

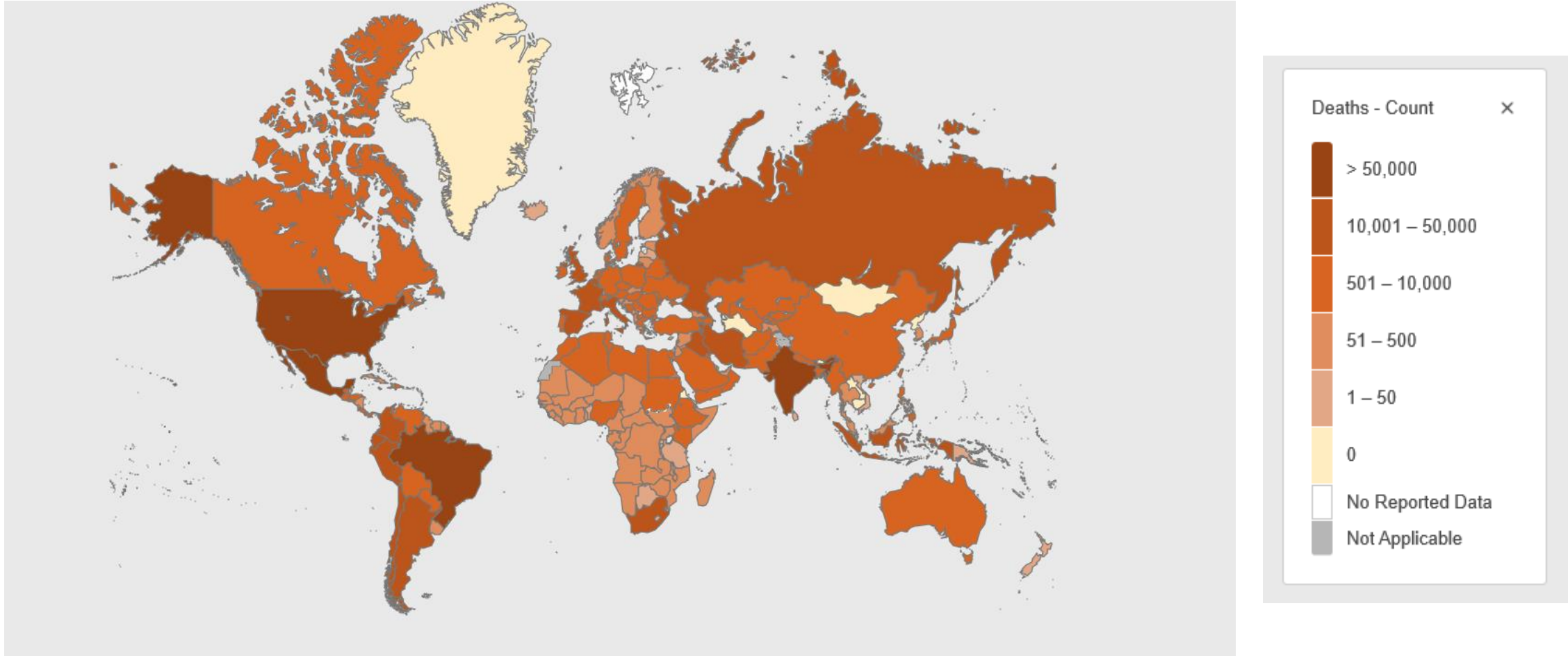
CLIMATE CHANGE: ENERGY TRANSITION RISKS AND OPPORTUNITIES FOR EUROPEAN PUBLIC COMPANIES' CREDIT WORTHINESS

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Climate Change, Credit Risk and COVID-19



Introduction



Source: World Health Organization – Coronavirus Disease (COVID-19) Dashboard – Deaths (as of October 20th, 2020)

- **Mounting evidence that the proliferation and transmission of certain diseases is facilitated by global warming.**
- E.g. dengue viruses, cholera, some other vibrios have better life due to global warming.

