement in climate risk regulation		
Authority	General Mandate	Climate Risk Supervision
European Central Bank (ECB)	Central bank for the Eurozone	Published final guide on climate risk and banking supervision Banks to perform self-assessment on ECB expectations in 2021 ECB to fully review banks' environmental/climate risk practices in 2022 Next supervisory stress test in 2022 to also focus on climate-related risks
European Banking Authority (EBA)	Financial regulator of the EU; responsibilities include regulatory stress tests of EU banks	Published a discussion paper on management of ESG risks
Bank of England (BoE)	Central bank of the UK, includes the regulatory function (Prudential Regulatory Authority)	BoE utilizes its stress testing framework to assess the impact of climate-related risks on the UK financial system; it publishes the Climate biennial exploratory scenario (Climate BEIS) starting in 2021
Hong Kong Monetary Authority (HKMA)	Central Bank of Hong Kong	Published principles of supervisory approach to climate risk management; conducts a dedicated climate stress test

# Session Seven: Climate Stress Testing

We discuss stress testing in general as well as its application to climate risk measurement

After discussing relevant scenarios designed by banking regulators, we ask students to work through a simple but realistic stress testing exercise

## Non-financial assumptions made by NGFS scenarios

Category	Scenario	Physical risk		Transition risk		
		Policy ambition	Policy reaction	Technology change	Carbon dioxide removal	Regional policy variation <sup>+</sup>
Orderly	Net Zero 2050	1.5°C	Immediate and smooth	Fast change	Medium use	Medium variation
	Below 2°C	1.7°C	Immediate and smooth	Moderate change	Medium use	Low variation
Disorderly	Divergent Net Zero	1.5°C	Immediate but divergent	Fast change	Low use	Medium variation
	Delayed transition	1.8°C	Delayed	Slow/Fast change	Low use	High variation
Hot House World	Nationally Determined Contributions (NDCs)	~2.5°C	NDCs	Slow change	Low use	Low variation
	Current Policies	3°C+	None – current policies	Slow change	Low use	Low variation

Source: NGFS

**1.3**

## *Defining ESG Finance*



**Socially Responsible Investing (SRI)** is any financial strategy with a dual objective: in addition to maximizing financial returns, the strategy seeks to “do no harm” or, sometimes, even to proactively bring about environmental, social, or corporate governance change. In the latter case, SRI is referred to as “impact investing”.

“Do no harm” requirement usually recognizes three relevant dimensions, collectively referred to as “ESG”. A non-exhaustive list of concerns related to one or more of the E, S or G dimensions follows...

**Note: this is a rapidly evolving field, and these definitions will continue evolving as well**

# Environmental Concerns

*The objective is to minimize the harm to the environment and to promote environmentally conscious and sustainable technologies. Many environmental concerns fall into three major overlapping categories*

## Sustainability

- SRI invests in, and therefore promotes, production that is sustainable, i.e. not depleting finite natural resources and not resulting in permanent damage to the environment, understood broadly. Example: reliance on fossil fuel energy is not sustainable, as this is a finite resource; reliance on renewable energy sources e.g. solar may be sustainable

## Climate Change

- Greenhouse gas emissions as a result of commercial production (not only by the energy industry, but including transportation, farming, and other industries) contributes to the greenhouse effect in the Earth's atmosphere, which in turn leads to – all things equal – a rise in the average global temperature of the atmosphere. This temperature rise is expected to result in further large-scale climate changes and the associated physical risk (floods, droughts, wildfires, famine, etc.). Climate Risk is a dedicated topic of a large portion of this text

## Animal Welfare

- This category includes welfare and humane treatment of farm animals, as well as limiting the use of animals in product testing (e.g. cosmetics). Under some definitions, this category belongs to the “social” dimension, while the environmental category focuses strictly on “systemic” concerns

# Social Concerns

*Loosely grouped into four overlapping categories*

## Consumer Protection

- SRI holds corporate entities accountable for their treatment of consumers, thereby focusing on long-term sustainability of demand. Example: predatory lending may be more profitable in the short-term but is harmful to the consumer body in the longer run and therefore not sustainable

## Talent Diversity

- SRI promotes diversity in hiring (human capital generally) based on the assumption that – in the long run – diverse perspectives are beneficial to the business

## Human Rights

- Relevant considerations include health and welfare of employees, as well as the possible negative impact on local communities. A closely related concept is that of responsible/sustainable sourcing of materials

## “Sin Stocks”

- Closely related concept, referring to businesses involved in activities that some consider immoral. Which businesses are included varies and is subject to interpretation, but typical examples include those involved in alcohol or tobacco production, firearms manufacturing, etc.

# Corporate Governance Concerns

*Focus on corporate management structure and management practice. Generally accepted principles of corporate governance link best practices in corporate governance to minimization of conflicts of interest between management and common shareholders and other stakeholders*

## Management Structure

- Independence of the Board of Directors from company management is a key feature of strong governance practices. Another related but important feature is the separation of the CEO and President role

## Executive Compensation

- Norms closely linked to the best practices of management structure and Board independence. This category may be viewed as a special case of the one above

## Employee Relations

- Includes considerations related to employees' work conditions and satisfaction. Examples include workplace safety concerns and worker unions and their relationship with the management

# Historical Factoids

## *Early examples of SRI adoption*

- “Use of Money” sermon by John Wesley (1703-1791)
- *Divestment from South Africa in opposition to their apartheid politics, a strategy followed in the 1970s*

## *Friedman vs Freeman debate*

- *Friedman Doctrine: until recently, a dominant paradigm driving investment and corporate financing decisions: Friedman’s 1970 essay for The New York Times titled “A Friedman Doctrine: The Social Responsibility of Business is to Increase Its Profits”*
- *A different line of thinking gaining acceptance recently (and closely linked to ESG finance) is the Stakeholder Theory of Edward Freeman: Corporate Social Responsibility (CSR), a form of private self-regulation that accounts for the utilities of societal goals beyond profit maximization*



*We define “ESG Finance” as an umbrella term incorporating SRI and its different forms (buy-side Finance), as well as ESG-conscious financing (sell-side Finance)*

*The taxonomy of market participants that comprise the ESG Finance ecosystem mirrors that of financial markets as a whole*

