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

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Climate Change, Credit Risk and COVID-19

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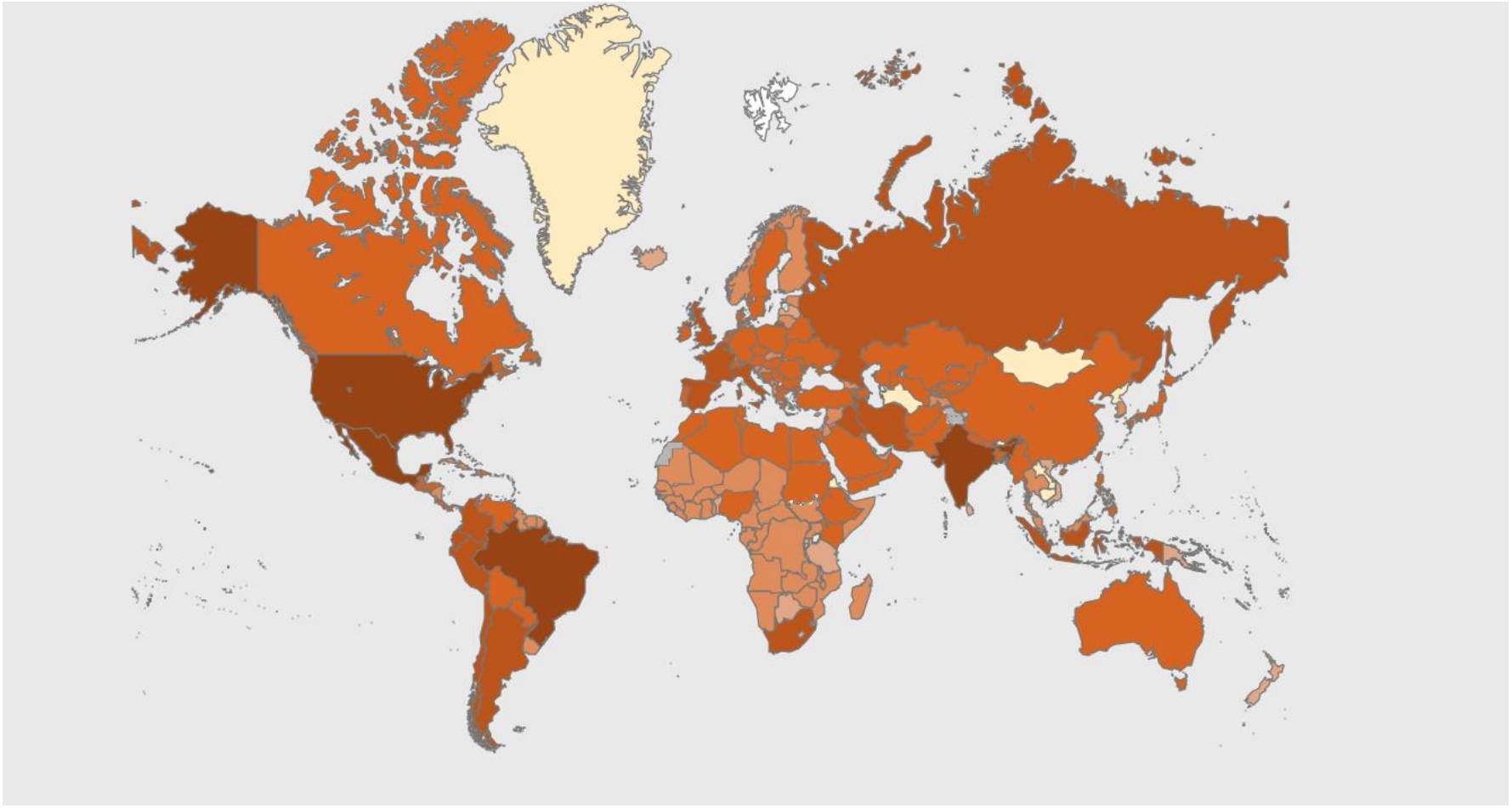
Introduction



