

THE CREDIT RISK OF CLIMATE CHANGE

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SUPERVISION RISKS AND PROFITABILITY

Associazione Bancaria Italiana

Rome – September 21st, 2020



Climate Change Risks and Transmission Mechanism



Source: S&P Global Market intelligence. For illustrative purposes only.

Climate Risks & Opportunities in Banks' Lending Activities

Risks:

Collateral Depreciation: The site of a commercial borrower used as collateral can depreciate due to natural disasters (floods, etc.), thus increasing the expected loss for the bank.

Lack of Liquidity: A firm's earnings could be influenced by increased costs of chosen investments into new/green technologies. These investments, in turn, could decrease its liquidity and, therefore, the ability to repay a loan. Moreover, the need for additional capital to invest in green technologies could result in a decrease of the capital/debt ratio, which in turn would lead to an increase in credit risk.

Debt Service Capacity: The potential introduction/increase of a carbon tax will penalize companies with high greenhouse gas emissions, thus affecting their debt service capacity.

Earnings loss: There can also be indirect influences that affect a borrower's earnings, such as operations disruption by environmental activists or consumer boycotts against "brown" companies.

Opportunities:

Profitability Enhancements: Resource efficiency and cost savings due to innovative technologies can help maximize a borrower's profits and liquidity.

Higher Competitiveness: Competitive Companies with lower costs may reduce prices and compete more effectively to gain market share and increase earnings. These have a positive impact on firms' creditworthiness.

Empirical Evidence from S&P Global Ratings

Impact of Environmental and Climate (E&C) risks and opportunities on corporate credit ratings:¹

- **9,000 research updates** (mid-2015 to mid-2017)
- **717 ratings** where E&C risks were an important factor, and **106** where those risks were key to a rating action
- This equates to **~10%**: significant percentage given the number of different risks that can have an impact on credit quality
- In a number of instances where E&C factors featured in the analysis, these factors were considered as **longer-term risks**, even if they were not a key driver of the particular rating action on that day
- *Affected industries: **Oil, Gas, and Power***

¹How Does S&P Global Ratings Incorporate Environmental, Social, and Governance Risks Into Its Ratings Analysis, November 21st, 2017.

Regulatory Consensus Emerging on Climate Risk

REGION	REGULATOR	CLIMATE RISK ASSESSMENT MEASURES	TIMELINES ¹
United Kingdom	BoE/PRA	<ul style="list-style-type: none"> Launched a discussion paper on biennial stress scenario for climate risk stress testing for banks and insurers (Dec 2019) Consultations were open till Mar 2020 	<ul style="list-style-type: none"> 2H 2020: Publication of Stress Scenarios 1H 2021: Commencement of Exercise
European Union	ECB/EBA	<ul style="list-style-type: none"> Prior to the EBA 2020 stress test cancellation, said that climate risks won't be part of the tests Issued guidance document for discussion on wide ranging practices (May 2020) 	<ul style="list-style-type: none"> End-2020: Guidelines in effect
France	ACPR	<ul style="list-style-type: none"> Issued stress testing discussion paper with scenarios included (May 2020) 	<ul style="list-style-type: none"> End-2020: Bank stress test submissions Apr 2021: Publication of results
Singapore	MAS	<ul style="list-style-type: none"> The 2018 insurance stress tests incorporated extreme flooding scenarios Released discussion paper on climate risk, including stress testing (Jun 2020) 	<ul style="list-style-type: none"> Aug-2020: Closure of consultation Aug/Sep 2021: Compliance timeline
Netherlands	DNB	<ul style="list-style-type: none"> 2017 stress tests included scenarios of physical climate risks on non-life insurers 	<ul style="list-style-type: none"> N/A
Denmark	Danmarks Nationalbank	<ul style="list-style-type: none"> Announced it may present an analysis of transition risks in the coming stress test of credit institutions (Dec 2019) 	<ul style="list-style-type: none"> Mid-2020: Publication of analysis of transition risks
Australia	APRA	<ul style="list-style-type: none"> Announced it would conduct climate risk vulnerability assessment for large ADIs (Feb 2020) 	<ul style="list-style-type: none"> 2H 2020: Scenario design 2021: Execution
Canada	Bank of Canada	<ul style="list-style-type: none"> Developing models to understand economic consequences of climate change (Nov 2019) 	<ul style="list-style-type: none"> N/A

Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only.

¹Subject to revision,

Climate Change Transition Scenario Analysis: **Challenges**

- Scenario analysis is routinely employed at banks' risk management departments, but the analysis of climate risk (and transition risk in particular) poses **new challenges**:
- **What data** on company emissions? Geographical **distribution**?
- **What scenarios** in each **country/industry sector**? **How many scenarios**? **How far** away in time?
- **What methodology** to connect transition risks to credit risk, for **tens of thousands** of public and private **firms** in a typical loan book? How to capture **risks & opportunities**?