**In every category of general financial market participants, many are focused on ESG to a certain degree:**

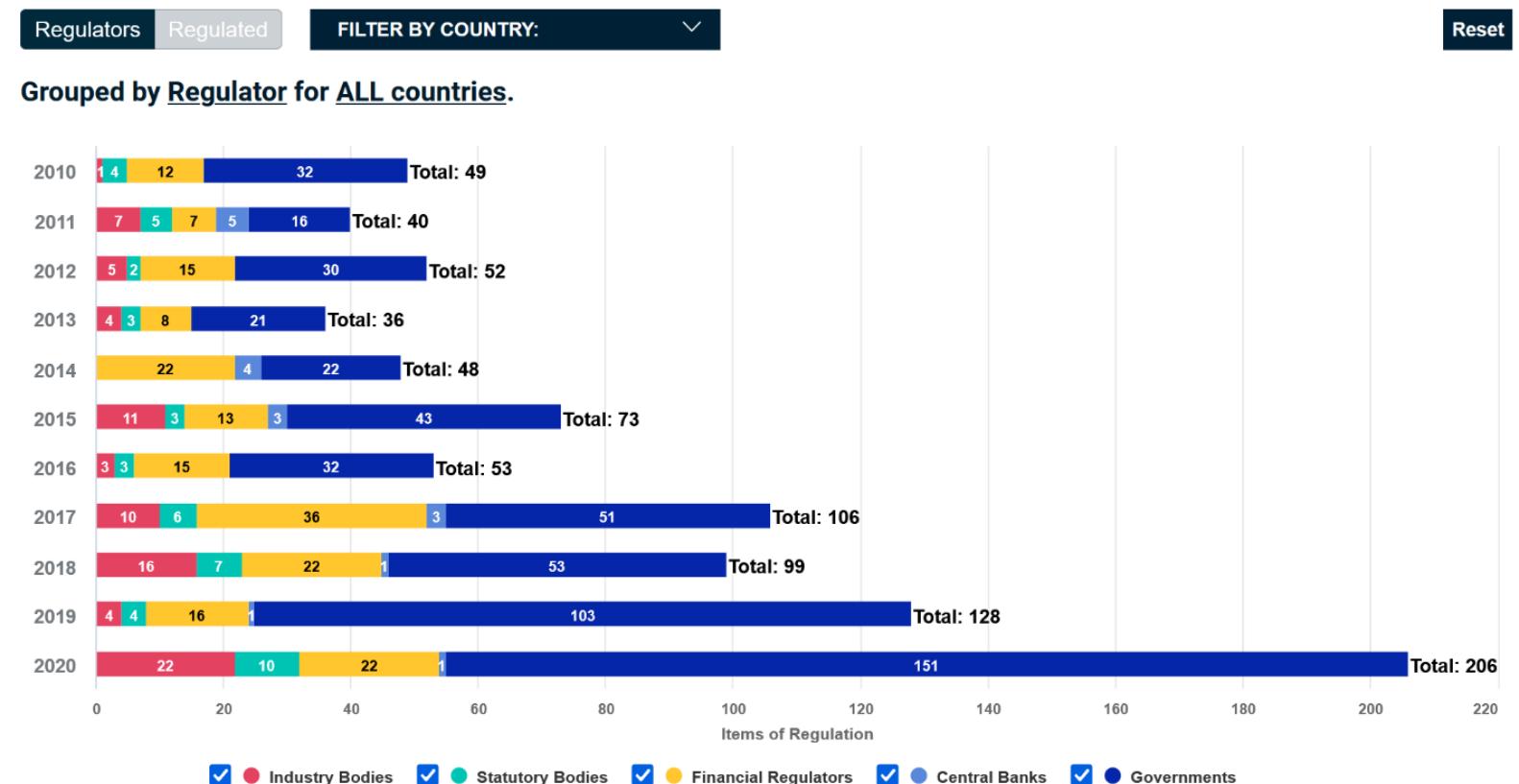
- Institutional investors: pension funds, sovereign wealth funds, insurance companies, endowments, mutual funds, family offices, etc.
- Retail investors
- Investees (issuers of securities)
- Investment and corporate banks
- Market utilities: ESG rating agencies and data providers, ESG index sponsors
- Government regulatory agencies and other regulatory bodies (non-government governance entities, industry associations, etc.)

# Regulation of ESG Finance

*Regulatory category is important! Numerous regulatory bodies focus on ESG concerns.*

*An impressive interactive graphic by MSCI highlights the rapid growth in the number of regulators involved in this space (you can view the list of regulators by clicking on the relevant category, link below)*

## MSCI: Who will regulate ESG?

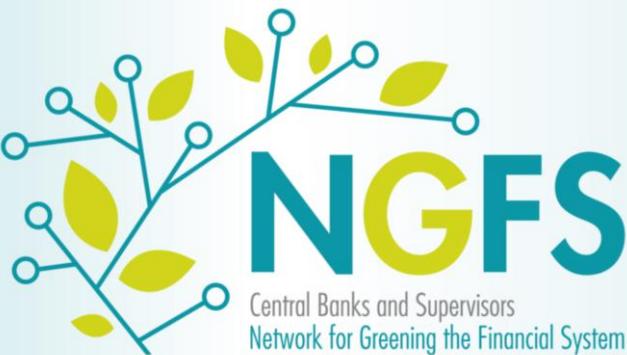


Source: Regulations database has been compiled using numerous sources, e.g. US Federal Register, Publications Office of EU, ILO etc. Please contact MSCI ESG Research for more details.

Source: <https://www.msci.com/who-will-regulate-esg>

# International Cooperation in ESG

*A number of international organizations/associations have been established to collectively address ESG-related matters*

<p><b>Network for Greening the Financial System (NGFS)</b> <a href="https://www.ngfs.net/en">https://www.ngfs.net/en</a></p> 	<p>Network of Central Banks and Supervisors for Greening the Financial System, launched at the first One Planet Summit in 2017, is a group of central banks and supervisors willing, on a voluntary basis, to share best practices and contribute to the development of environment and climate risk management in the financial sector and to mobilize mainstream finance to support the transition toward a sustainable economy. Publishes "NGFS climate scenarios"</p>
<p><b>Global Sustainable Investment Alliance (GSIA)</b> <a href="http://www.gsi-alliance.org/">http://www.gsi-alliance.org/</a></p> 	<p>An association of membership-based sustainable investment organizations globally. The GSIA's mission is to deepen the impact and visibility of sustainable investment organizations at the global level. Members include European sustainable investment forum (Eurosif), UKSIF, US SIF, JSIF, etc.</p>
<p><b>Principles for Responsible Investment (PRI)</b> <a href="https://www.unpri.org/">https://www.unpri.org/</a></p> 	<p>An international group of large institutional investors (signatories) have joined a process to develop Principles for Responsible Investment, facilitated by the UN. PRI encourages investors globally to adhere to responsible investment principles</p>

# Principles for Responsible Investment

*PRI organization has established six principles it encourages investors to follow. "Signatories" of the PRI commit that they:*