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	• 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	• **2H 2020**: Publication of Stress Scenarios • **1H 2021**: Commencement of Exercise
European Union	ECB/EBA	• 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)	• **End-2020**: Guidelines in effect
France	ACPR	• Issued stress testing discussion paper with scenarios included (May 2020)	• **End-2020**: Bank stress test submissions • **Apr 2021**: Publication of results
Singapore	MAS	• The 2018 insurance stress tests incorporated extreme flooding scenarios • Released discussion paper on climate risk, including stress testing (Jun 2020)	• **Aug-2020**: Closure of consultation • **Aug/Sep 2021**: Compliance timeline
Netherlands	DNB	• 2017 stress tests included scenarios of physical climate risks on non-life insurers	• **N/A**
Denmark	Danmarks Nationalbank	• Announced it may present an analysis of transition risks in the coming stress test of credit institutions (Dec 2019)	• **Mid-2020**: Publication of analysis of transition risks
Australia	APRA	• Announced it would conduct climate risk vulnerability assessment for large ADIs (Feb 2020)	• **2H 2020**: Scenario design • **2021**: Execution
Canada	Bank of Canada	• Developing models to understand economic consequences of climate change (Nov 2019)	• **N/A**

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

[1]Subject to revision,

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Market Intelligence's Energy-Transition Credit Risk Overlays

FUNDAMENTALS-DRIVEN	MARKET-VALUATION DRIVEN
Company financials conditioned on climate-linked transition scenarios.	*Company earnings and costs 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	**Scope:** all sectors, public (45,000+[2]) and private firms; will be expanded to include physical risks
Main Output: firm's projected full financial statements and credit score change	**Main Output:** firm's projected costs, revenues, earnings, (implied) market cap, credit score change
Engine: *CreditModel™*	**Engine:** PD Model Market Signals
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.	**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.
*Developed in consultation with **Oliver Wyman****	***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

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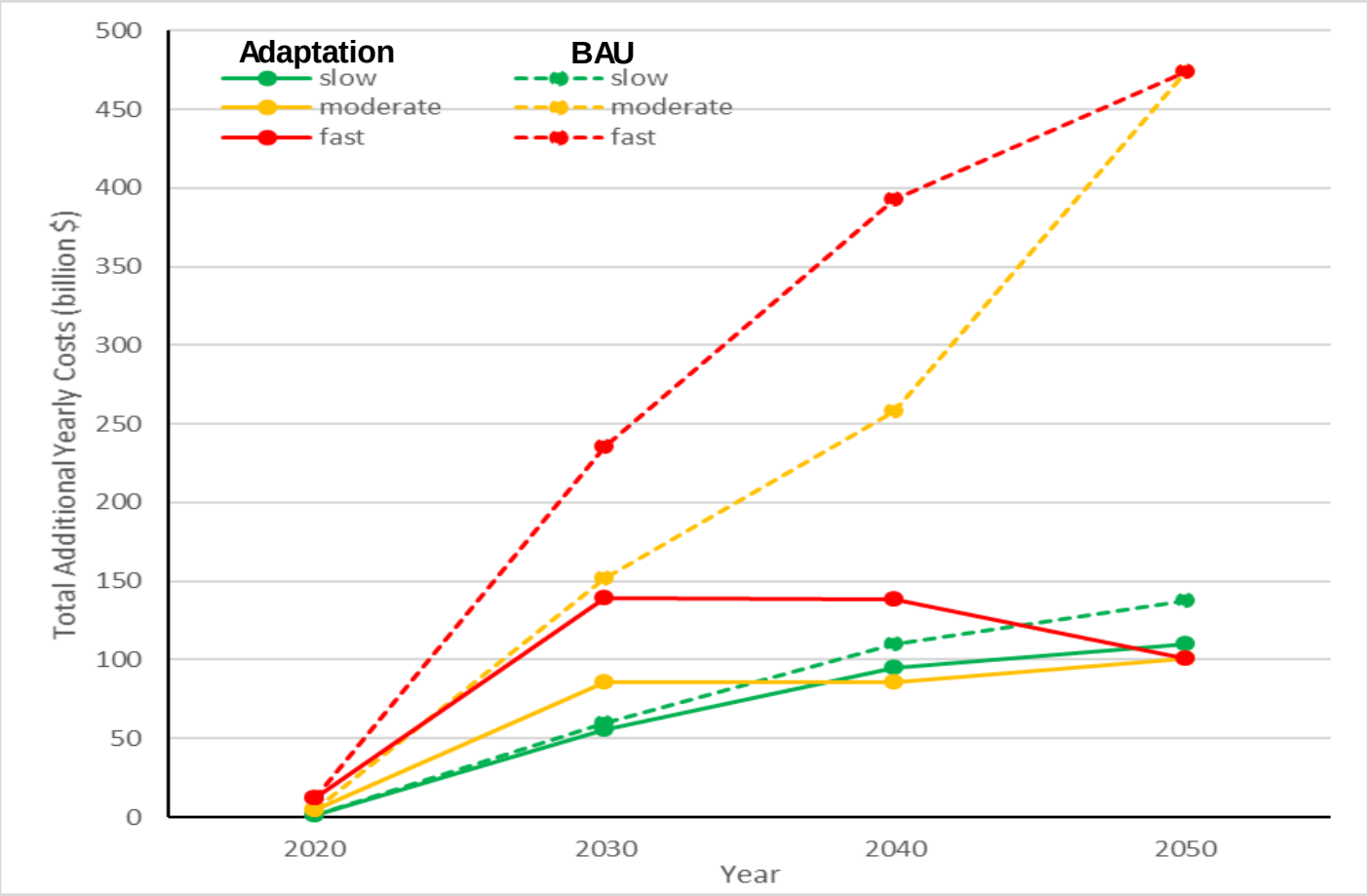
Estimated Total Yearly Costs[1] Of European Union Public Firms