We have developed two modelling frameworks to estimate the impact of climate transition risks and opportunities on credit risk of public & private firms

Market Intelligence's **Energy-Transition** Credit Risk **Overlays**

FUNDAMENTALS-DRIVEN	MARKET-VALUATION DRIVEN
<p><i>Company financials conditioned on climate-linked transition scenarios.</i></p> <p>Scope: up-stream oil & gas large firms (1,200+¹); will be expanded to other 6 carbon-intensive sectors (and a sector-generic model)</p> <p>Main Output: firm's projected full financial statements and credit score change</p> <p>Engine: <i>CreditModel™</i></p> <p>PROS:</p> <ul style="list-style-type: none"> • Can be used to power other fundamentals-based credit risk models • Sector-specific granular data • In-depth scenario analysis of large exposures to borrowers, loan origination and benchmarking. <p style="border: 1px dashed red; padding: 5px; text-align: center;"><i>Developed in consultation with Oliver Wyman*</i></p>	<p><i>Company earnings and costs conditioned on climate-linked transition scenarios.</i></p> <p>Scope: all sectors, public (45,000+²) and private firms; will be expanded to include physical risks</p> <p>Main Output: firm's projected costs, revenues, earnings, (implied) market cap, credit score change</p> <p>Engine: PD Model Market Signals</p> <p>PROS:</p> <ul style="list-style-type: none"> • Credit score change as overlay to credit scores produced by other credit risk models • Risks/opportunities and multiple response types • Scaling scenario analysis to thousands of exposures in all sectors, loan origination and benchmarking. <p style="border: 1px dashed red; padding: 5px; text-align: center;"><i>Complementary to Fundamentals approach</i></p>

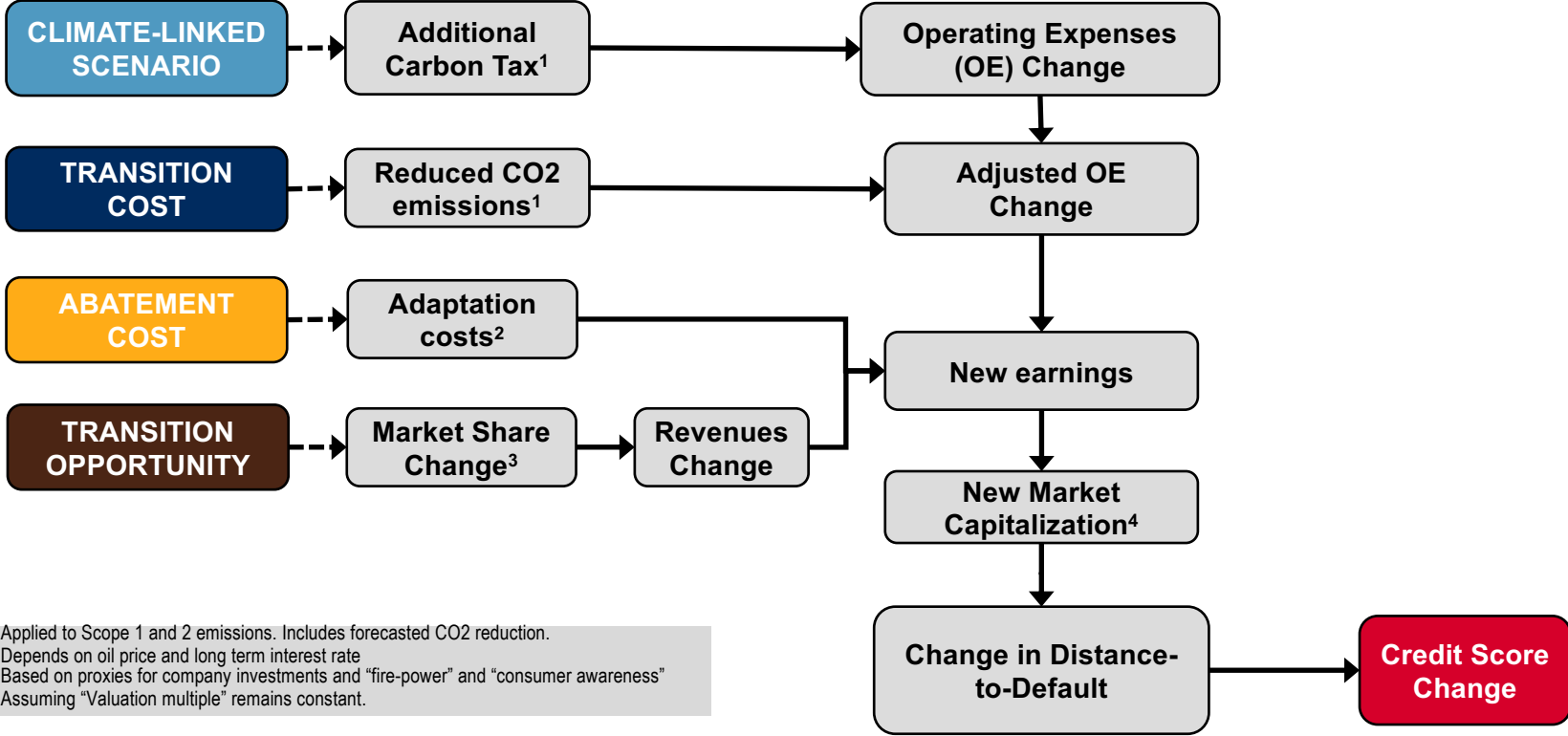
*Oliver Wyman is not an affiliate of S&P Global or any of its divisions.

^{1,2}: Coverage figures: S&P Global Market Intelligence as of August 31st, 2020.