- Will incorporate ESG issues into investment analysis and decision-making processes
- Will be active owners and incorporate ESG issues into our ownership policies and practices
- Will seek appropriate disclosure on ESG issues by the entities in which we invest
- Will promote acceptance and implementation of the Principles within the investment industry
- Will work together to enhance our effectiveness in implementing the Principles
- Will each report on our activities and progress towards implementing the Principles

# ESG Strategy Approaches

*GSIA recognizes seven core approaches to sustainable investing. Commonly, a single investment strategy will combine one or more of these approaches*

*As mentioned, ESG investment space is experiencing rapid growth, which extends across most of the approaches listed above!*

<b>ESG integration</b>	The systematic and explicit inclusion by investment managers of environmental, social and governance factors into financial analysis.
<b>Corporate engagement &amp; shareholder action</b>	Employing shareholder power to influence corporate behaviour, including through direct corporate engagement (i.e., communicating with senior management and/or boards of companies), filing or co-filing shareholder proposals, and proxy voting that is guided by comprehensive ESG guidelines.
<b>Norms-based screening</b>	Screening of investments against minimum standards of business or issuer practice based on international norms such as those issued by the UN, ILO, OECD and NGOs (e.g. Transparency International).
<b>Negative/exclusionary screening</b>	The exclusion from a fund or portfolio of certain sectors, companies, countries or other issuers based on activities considered not investable.  Exclusion criteria (based on norms and values) can refer, for example, to product categories (e.g., weapons, tobacco), company practices (e.g., animal testing, violation of human rights, corruption) or controversies.
<b>Best-in-class/positive screening</b>	Investment in sectors, companies or projects selected for positive ESG performance relative to industry peers, and that achieve a rating above a defined threshold.
<b>Sustainability themed/thematic investing</b>	Investing in themes or assets specifically contributing to sustainable solutions - environmental and social - (e.g., sustainable agriculture, green buildings, lower carbon tilted portfolio, gender equity, diversity).
<b>Impact investing and community investing</b>	<b>Impact investing</b> Investing to achieve positive, social and environmental impacts - requires measuring and reporting against these impacts, demonstrating the intentionality of investor and underlying asset/investee, and demonstrating the investor contribution.  <b>Community investing</b> Where capital is specifically directed to traditionally underserved individuals or communities, as well as financing that is provided to businesses with a clear social or environmental purpose. Some community investing is impact investing, but community investing is broader and considers other forms of investing and targeted lending activities.

Source: <http://www.gsi-alliance.org/wp-content/uploads/2021/07/GSIR-2020.pdf>

# Greenwashing

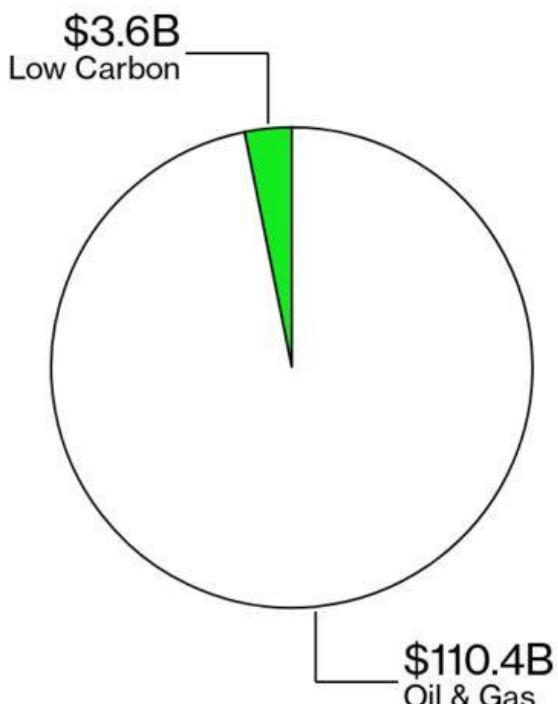
*Greenwashing is a form of marketing spin in which “green PR” and green marketing are deceptively used to persuade the public that an organization's products, aims and policies are environmentally friendly*

*As ESG Finance is a rapidly developing area of finance, it is less standardized at this stage than more conventional areas of finance; as such, Greenwashing is an acute problem in ESG Finance!*

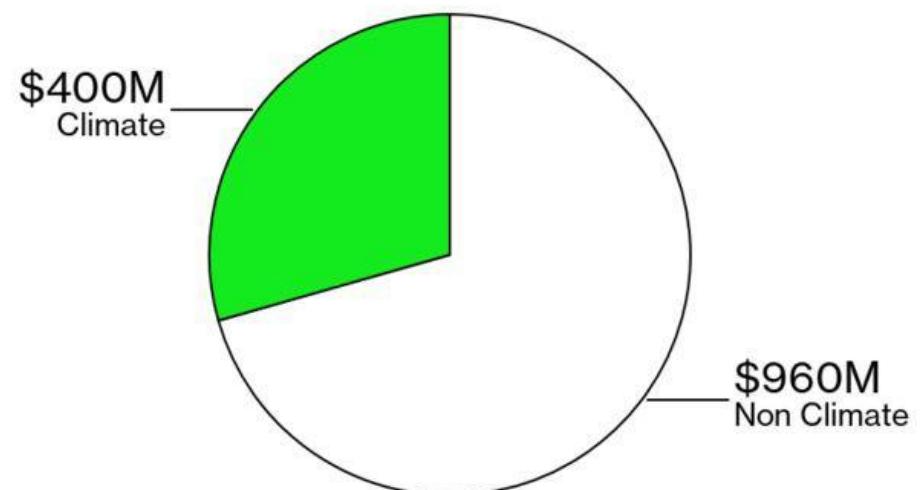
## The Price of Greenwashing

Energy companies brand climate positive but have not yet spent on it

Forecast Capital Expenditures, 2019



Lobbying/Branding Spend in 2018



Source: InfluenceMap

Note: Includes spending data on Chevron, Shell, ExxonMobil, BP and Total

Bloomberg Green

Source: <https://www.bloomberg.com/news/articles/2020-02-19/greenwashing-is-going-to-get-more-expensive-green-insight>

**1.4**

## *ESG Investment Performance*

# ESG Investment Performance

*Performance of ESG strategies overall is uncertain, and we will not attempt here to determine whether ESG strategies outperform*

*A simple logical argument: ESG strategies impose a constraint on the universe of securities available for investment making it narrower --> an ESG strategy can be at most as good as an “unconstrained” strategy*

*On the other hand, growing societal/regulatory interest in ESG leads to a continuing increase in demand for ESG investments, leading to outperformance*