Source: Under the Weather: Climate, Ecosystems, and Infectious Disease. National Research Council (US) Committee on Climate, Ecosystems, Infectious Diseases, and Human Health. Washington (DC): National Academies Press (US); Date: 2001. <https://www.ncbi.nlm.nih.gov/books/NBK222258/>.

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.

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,

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

FUNDAMENTALS-DRIVEN

Company financials conditioned on climate-linked transition scenarios.

Scope: up-stream oil & gas large firms (1,200+¹); will be expanded to other 6 carbon-intensive sectors

Main Output: firm's projected full financial statements and credit score change

Engine: *CreditModel™*

PROS:

- 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.

*Developed in consultation with **Oliver Wyman****

MARKET-VALUATION DRIVEN

Company earnings and costs conditioned on climate-linked transition scenarios.

Scope: all sectors, public (45,000+²) and private firms; will be expanded to include physical risks

Main Output: firm's projected costs, revenues, earnings, (implied) market cap, credit score change

Engine: PD Model Market Signals

PROS:

- 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.

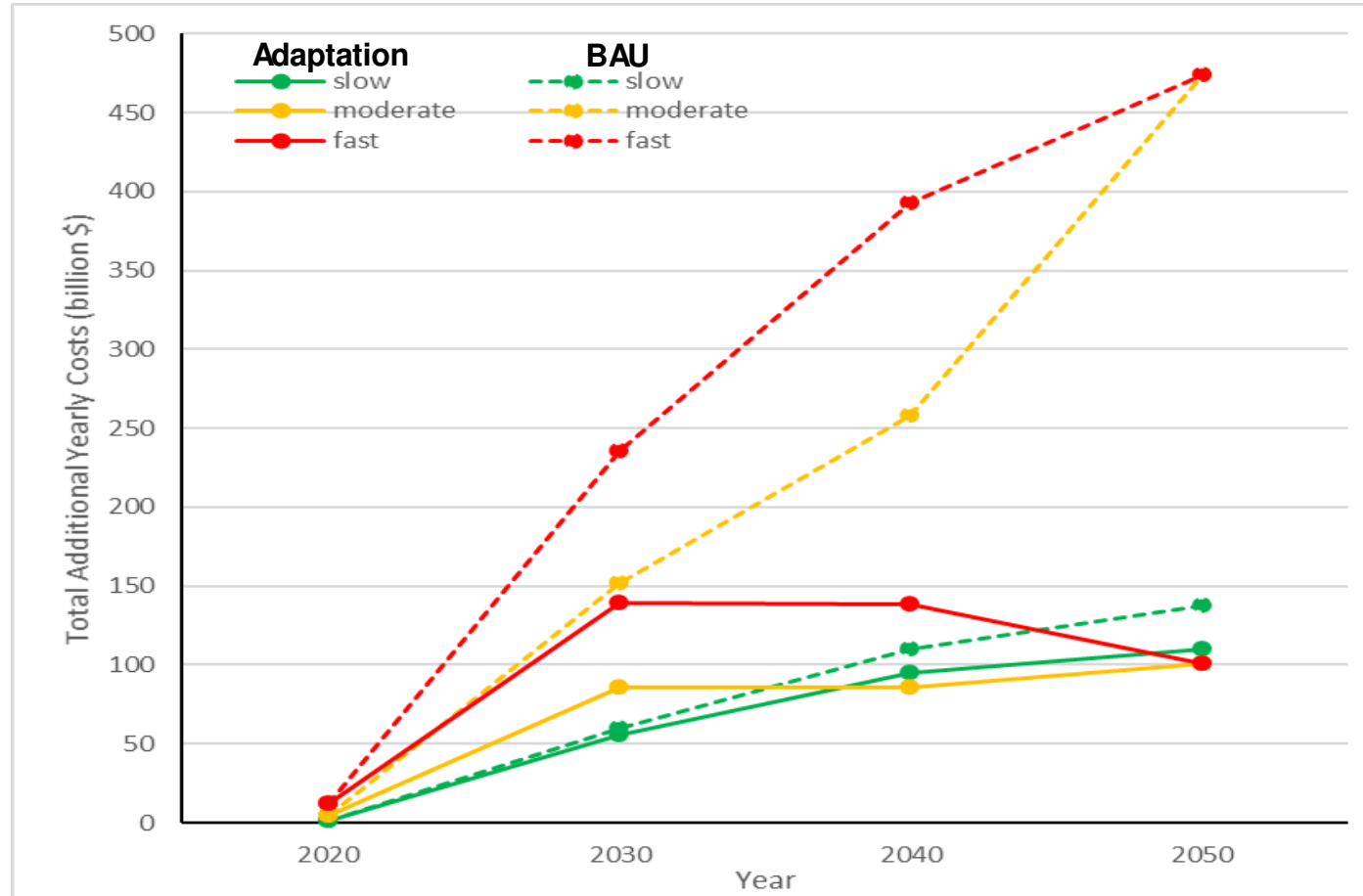
Complementary to Fundamentals approach

*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.

³ REMIND 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>

Estimated Total Yearly Costs¹ Of European Union Public Firms

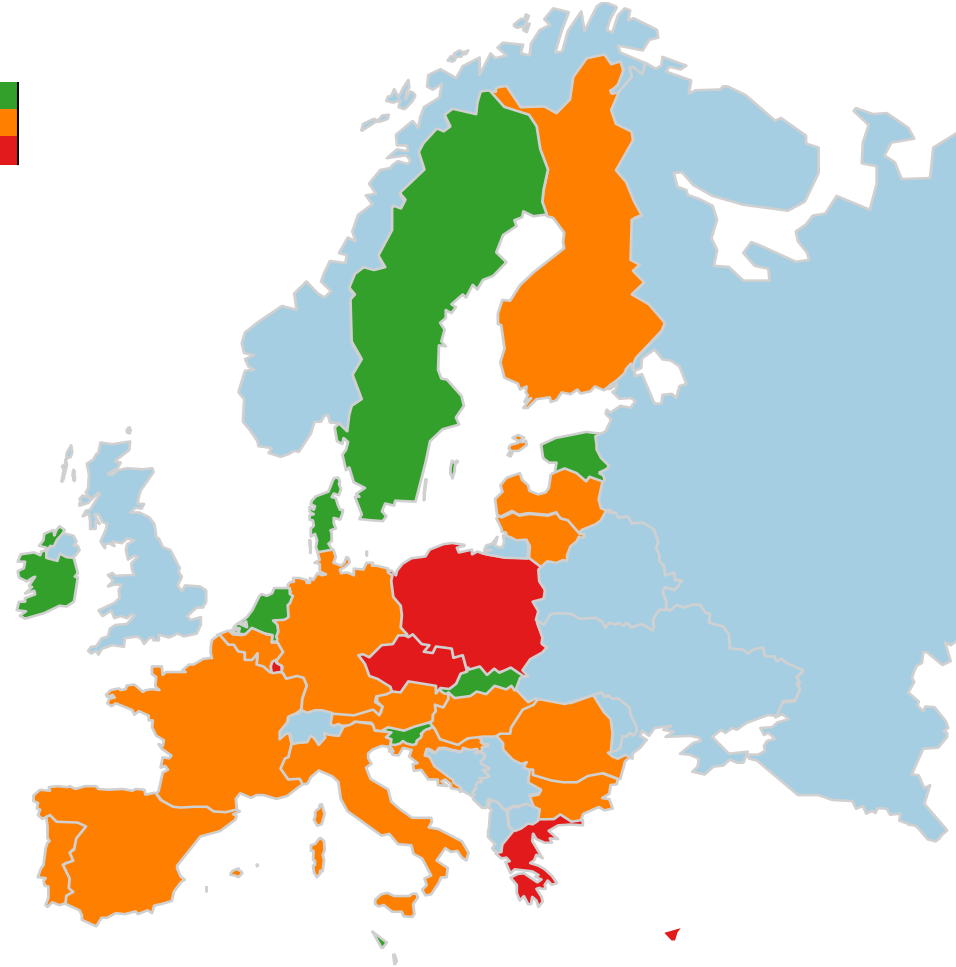
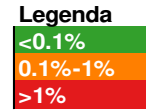


Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only. Based on 4596 European Union public firms in S&P Global Market Intelligence's database. ¹ Carbon tax and (where applicable) abatement costs.