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".

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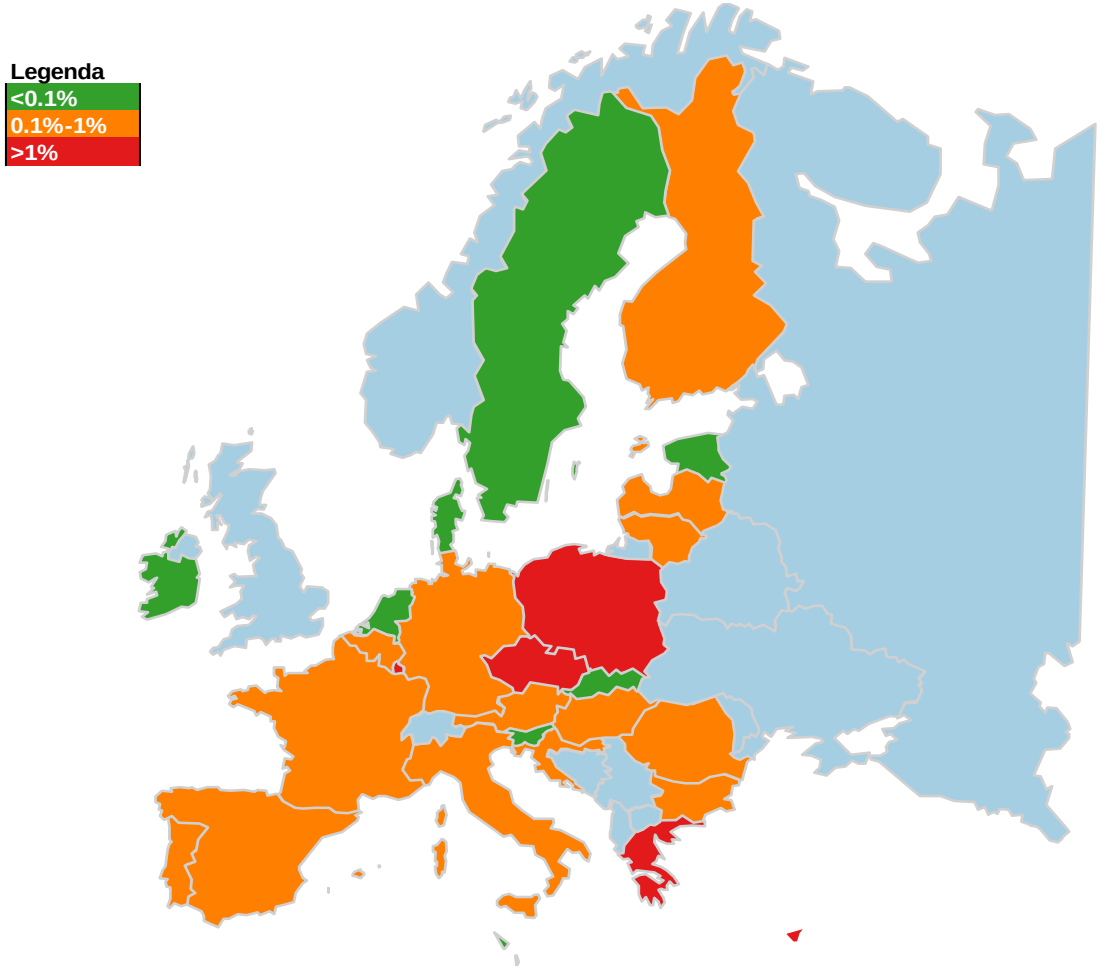
Adaptation Costs Of European Union Public Firms