## Recent academic studies:

- Stronger shareholder rights lead to stronger corporate and market performance (Gompers et al. 2003)
- High corporate social responsibility leads to lower cost of capital (Ghoul et al. 2011). (Note that corporate performance and financing costs do not have to be fully aligned with equity market performance.)
- Corporate financial performance is not a monotonic function of corporate social performance; rather, an optimal point exists (Barnett et al. 2012)
- No evidence of ESG focus leading to stronger financial performance (Schroder, 2007)

# Sorted Portfolios Approach

*We apply the sorted portfolios approach used by Fama and French to demonstrate the relative effect of ESG risk factors on investment performance in different regions*

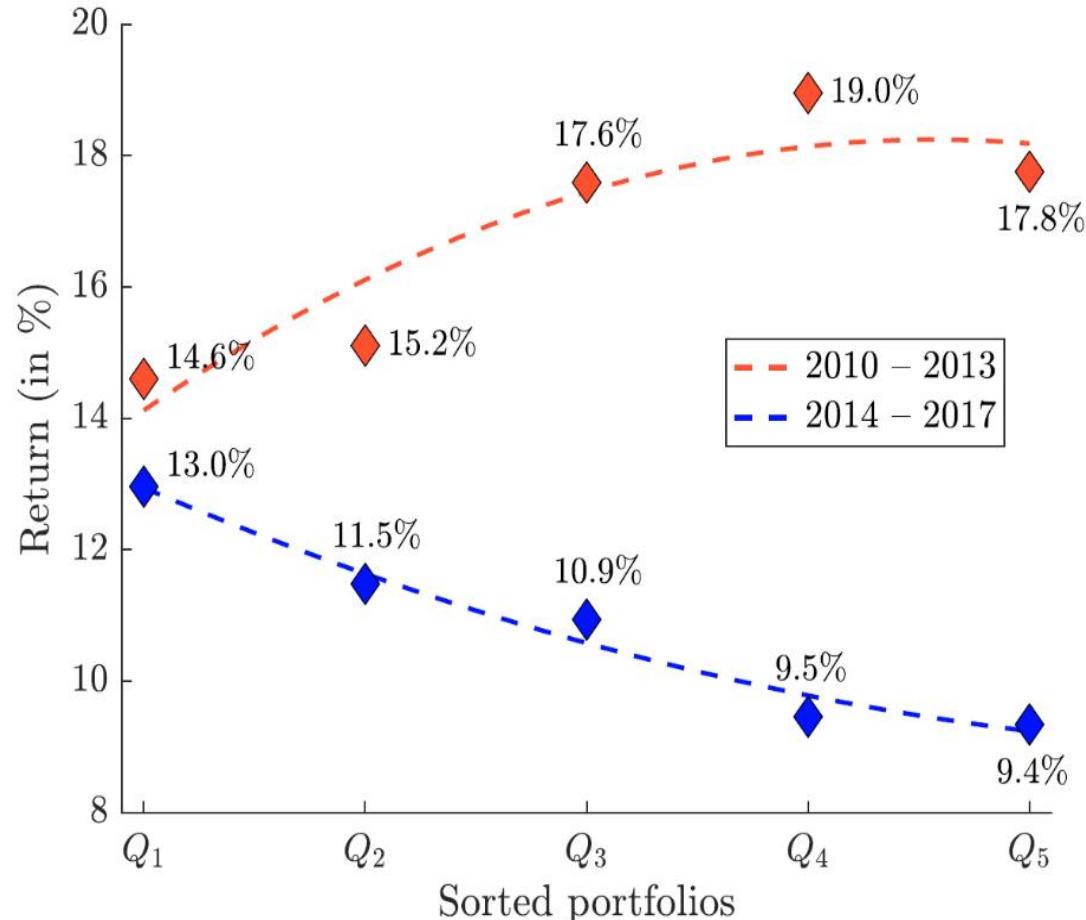
*We will formally introduce the approach in the next session*

**The sorted portfolios approach follows the steps:**

- At each rebalancing date, rank all securities in the portfolio according to their “ESG score” as of that date
- Form several portfolios by bucketing the securities into consecutive ranges of ESG scores; for instance, sort all securities into five quintile portfolios: securities from the best ESG score up to but not including the 20% percentile of scores form the first quintile portfolio; securities between 20<sup>th</sup> and 40<sup>th</sup> percentiles form the second portfolio, and so on.  
**Fifth portfolio contains securities with the worst scores** (between 80<sup>th</sup> percentile and the worst)
- Portfolios are invested between consecutive rebalancing dates. In this example, we choose to rebalance portfolios quarterly

# North America ESG Performance

*Performance of ESG strategies had a regime switch around 2014: in the period since, better ESG scores signal better stock performance, the opposite of the dependency observed earlier!*



**Figure 17:** Annualized return of **ESG** sorted portfolios (North America)

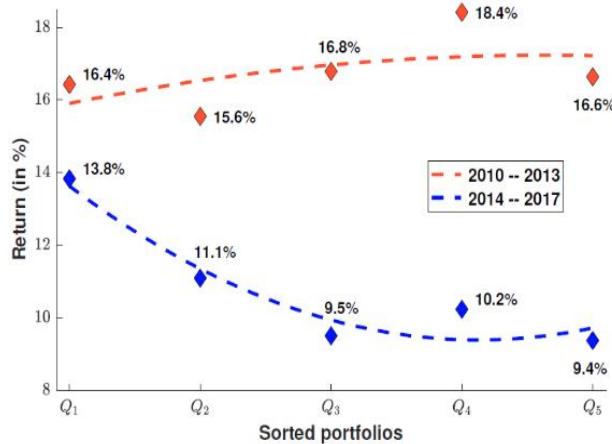
Source: Amundi Quantitative Research (2018)

Source: Thierry Roncalli

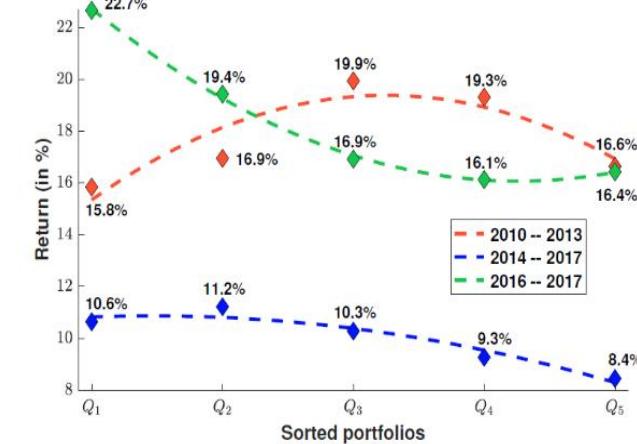
# North Am. Performance by Letter Category