³REMIND is a global multi-regional model incorporating the economy, the climate system and a detailed representation of the energy sector developed by the Potsdam Institute for Climate Impact Research, REMIND stands for Regionalized Model of Investments and Development. <https://www.pik-potsdam.de/research/transformation-pathways/models/remind/remind>

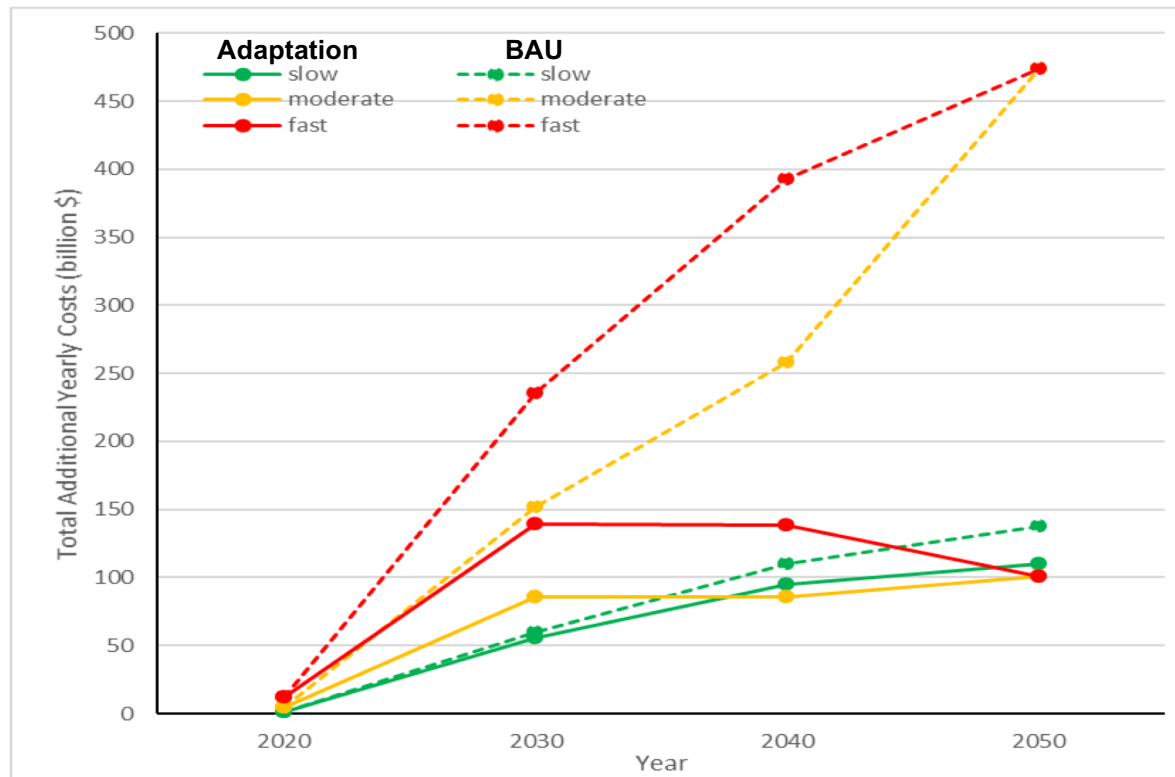
Market-Valuation Driven Credit Risk Overlay

- A global overlay for all public and private firms, with Trucost or user-defined transition scenarios



Source: S&P Global Market Intelligence, as of August 31st, 2020. Charts and graphs are for illustrative purposes only

Estimated Total Yearly Costs Of European Union Public Firms

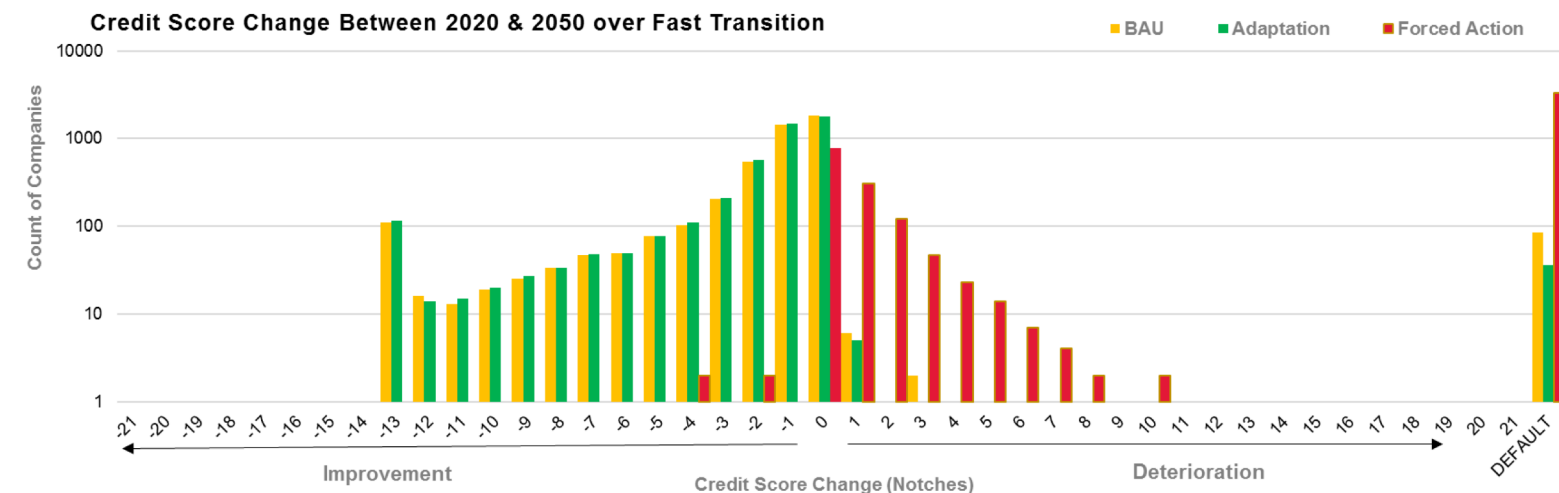


Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only. Based on 4596 European Union public firms in S&P Global Market Intelligence's database.