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.

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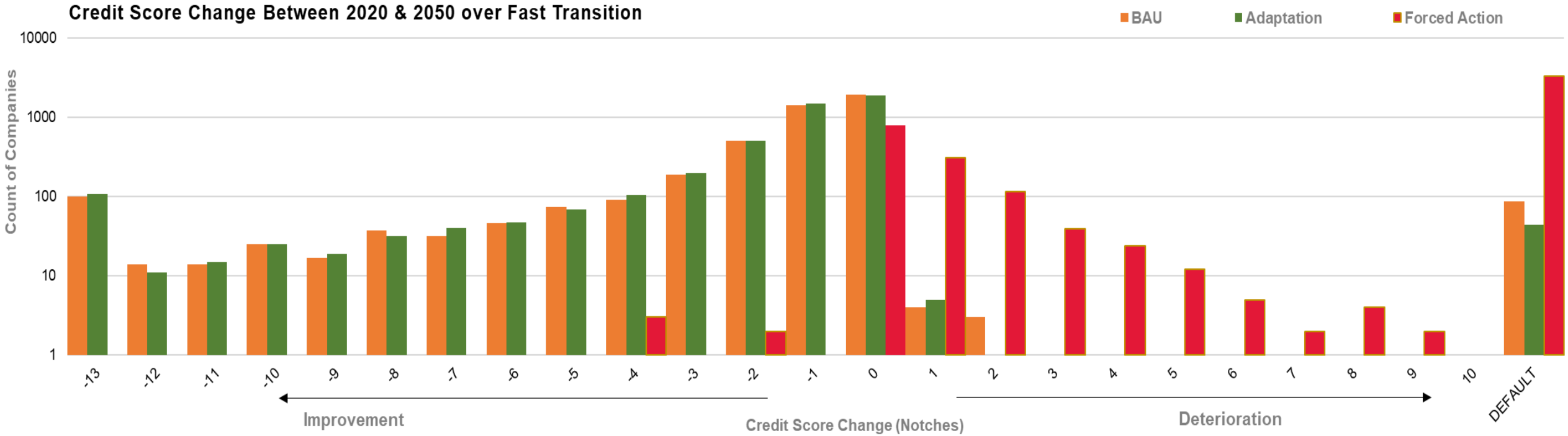
Energy Transition For European Union Public Firms

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.