- 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”.

Adaptation Costs Of European Union Public Firms

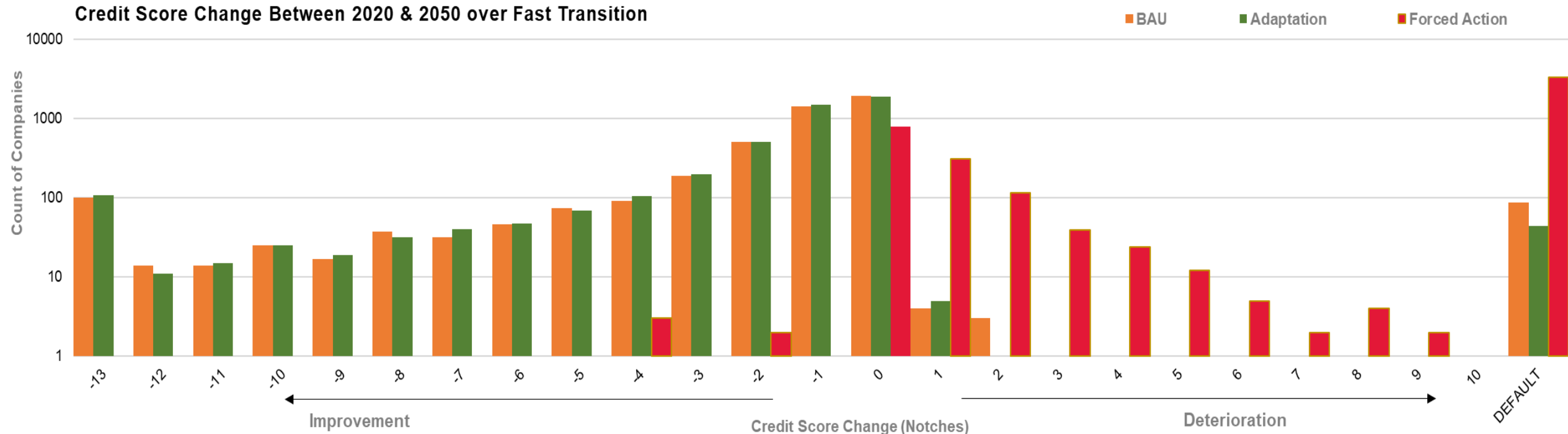
Abatement costs estimate as fraction of (projected) total revenues
(over fast transition, by 2050)



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

Energy Transition For European Union Public Firms

Multiple Response Types Over A Fast Transition (with liabilities and other expenses kept constant)



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.

Business As Usual (BAU): carbon tax increase; no emission reduction

Adaptation: carbon tax increase; emission reduction (with abatement costs)