- Business as usual (BAU): carbon emissions keep increasing over time, despite carbon tax increases.
- Adaptation: carbon emissions decrease as carbon tax increases; abatement costs add up to the “bill”.

Energy Transition For European Union Public Firms

Multiple Response Types Over A Fast Transition



Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only. Based on a sample of 4596 European Union public firms in S&P Global Market Intelligence's database.

Response Types

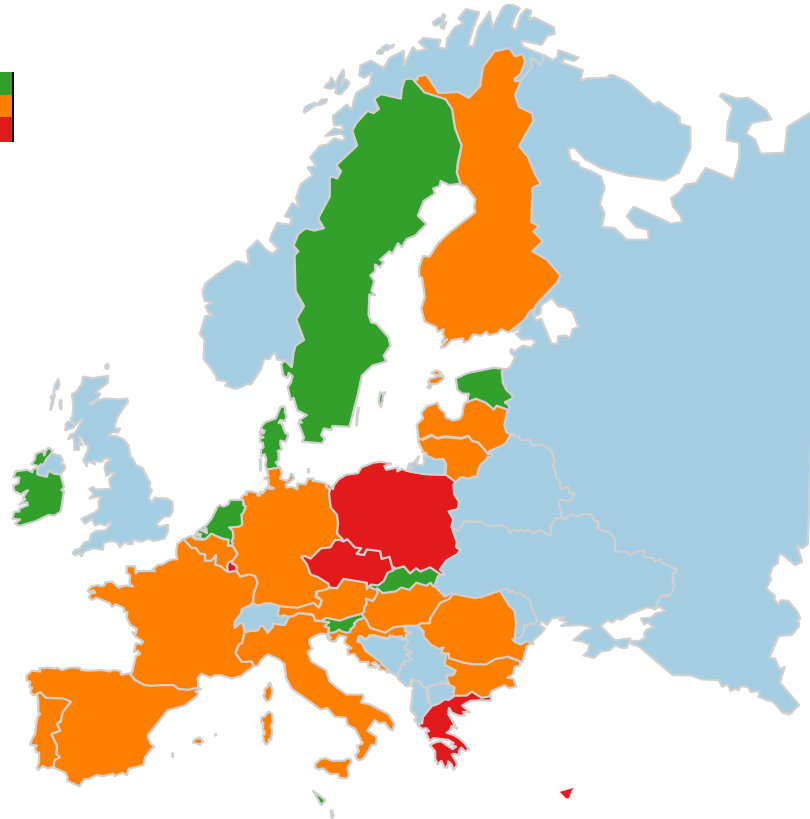
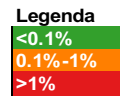
- **Business As Usual (BAU):** carbon tax increase; no emission reduction
- **Adaptation:** carbon tax increase; emission reduction (with abatement costs)
- **Forced Action:** carbon tax increase ; governments enforce carbon emission reduction,¹ inducing hefty revenue losses (linked to asset stranding).

¹ E.g. by banning polluting materials, some technologies, etc.

THANK YOU!

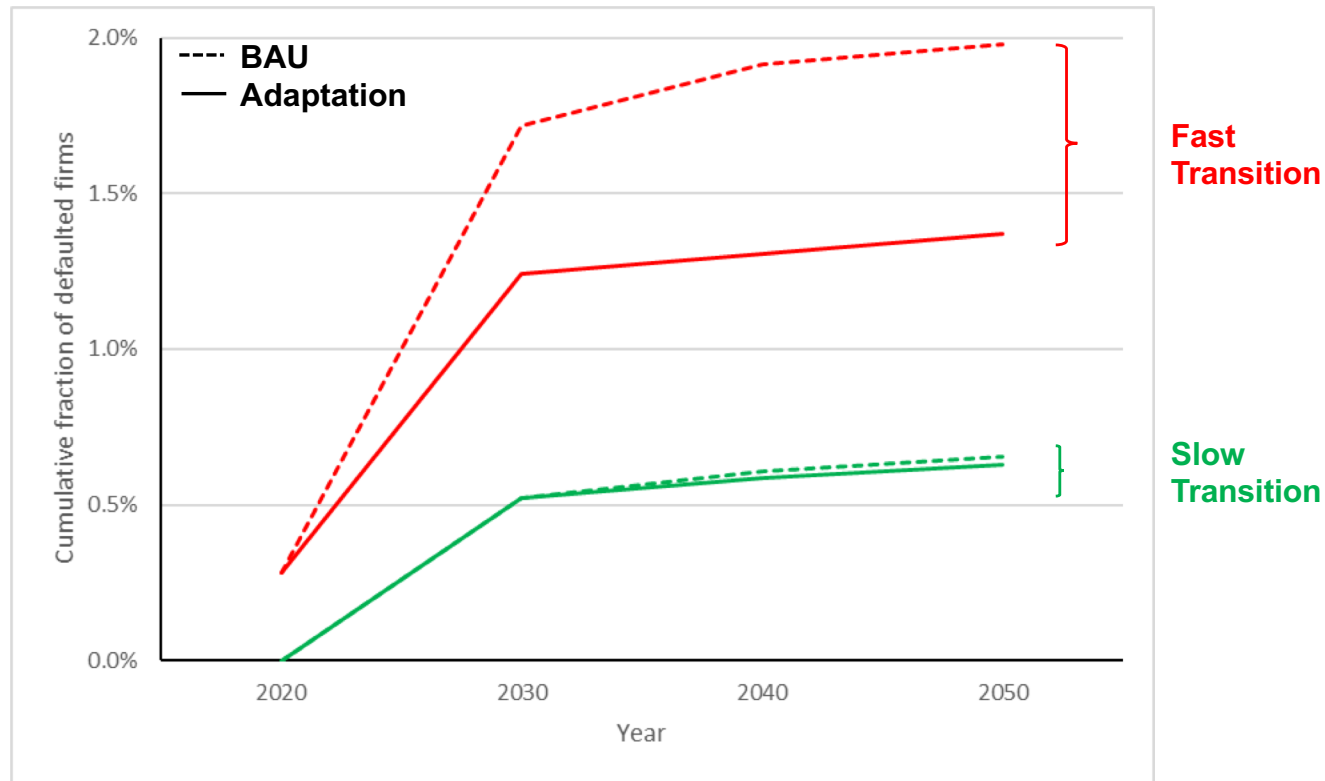
Adaptation Costs Of European Union Public Firms