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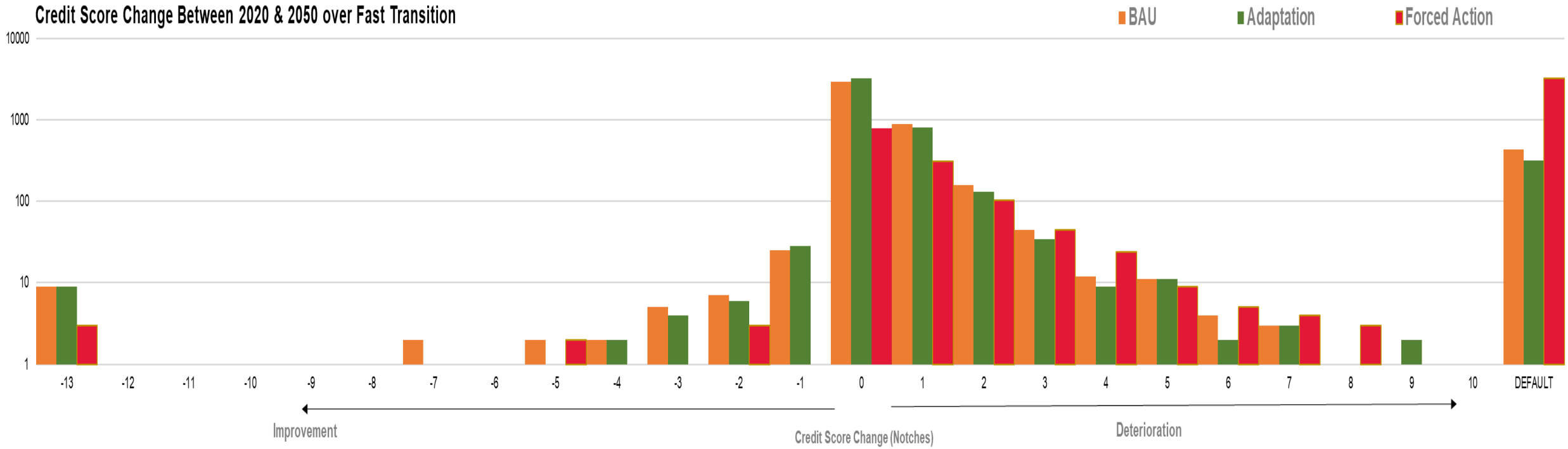
Energy Transition For European Union Public Firms

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



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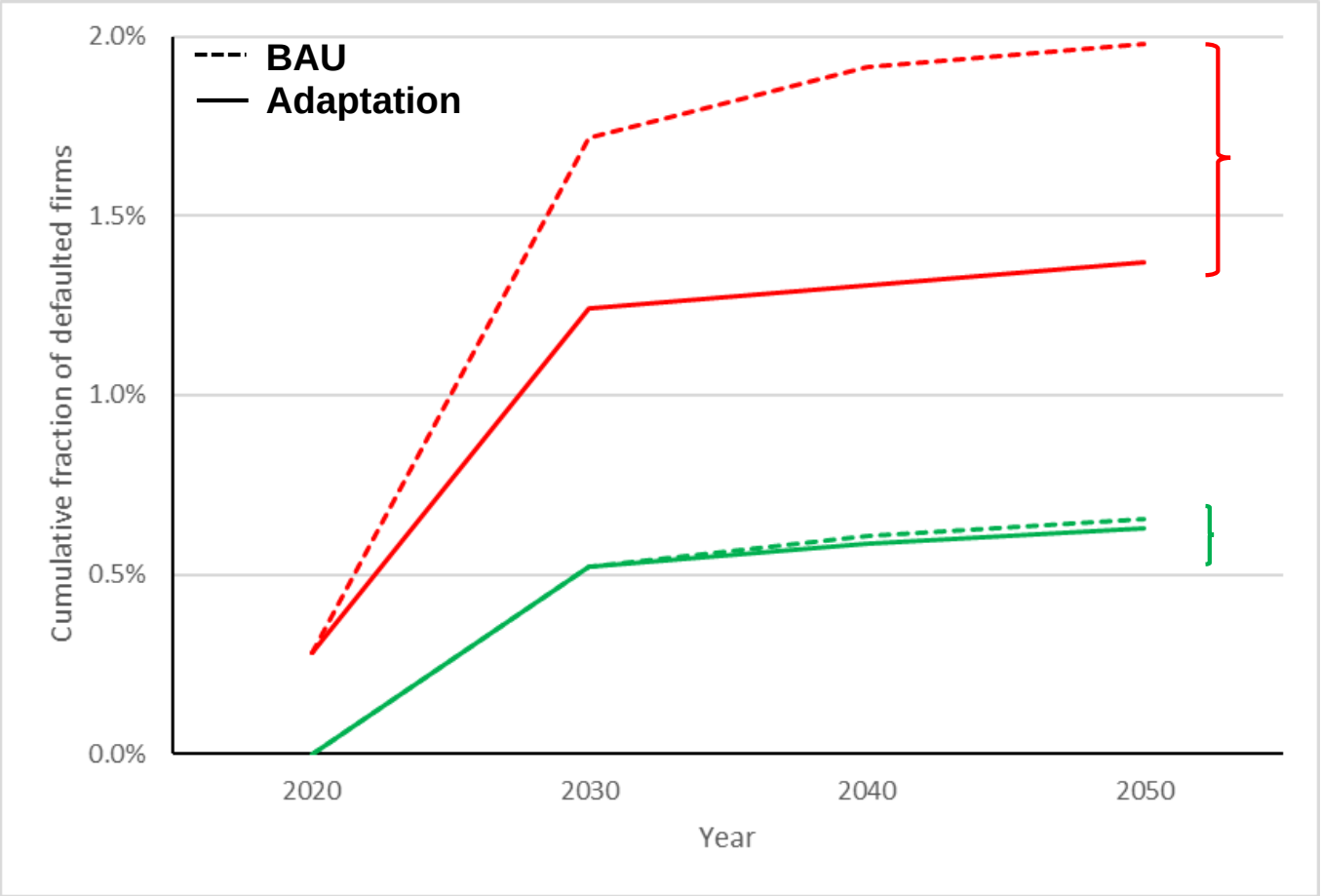
Estimated Transition Scenarios: European Union Public Firms
Technical[1] Defaults