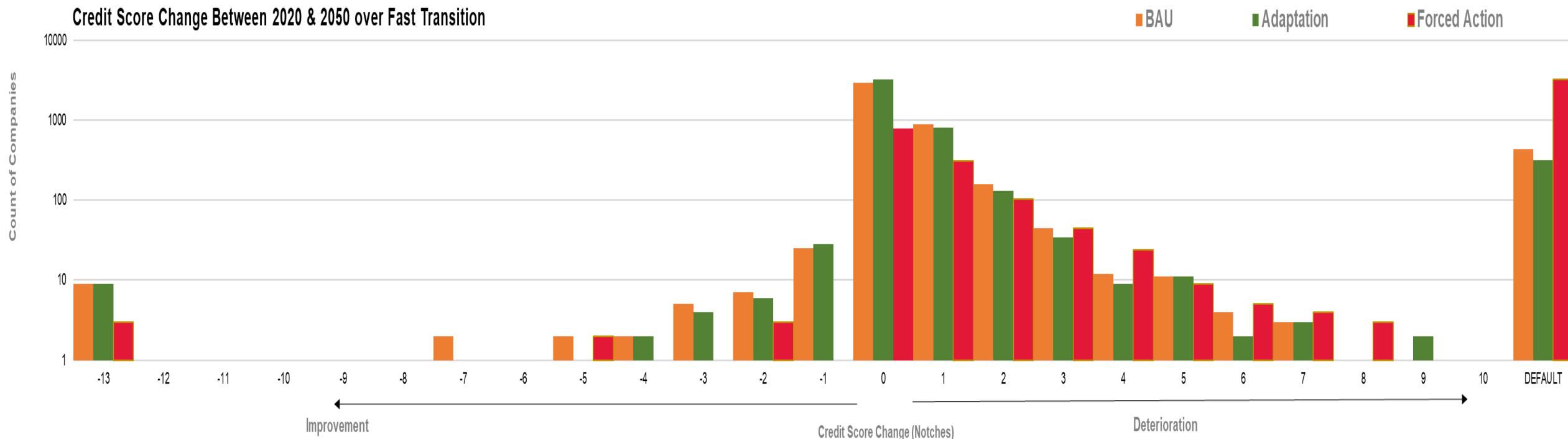
Forced Action: carbon tax increase; governments enforce carbon emission reduction,¹ inducing hefty revenue losses (linked to asset stranding).

- Neglecting additional defaults due to physical risk event losses.

¹ E.g. by banning polluting materials, carbon-intensive technologies, etc.

Energy Transition For European Union Public Firms