Abatement costs estimate as fraction of (projected) total revenues
(over fast transition, by 2050)



Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only.

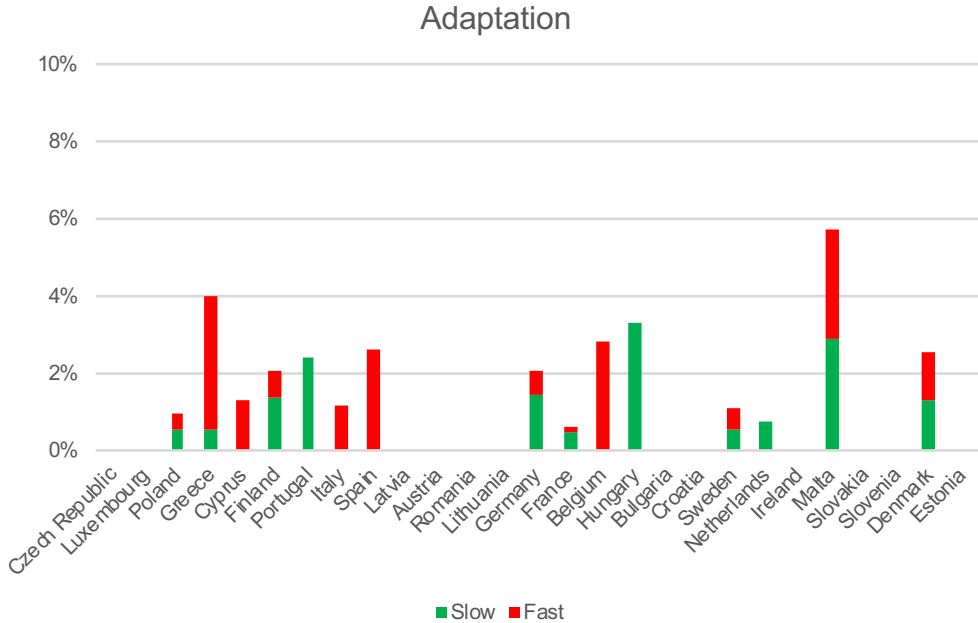
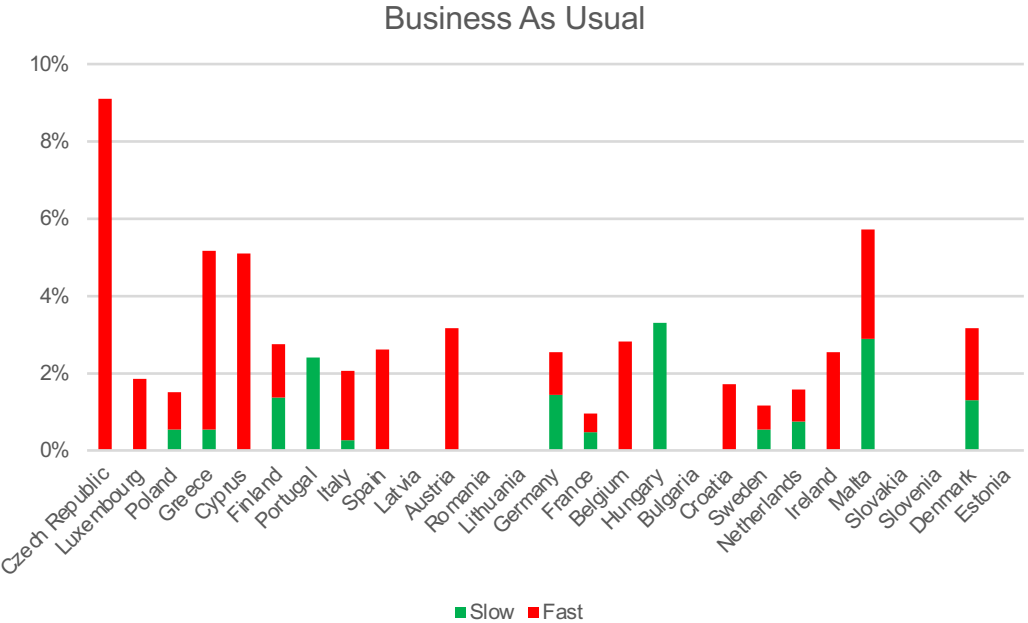
Estimated Transition Scenarios: European Union Public Firms Technical¹ Defaults



Source: S&P Global Market Intelligence (as of August 31st, 2020). For illustrative purposes only. Based on a sample of 4596 European Union public firms in S&P Global Market Intelligence's database.

