

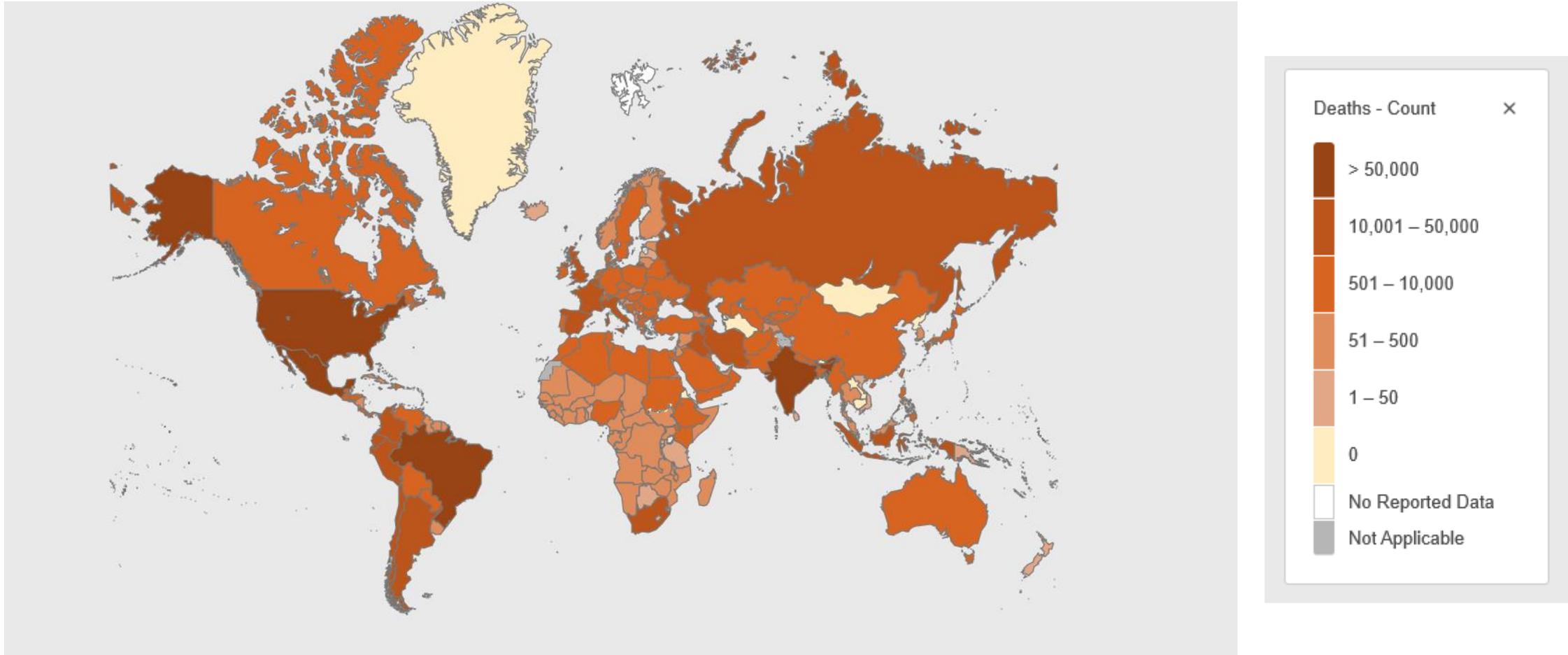
CLIMATE CHANGE: ENERGY TRANSITION RISKS AND OPPORTUNITIES FOR EUROPEAN PUBLIC COMPANIES' CREDIT WORTHINESS

Giorgio Baldassarri, Ph.D.
Global Head
Analytical Development Group
Credit Risk Solutions

November 5th, 2020 – EDHEC-RISK Institute
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/NBK22258/>.