Multiple Response Types Over A Fast Transition (with liabilities and other expenses increasing)



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.

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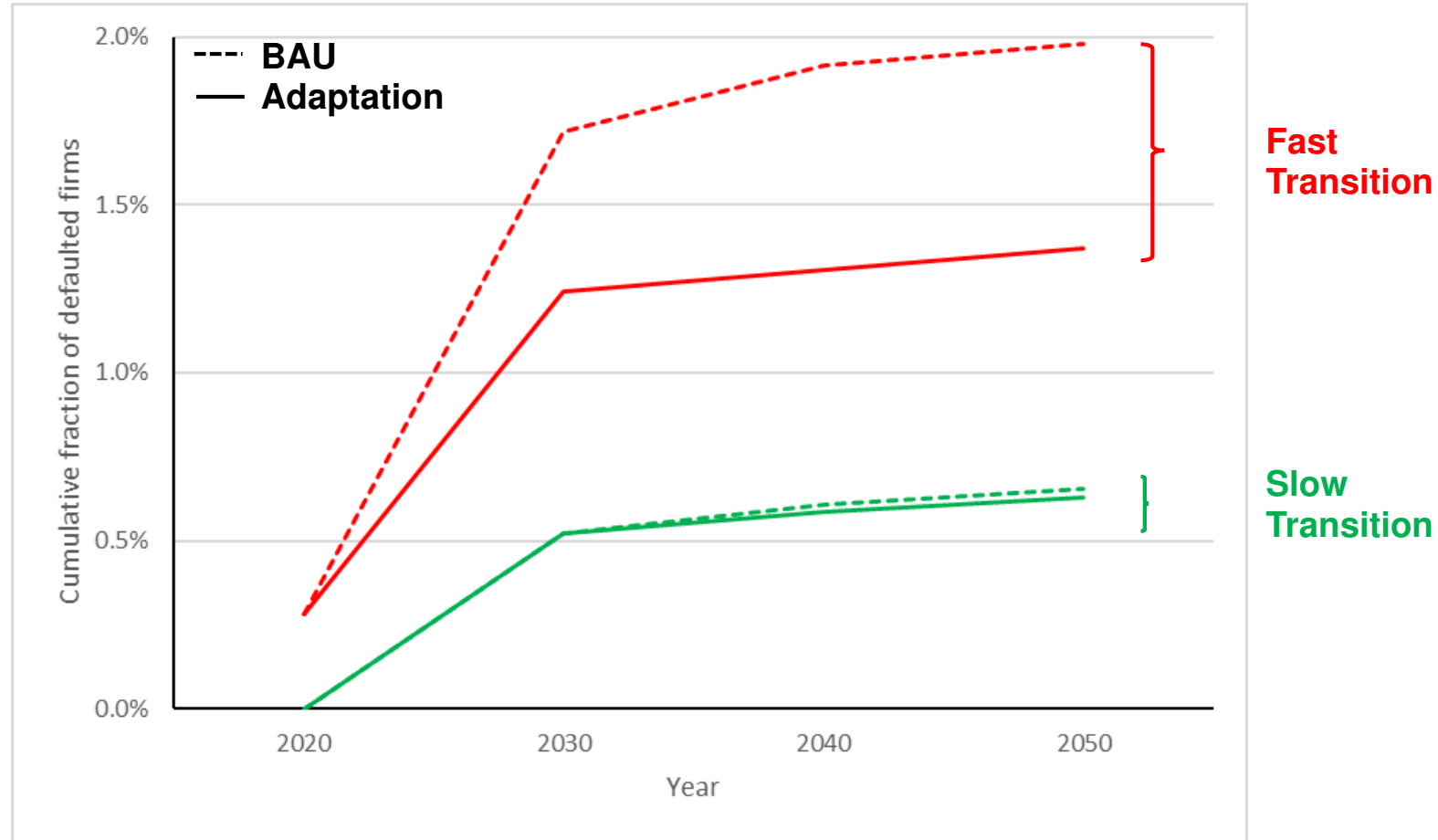
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Estimated Transition Scenarios: European Union Public Firms