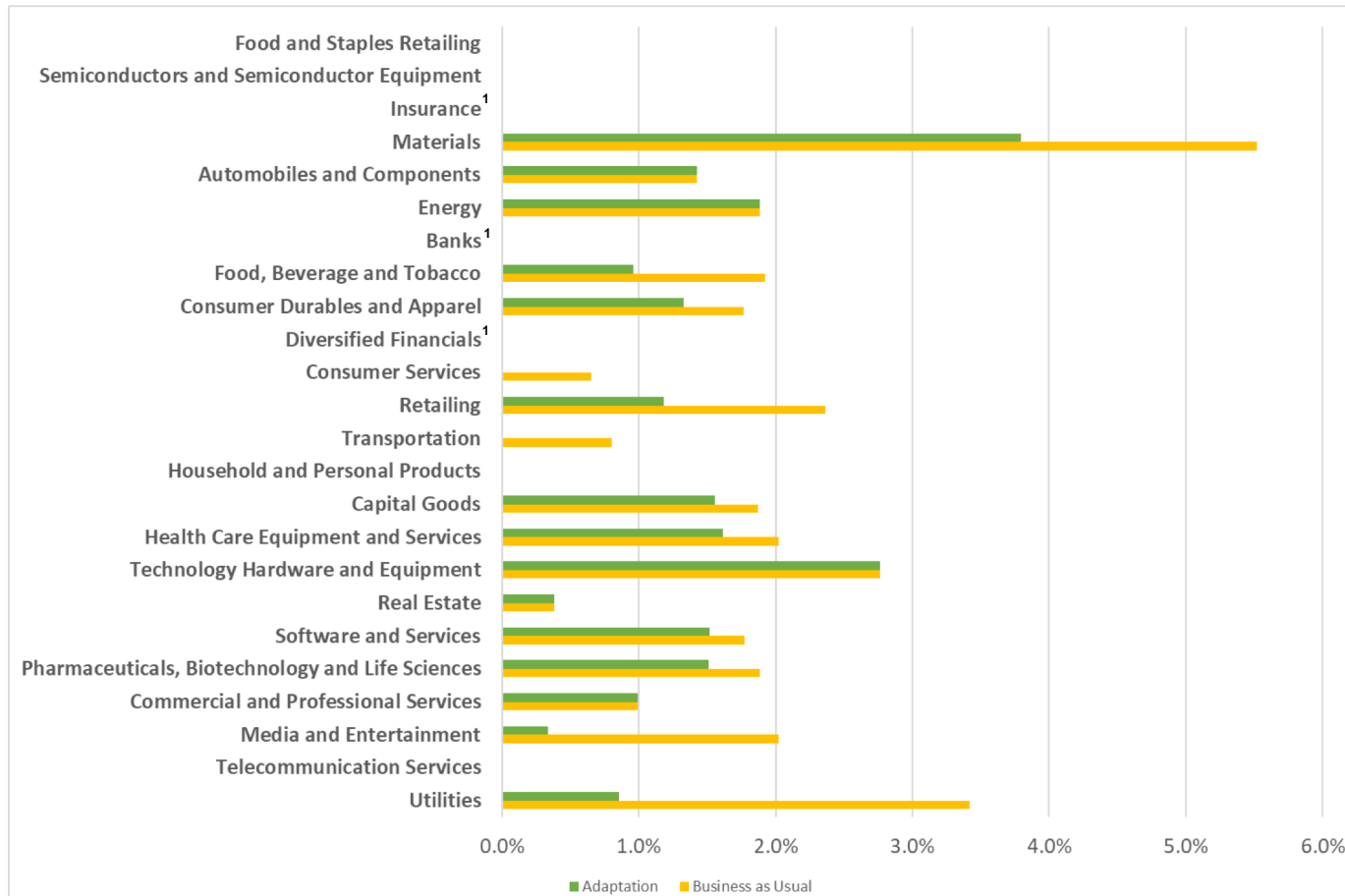
¹Technical default: company market capitalization falls below zero.

European Union Public Firms' Cumulative Default Rate By Country By 2050



Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only. Based on a sample of 4596 European Union public firms in S&P Global Market Intelligence's database.

Estimated Fast Transition: Default Rates By Industry Sector By 2050



Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only. Based on a sample of 4596 European Union public firms in S&P Global Market Intelligence's database.

¹ Based on emissions produced from owned (e.g. reported in their balance sheet) or controlled (e.g. rented) assets.

Conclusions

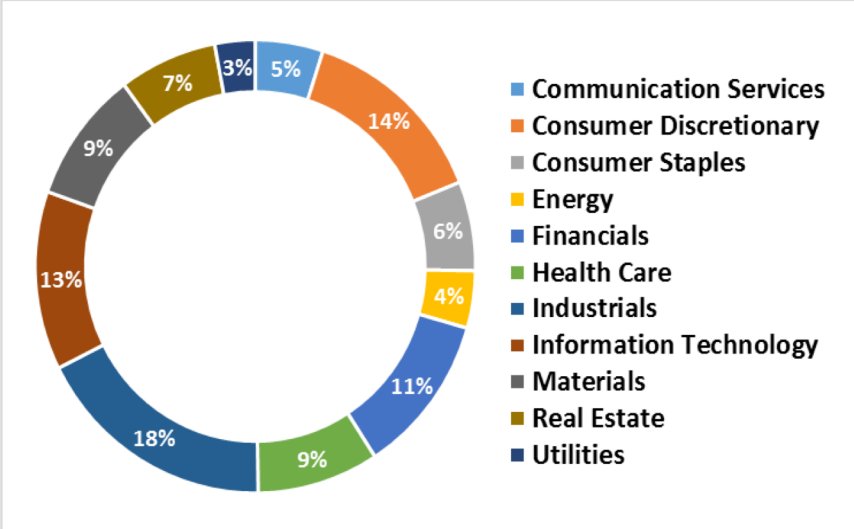
- The **transition** to a low-carbon economy poses several risks that can impact a firm's creditworthiness, but also offers opportunities to those who are ready to seize them.
- Using S&P Global Market Intelligence's data and analytics, we analysed the impact of multiple carbon tax scenarios on the creditworthiness of **European Union public firms** over the next 30 years.
- The **speed** of the carbon tax increase and the firms' **response** type (e.g. adaptation, business as usual or forced action) are critical drivers of the creditworthiness change and can trigger **several defaults** among public companies.
- Our analysis suggests that over a fast increase of the carbon tax (by 2050), the major sectors affected from a default risk standpoint are: **Materials, Utilities, and Technology Hardware & Equipment**. This risk is lower when companies start adopting greener technology/reduce emissions than in a business as usual or forced action scenario.
- Our market-valuation approach is complementary to a more fundamentals-based approach that conditions full company financial statements on a given carbon pricing path,¹ allowing a more detailed and in-depth analysis for carbon-specific sectors.