*Regime switch is visible across all three categories: E, S, or G, with Social risk factor strongly outperforming recently*

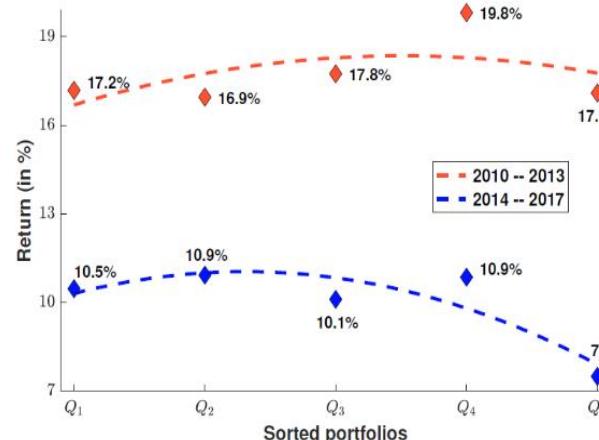
## Environmental



## Social



## Governance



Source: Amundi Quantitative Research (2018)

Source: Thierry Roncalli

# Performance across Regions

*It is not possible to tell definitively what the exact reason for the regime switch is. Some of it may have to do with the actual change in investor perceptions and the way investors evaluate the future impact of ESG considerations on the firms' financials*

*More likely, outperformance of the ESG risk factor is driven by more technical factors: ESG became a popular consideration, which directly increased demand for securities with good ESG scores*

		Before 2014				
Factor		North America	Eurozone	Europe ex-EMU	Japan	World DM
ESG	—	—	—	0	+	0
E	—	—	0	+	—	0
S	—	—	—	0	—	—
G	—	—	0	+	0	+

		Since 2014				
Factor		North America	Eurozone	Europe ex-EMU	Japan	World DM
ESG	++	++	—	0	—	+
E	++	++	—	—	+	++
S	+	+	—	0	0	+
G	+	++	—	0	+	++

Source: Amundi Quantitative Research (2018)

Source: Thierry Roncalli

# ESG Fixed Income Performance

- **Equity vs. debt investments:**
  - *Equity prices are generally more sensitive to ESG scores than debt prices. ESG is expected to have a strong impact on long-term business strategy and prospects and therefore impacts equity directly, as the equity prices reflect expectations of long-term financial performance*
  - *Debt pricing reflects creditworthiness over shorter (typically) horizons and therefore less sensitive to ESG.*
- *ESG strategies in fixed income space tend to focus on exclusion based on binary criteria*
- *There is also a dedicated area of fixed-income ESG securities (“green bonds” and “social bonds”, etc.).*
- **ESG scores and credit ratings appear to be positively correlated:** higher-rated obligors (investment grade) tend to have better ESG scores than high-yield issuers. This may be driven by industry representation

[ Exercise: Retrieving ESG data freely available online ]

1.5

## *Sustainability (from Macro to Micro) and Sustainable Finance*

# Sustainable Development Goals

*SDGs are a collection of 17 interlinked global goals designed as a "blueprint to achieve a better and more sustainable future for all", set up in 2015 by the UN General Assembly, intended to be achieved by member countries by 2030*



Source: <https://sdgs.un.org/>

# SDGs: Goals 1 to 9 out of 17

- *No poverty*: end poverty, in all its forms, everywhere
- *Zero hunger*: end hunger, achieve food security and improved nutrition, and improve agriculture
- *Good health and wellbeing*: ensure healthy lives and promote well-being for all, at all ages
- *Quality education*: ensure inclusive and equitable, quality education, and promote lifelong learning opportunities for all
- *Gender equality*: achieve gender equality and empower all women and girls
- *Clean water and sanitation*: ensure the sustainable management and availability of water and sanitation for all
- *Affordable energy*: ensure access to affordable, reliable, sustainable and modern energy for all
- *Decent work and economic growth*: promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all
- *Industry innovation and infrastructure*: build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation

# SDGs: Goals 10 to 17 out of 17

- *Reduced inequalities:* reduce inequality within and among countries
- *Sustainable cities and communities:* make cities and human settlements inclusive, safe, resilient and sustainable
- *Responsible consumption and production:* ensure sustainable consumption and production patterns
- *Climate action:* take urgent action to combat climate change and its impacts
- *Life below water:* conserve and sustainably use the oceans, seas and marine resources for sustainable development
- *Life on land:* protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss
- *Peace, justice and strong institutions:* promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable institutions at all levels
- *Partnerships for the goals:* strengthen the means of implementation and revitalize the global partnership for sustainable development

# SDGs can be categorized into Environmental, Social, and Governance

*SDGs were made more "actionable" by a UN Resolution adopted by the General Assembly in 2017*

*The resolution identifies specific targets for each goal, along with indicators that are being used to measure progress toward each target*

*The year by which the target is meant to be achieved is usually between 2020 and 2030*



Source: Thierry Roncalli

# Sustainable Development Report

*Sustainable Development Report (<https://sdgindex.org/>) is a worldwide monitor assessing where each country stands with regard to achieving the Sustainable Development Goals*

*It grades every country against 17 sustainable goal dimensions, both level of achievement as well as recent change/trend*

Sample SDG country profile:

## Russian Federation

Eastern Europe and Central Asia



# Certifying Responsible Investments

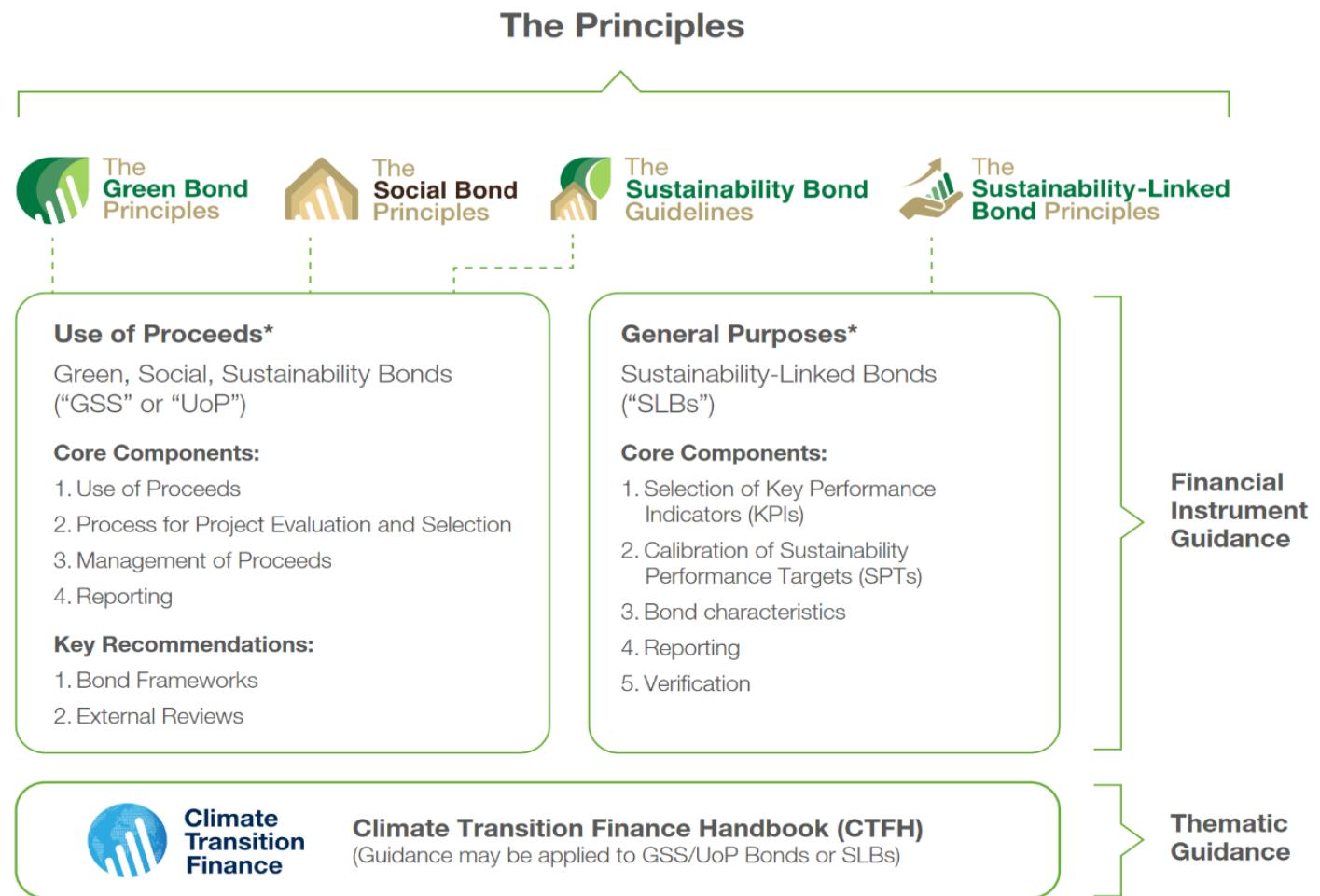
- *There exists a vast and rapidly expanding ecosystem of socially responsible investment funds, including mutual funds, ETFs and other more specialized investment vehicles. These funds employ a range of ESG approaches and may be thematic (focusing exclusively on investments in climate solutions, water resources, renewable energy, etc.) or broad-based*
- *Greenwashing and false sustainability claims continue to be a major concern for the industry. In order to combat greenwashing and similar unethical practices and independently confirm their SRI credentials, funds rely on independently administered sustainable finance labels*
- *One of many examples of such a label is Luxembourg Finance Labeling Agency (LuxFLAG), an independent international non-profit association created in Luxembourg in 2006 to support sustainable finance*



# “Principles” Framework by ICMA

*In addition to investment funds with ESG focus, there is a variety of securities linked explicitly to sustainability, especially in the fixed income space (“green bonds”, “social bonds”, etc.)*

*Standardization of this market is voluntary but strongly encouraged by regulators and investors alike. In the United States, “Principles” framework is the de facto standard*



Source: <https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/>

# Green Bonds

*Defined as any type of bond instrument where the proceeds or an equivalent amount will be exclusively applied to finance or refinance, in part or in full, new and/or existing eligible Green Projects and which are aligned with the four core components of the Green Bond Principles*

**Types of Green Bonds are currently defined  
(additional types may emerge as the market develops further):**

- *Standard Green Use of Proceeds Bond:* a standard recourse-to-the-issuer debt obligation aligned with the GBP
- *Green Revenue Bond:* a non-recourse-to-the-issuer debt obligation aligned with the GBP in which the credit exposure in the bond is to the pledged cash flows of the revenue streams, fees, taxes etc., and whose use of proceeds go to related or unrelated Green Project(s)
- *Green Project Bond:* a project bond for a single or multiple Green Project(s) for which the investor has direct exposure to the risk of the project(s) with or without potential recourse to the issuer, and that is aligned with the GBP
- *Green Securitized Bond:* a bond collateralized by one or more specific Green Project(s), including but not limited to covered bonds, ABS, MBS, and other structures; and aligned with the GBP. The first source of repayment is generally the cash flows of the assets

# Green Bonds: Use of Proceeds

*Proceeds must be utilized for eligible Green Projects, projects which contribute to environmental objectives such as: climate change mitigation, climate change adaptation, natural resource conservation, biodiversity conservation, and pollution prevention and control. Most common types of projects supported by Green Bonds include (not an exhaustive list):*

- Renewable energy (including production, transmission, appliances, and products)
- Energy efficiency (such as in new and refurbished buildings, energy storage, district heating, smart grids, etc.)
- Pollution prevention and control (including reduction of air emissions, greenhouse gas control, soil remediation, waste prevention, waste reduction, waste recycling, etc.)
- Environmentally sustainable management of living natural resources and land use (including environmentally sustainable agriculture, environmentally sustainable animal husbandry, etc.)
- Terrestrial and aquatic biodiversity conservation (including the protection of coastal, marine and watershed environments)
- Clean transportation (such as electric, hybrid, public, rail, non-motorized, multi-modal transportation, infrastructure for clean energy vehicles and reduction of harmful emissions)
- Sustainable water and wastewater management (including sustainable infrastructure for drinking water, etc.)
- Climate change adaptation (including efforts to make infrastructure resilient to climate change, climate observation and early warning systems)
- Circular economy adapted products, production technologies and processes (such as the design and introduction of reusable, recyclable and refurbished materials, etc.)
- Green buildings that meet regional, national, or internationally recognized standards or certifications for environmental performance

# Green Bond Principles (Continued)

***Project Evaluation and Selection:*** The issuer of a Green Bond should clearly communicate to investors:

*The environmental sustainability objectives of the eligible Green Projects*

*The process by which the issuer determines how the projects fit within the eligible Green Projects categories*

*Processes by which the issuer identifies and manages perceived social and environmental risks associated with the project*

***Management of Proceeds:*** The net proceeds of the Green Bond should not be comingled with proceeds from other types of financing. It is recommended that an issuer's management of proceeds be reviewed by an external auditor or another independent third party to verify the internal tracking method and the allocation of funds from the Green Bond proceeds