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. [1]Technical 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.

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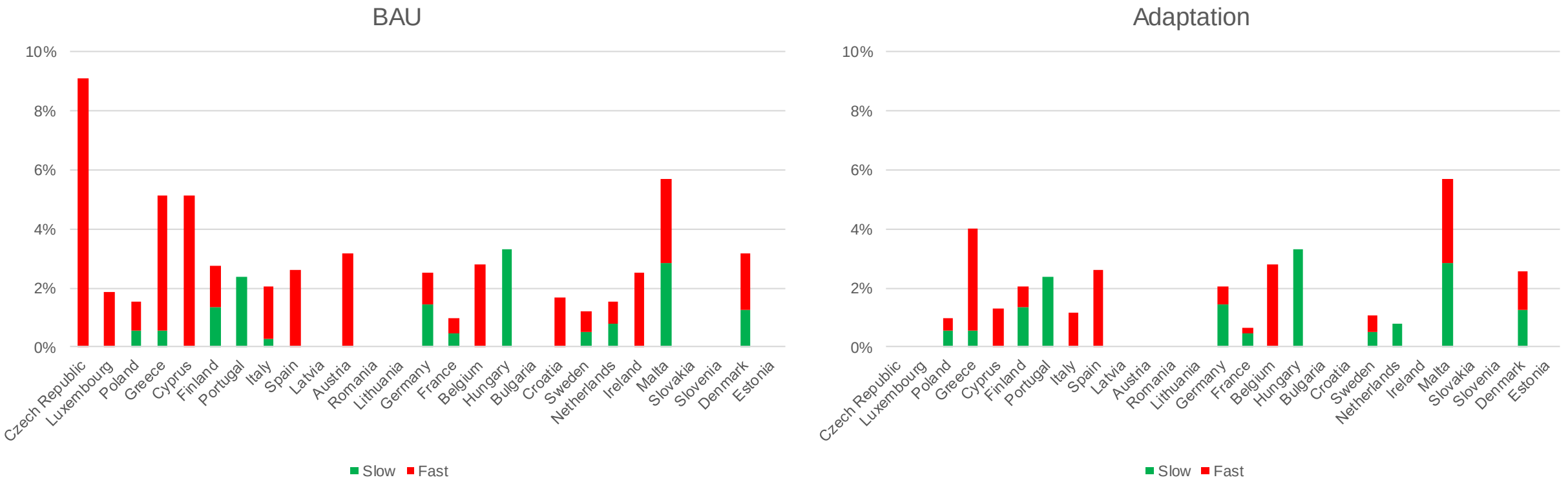
European Union Public Firms' Cumulative Default Rate By Country