¹ This tool is developed in consultation with Oliver Wyman™. Oliver Wyman is not an affiliate of S&P Global or any of its divisions.

Trucost, part of S&P Global - Emission Data

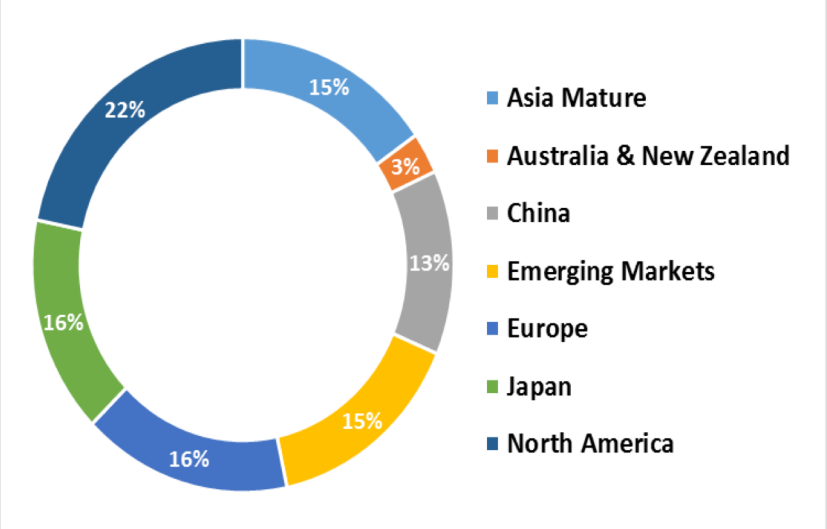
15,000+ companies, Scope 1-3 emissions, 15 years history¹

Emission Data Coverage by Segment



Source: S&P Global Market Intelligence (As of March 31st, 2020). For illustrative purposes only.

Emission Data Coverage by Region

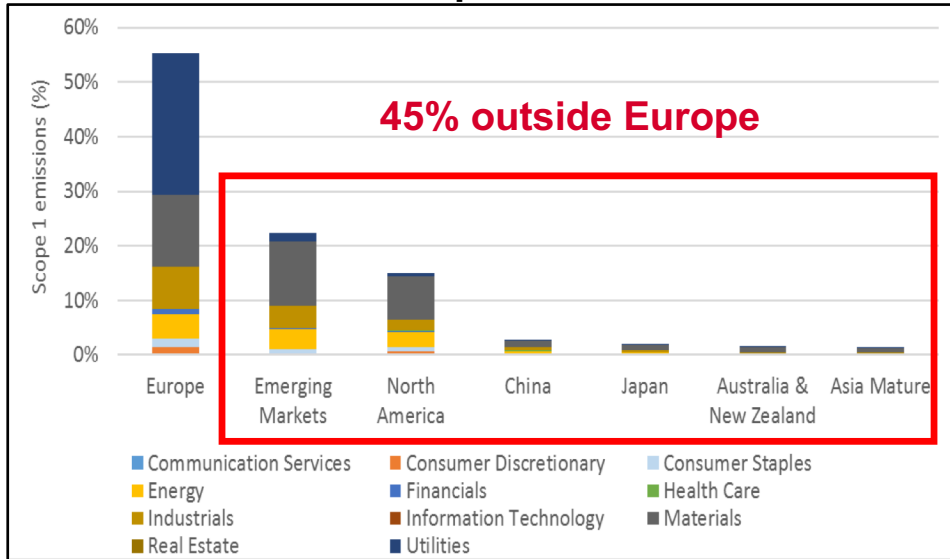


Source: S&P Global Market Intelligence (As of March 31st, 2020). For illustrative purposes only.

¹ As of March 1st, 2020.