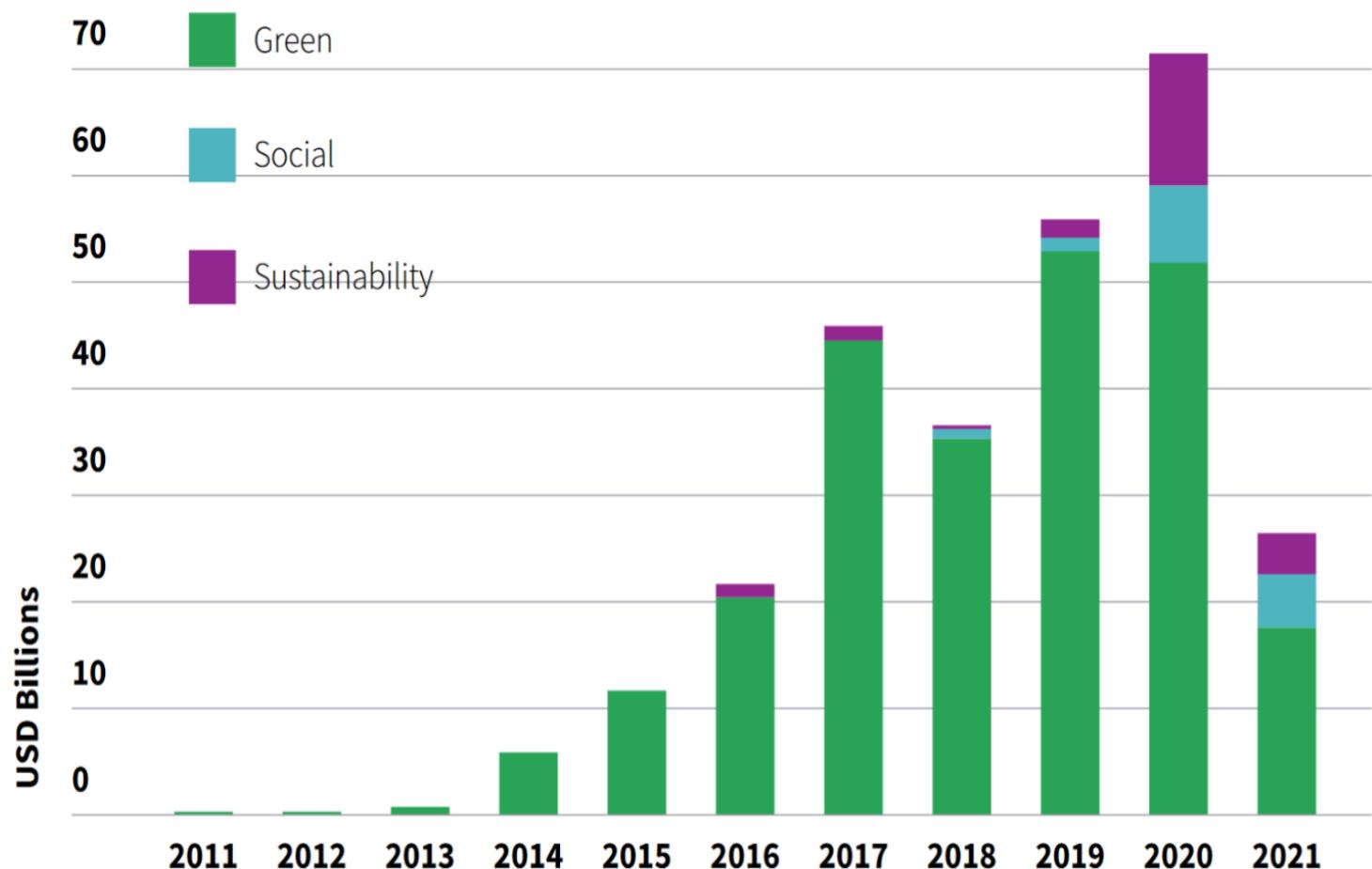
***Reporting:*** The annual report should include a list of projects to which Green Bond proceeds have been allocated, their brief description, and the amounts allocated. It is also important to communicate the expected and/or achieved impact of projects

# Green Bonds dominate issuance with Social Bonds growing rapidly

*Climate Bonds Initiative publishes state of the market reports.*

*Green Bonds still dominate the Green, Social, and Sustainable issuance, although Social and “Sustainable” (which finances projects that combine features of both categories) have been growing rapidly in the last 3 years*