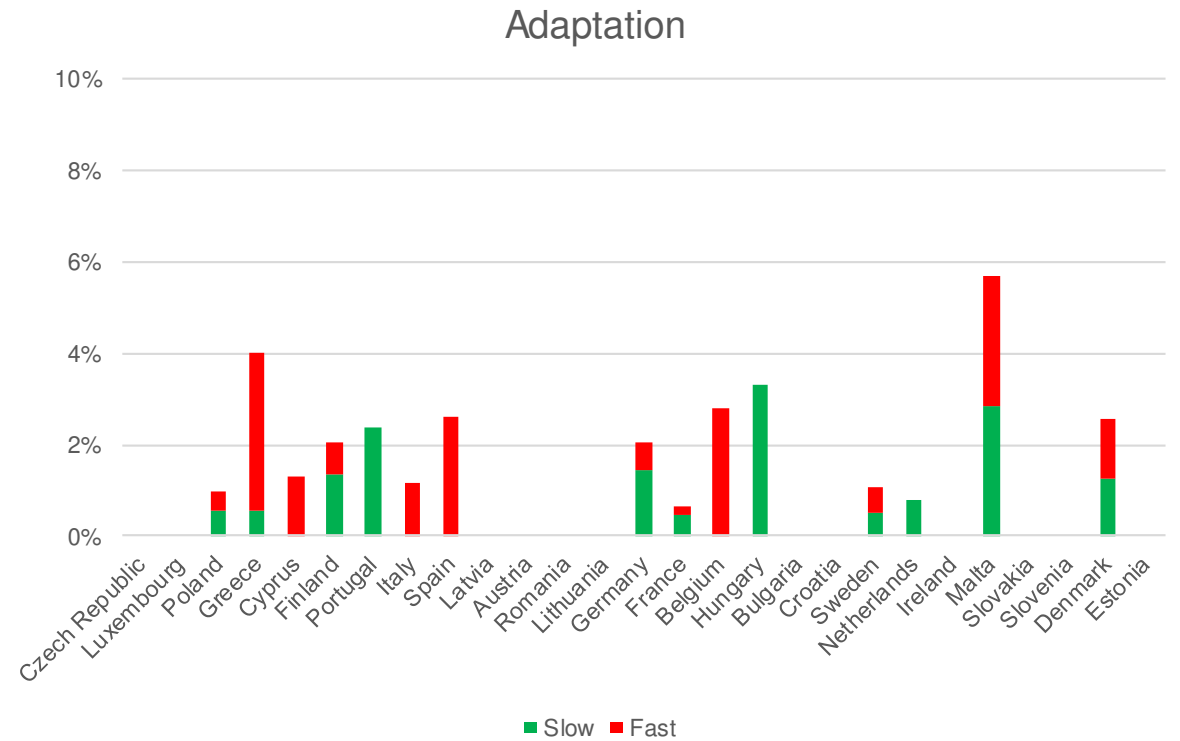
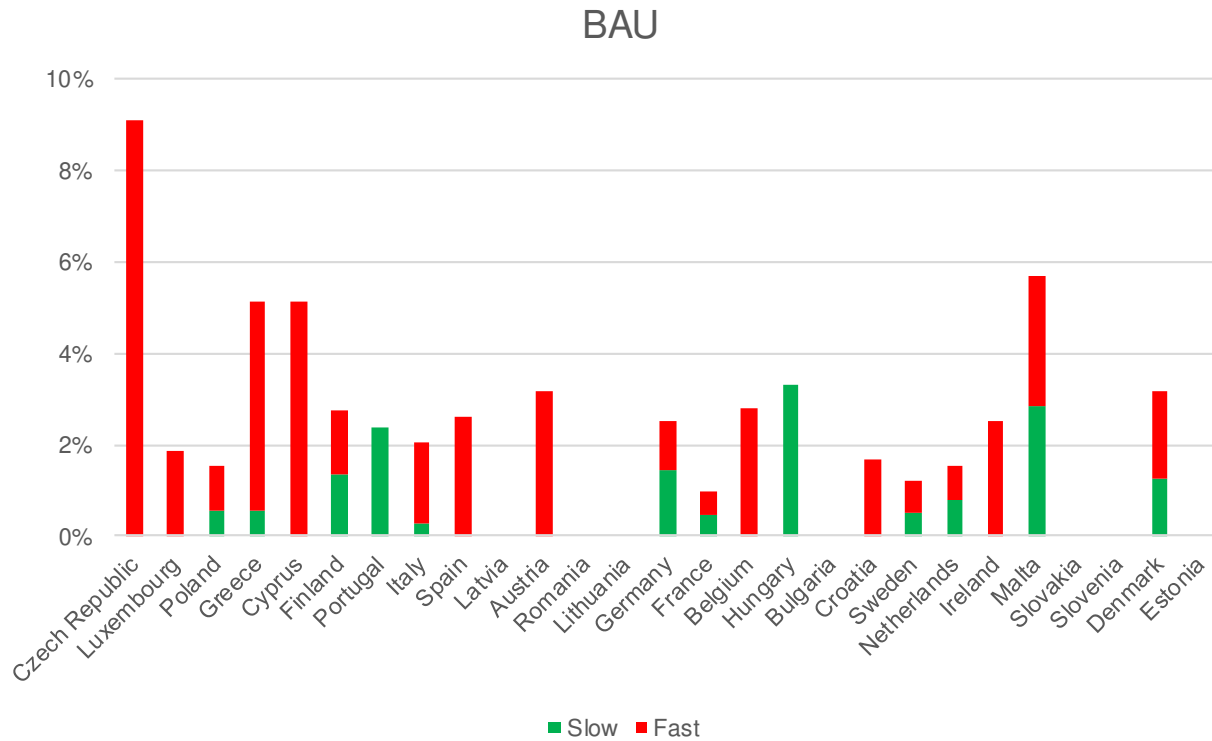
Technical¹ Defaults