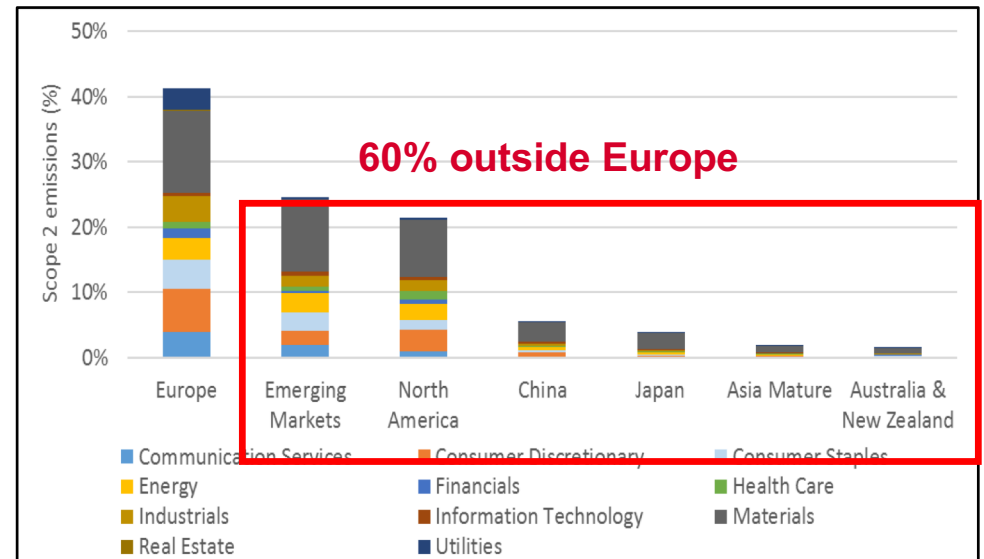
Carbon Emissions of European Companies

Scope 1



Source: S&P Global Market Intelligence (As of March 31st, 2020, based on 2018 data). For illustrative purposes only.

Scope 2



Source: S&P Global Market Intelligence (As of March 31st, 2020, based on 2018 data). For illustrative purposes only.

Climate-Related Transition Scenarios

Carbon pricing is one of the main policy tools adopted by governments to facilitate a transition to a low-carbon economy and limit global warming below a certain level versus pre-industrial levels.

Trucost has devised **three** potential transition scenarios (**2020-2050**), based on different carbon pricing paths, covering **44 major economies** and **all industry sectors**

SLOW: based on full implementation of the existing Nationally Determined Contributions (NDCs), and is envisaged to limit global warming to between 2.7 and 3.0 degrees Celsius above pre-industrial levels

MODERATE: assumes a delayed action in the short-term, followed by a rapid uptick in prices later on, to achieve a maximum global warming of 2 degrees Celsius

FAST: assumes a seven-fold increase in the current average price of carbon, to achieve around \$120/tCO₂ by 2030 in OECD countries

Source: Trucost (As of August 31st, 2020). For illustrative purposes only.

Carbon pricing **path** is **different** in each **country** and depends on the **sector**

Putting All Together

Market Signal PD Transition Risk Scenario Template
 POWERED BY CREDIT ANALYTICS S&P Global Market Intelligence

PARAMETERS

Clear Existing List CLEAR LIST

Company / WatchList ADD
Remove Watchlist ID to add companies manually.

Run ID Check RUN ID CHECK

	Model Inputs	User Override
Current Date	08/04/2020	
Scenario	Fast	
Response Type	Adaptation	
Year	2050	
Projected Global Emissions Growth (Current Policy)	30.9%	
Targeted Emission Reduction from current level (%)	67.5%	
Abatement Costs	Yes	
Transition Opportunity	Yes	
Future Long-term interest rate	4.0%	
Future Oil Price (\$/barrel)	60	

RUN SCENARIOS

Tickers / CIQ ID(s)	Company Name	Notes
NYSE:MMM	3M Company	
NYSE:AOS	A. O. Smith Corporation	
NYSE:ABT	Abbott Laboratories	
NYSE:ABBV	AbbVie Inc.	

Various scenario settings support tailored analysis

Enables pre-canned or user-defined scenarios

Portfolio insight into overall distribution of scenario outcomes



Detailed insight into model drivers

Comprehensive model outputs enable individual counterparty analysis

Company Name	Industry Group	Primary Industry	Country	Revenues (\$ m)	Capex (\$ m)	Scope 1 Emissions	Scope 2 Emissions	Total current emissions	Current carbon tax costs on current emissions	Additional Carbon Tax Costs (\$)	Scope 1 Additional Carbon Tax Costs (\$)	Scope 2 Additional Carbon Tax Costs (\$)	Additional Carbon Tax Costs on current emissions levels (\$m)	Abatement costs to reduce or from BAU emissions (from current levels, reduction of growth)	Additional Total Costs after reduction of emissions (if any)	Opportunity Share	Revenues and Valuation	Current Market Cap	Future Market Cap	Credit score change (notches) - User Defined View
3M Company	Capital Goods	Industrial Conglomerate	United States	32,136	0	4,609,951	1,824,293	6,434,244	0	278,097,862	96,803,765	375	0.00	324.29	0.47%	-4,160	85,708	40,730	0.00	
A. O. Smith Corporation	Capital Goods	Building Products	United States	2,993	64	88,384	52,055	140,438	0	5,340,946	2,632,444	8	0.00	6.90	0.19%	-400	12.15	6,516	2,432	1.00
Abbott Laboratories	Health Care Equipment	Health Care Equipment	United States	31,904	1,638	557,818	527,942	1,085,760	0	32,408,914	25,712,270	58	0.00	50.27	0.10%	-4,267	17.82	149,804	97,984	0.00
AbbVie Inc.	Pharmaceuticals, Biotechnology	Pharmaceuticals, Biotechnology	United States	33,266	552	303,185	324,135	627,320	0	19,782,831	17,978,437	38	0.00	32.66	6.22%	-4,465	7.79	116,007	51,925	1.00
Abiomed Inc.	Health Care Equipment	Health Care Equipment	United States	841	42	17,679	15,233	32,911	0	1,205,981	840.101	2	0.00	1.77	0.00%	-112	26.52	7.042	5.674	0.00

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