US GSS volumes to Q1 2021



Source: Climate Bonds Initiative

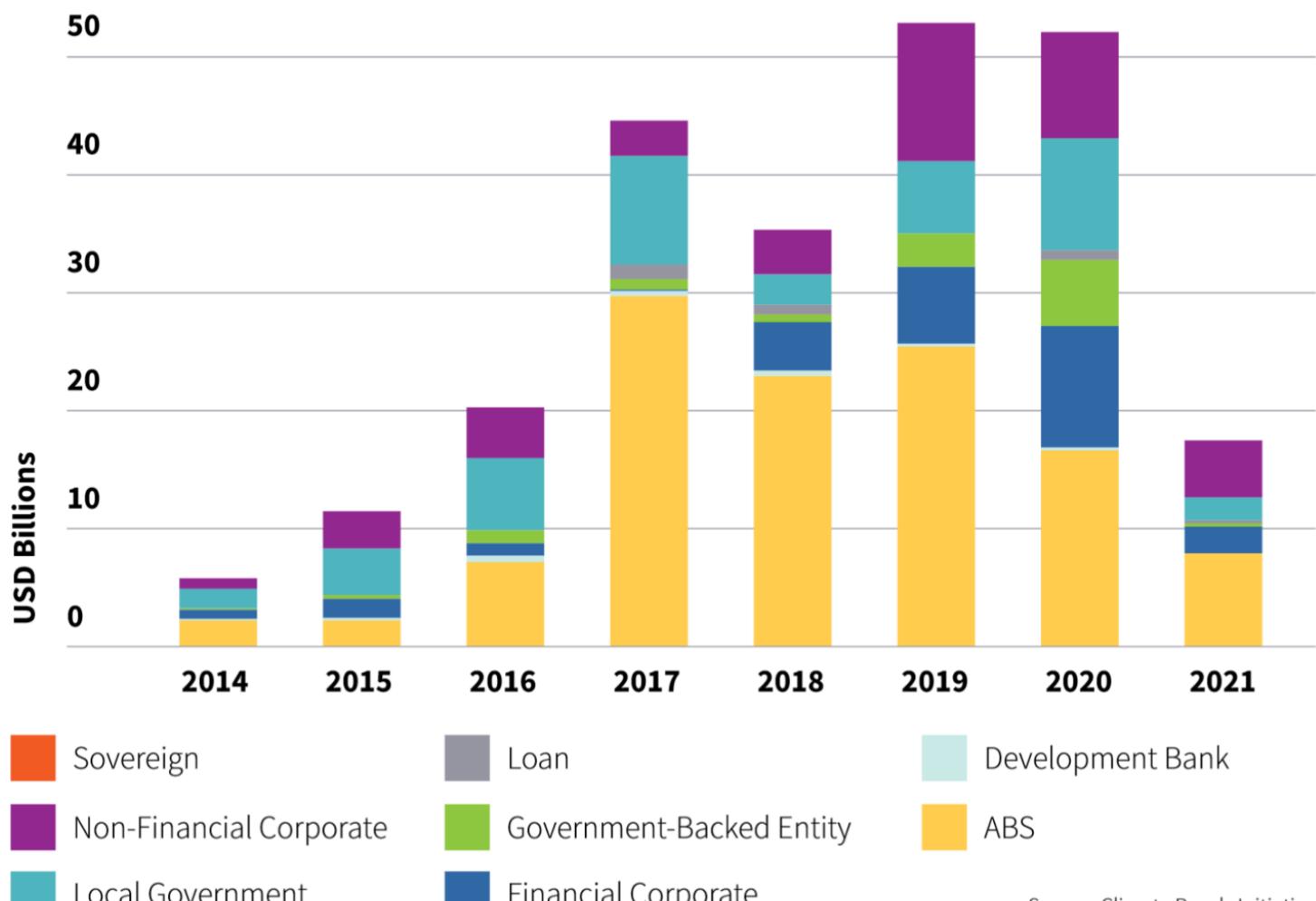
Source: <https://www.climatebonds.net/>

# Agency MBS is the most common type of Green Bonds

*The US Green Bond market is dominated by agency MBS (under the ABS issuer type) and US munis (falling under either local government or government-backed entities issuer types)*

*Agency MBS are mainly issued by Fannie Mae with the proceeds used for financing green mortgage loans*

US market dominated by ABS



Source: <https://www.climatebonds.net/>

# Green Bond Premium

*Green Bond Premium, defined as the difference between the OAS of a Green Bond and the OAS of a non-Green benchmark has been consistently negative, based on the findings of Ben Slimane et al. (2021). In other words, Green bonds are on average priced slightly higher*

Table 1: Overview of GB pricing in the literature

Study	Market	#GBs	Universe	Period	Method	Premium estimate
Bachelet et al. (2019)	Secondary	89	Global	2013 - 2017	OLS model	2.1 to 5.9 bps
Baker et al. (2018)	Secondary	2 083 19	US Municipals US Corporates	2010 - 2016 2014 - 2016	OLS model	-7.6 to -5.5 bps
Bour (2019)	Secondary	95	Global	2014 - 2018	Fixed effects model	-23.2 bps
Ehlers and Packer (2017)	Primary	21	EUR & USD	2014 - 2017	Yield comparaison	-18 bps
Fatica et al. (2019)	Primary	1 397	Global	2007 - 2018	OLS model	
Gianfrate and Peri (2019)	Primary Secondary	121 70 – 118	EUR	2013 - 2017 3 dates in 2017	Propensity score matching	-18 bps -11 to -5 bps
Hachenberg and Schiereck (2018)	Secondary	63	Global	August 2016	Panel data regression	Not significant
Hyun et al. (2020)	Secondary	60	Global	2010 - 2017	Fixed effects GLS model	Not significant
Kapraun and Scheins (2019)	Primary Secondary	1 513 769	Global	2009 - 2018	Fixed effects model	-18 bps +10 bps
Karpf and Mandel (2018)	Secondary	1 880	US Municipals	2010 - 2016	Oaxaca-Blinder decomposition	+7.8 bps
Larcker and Watts (2019)	Secondary	640	US Municipals	2013 - 2018	Matching & Yield comparaison	Not significant
Lau et al. (2020)	Secondary	267	Global	2013 - 2017	Two-way Fixed effects model	-1.2 bps
Nanayakkara and Colombage (2019)	Secondary	43	Global	2016 - 2017	Panel data with hybrid model	-62.7 bps
Ostlund (2015)	Secondary	28	Global	2011 - 2015	Yield comparaison	Not significant
Partridge and Medda (2018)	Primary Secondary	521	US Municipals	2013 - 2018	Yield curve analysis	-4 bps Small but below 0
Preclaw and Bakshi (2015)	Secondary	Index	Global	2014 - 2015	OLS model	-16.7 bps
Schmitt (2017)	Secondary	160	Global	2015 - 2017	Fixed effects model	-3.2 bps
Zerbib (2019)	Secondary	110	Global	2013 - 2017	Fixed effects model	-1.8 bps

Source: Ben Slimane et al. (2021)

# Social Bonds

*Social Bonds are defined (also by ICMA) as any type of bond instrument where the proceeds will be exclusively applied to finance or refinance in part or in full new and/or existing eligible Social Projects and which are aligned with the four core components of the Social Bonds Principles (a similar concept to the one discussed above for Green Bonds)*

## A list of typical Social Projects

- Affordable basic infrastructure (e.g. clean drinking water, sewers, sanitation, transport, energy)
- Access to essential services (e.g. health, education and vocational training, healthcare, financing and financial services)
- Affordable housing
- Employment generation, and programs designed to prevent and/or alleviate unemployment stemming from socioeconomic crises, including through the potential effect of SME financing and microfinance
- Food security and sustainable food systems (e.g. physical, social, and economic access to safe, nutritious, and sufficient food that meets dietary needs and requirements; resilient agricultural practices; reduction of food loss and waste; and improved productivity of small-scale producers)
- Socioeconomic advancement and empowerment (e.g. equitable access to and control over assets, services, resources, and opportunities; equitable participation and integration into the market and society, including reduction of income inequality)

# Social Bonds: Target Social Projects

*Examples of target populations for Social Projects include:*

- Living below the poverty line
- Excluded and/or marginalized populations and/or communities
- People with disabilities
- Migrants and/or displaced persons
- Undereducated
- Underserved, owing to a lack of quality access to essential goods and services
- Unemployed
- Women and/or sexual and gender minorities
- Aging populations and vulnerable youth
- Other vulnerable groups, including as a result of natural disasters

# Session I Homework

HW

*Which name in the S&P 500 currently has the best Environmental score? Worst Environmental score?*

*Please turn in either a Jupyter notebook or a script in a text file*