By 2050



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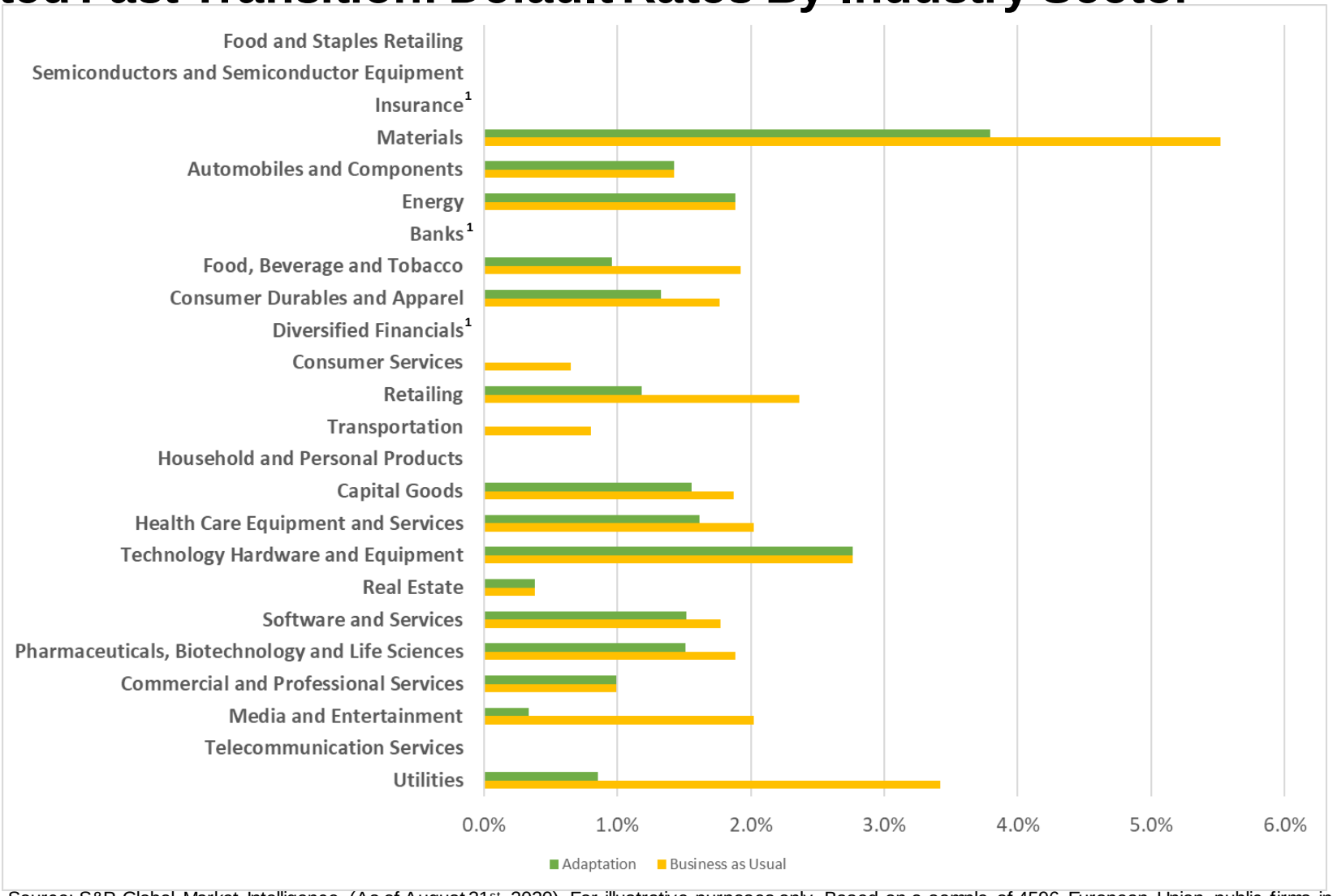
Estimated Fast Transition: Default Rates By Industry Sector

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.

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

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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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THANK YOU!

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