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.

- Assuming total liabilities and other operating costs remain similar to current levels.
- Neglecting additional defaults due to physical risk event losses.

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

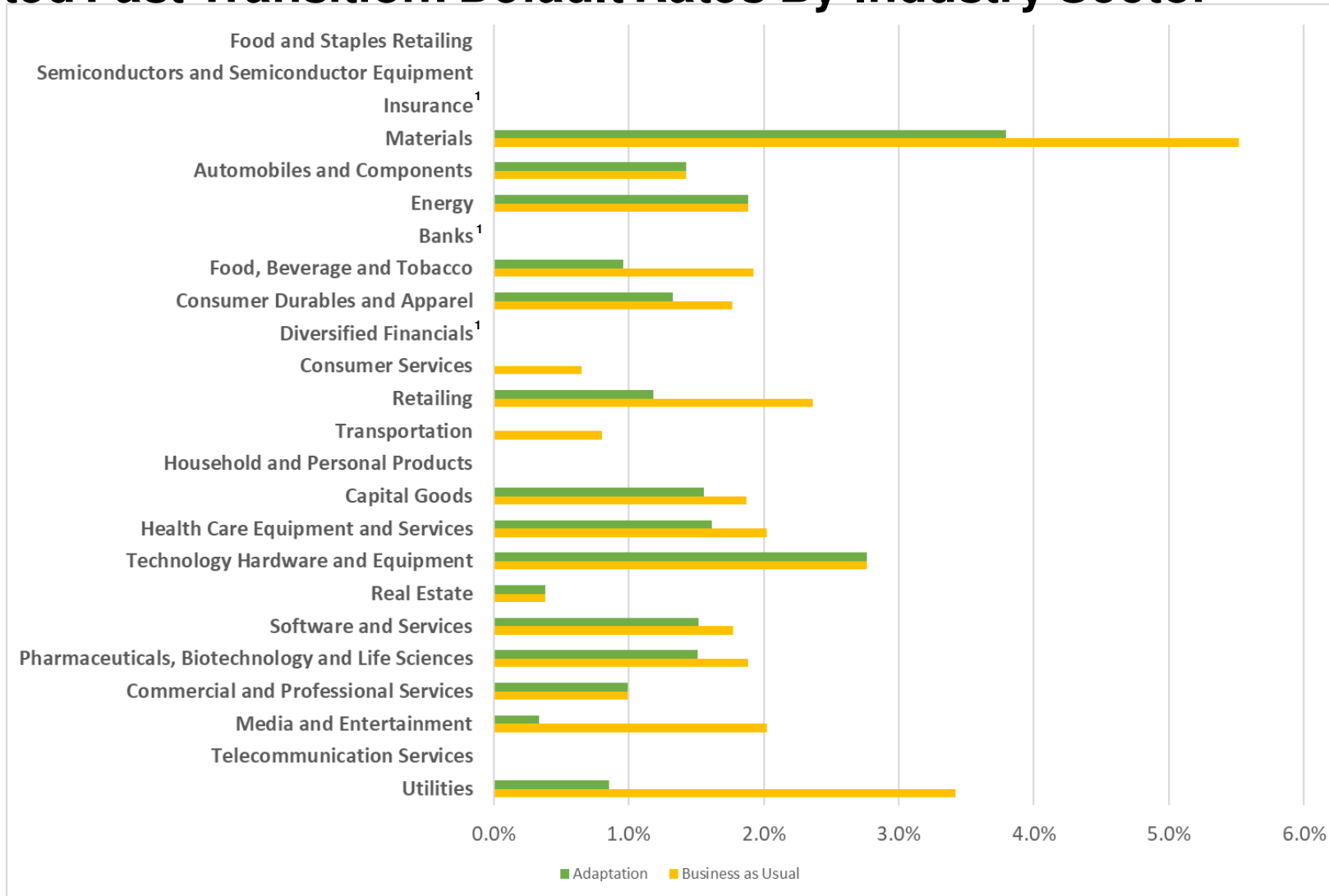


Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only. Based on a sample of 4596 European Union public firms in S&P Global Market Intelligence's database.

- Assuming total liabilities and other operating costs remain similar to current levels.
- Neglecting additional defaults due to physical risk event losses.

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

- Assuming total liabilities and other operating costs remain similar to current levels.
- Neglecting additional defaults due to physical risk event losses.

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.

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