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**

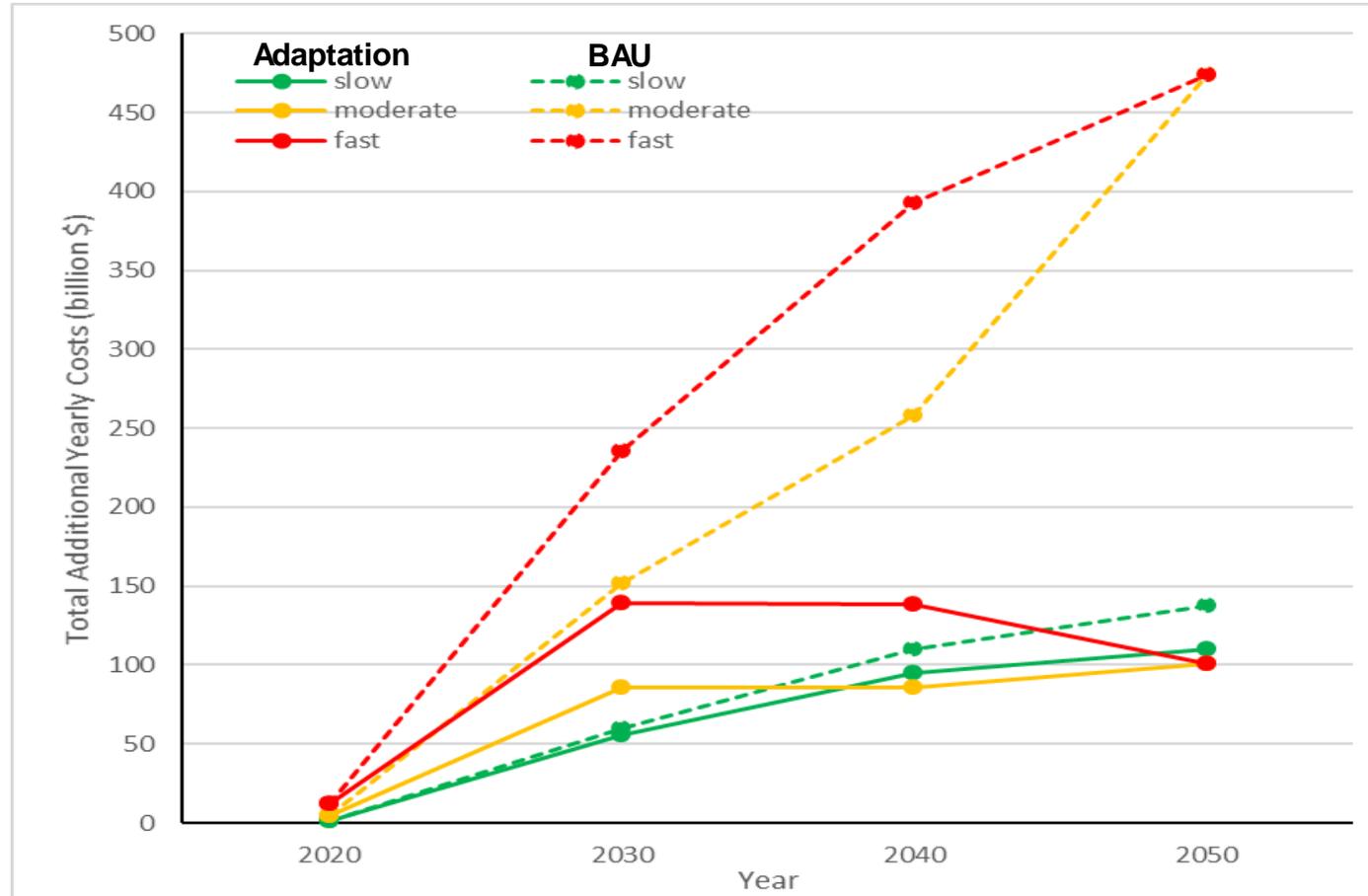
FUNDAMENTALS-DRIVEN	MARKET-VALUATION DRIVEN
<p><i>Company financials conditioned on climate-linked transition scenarios.</i></p> <p>Scope: up-stream oil & gas large firms (1,200+¹); will be expanded to other 6 carbon-intensive sectors</p> <p>Main Output: firm's projected full financial statements and 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><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><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.

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

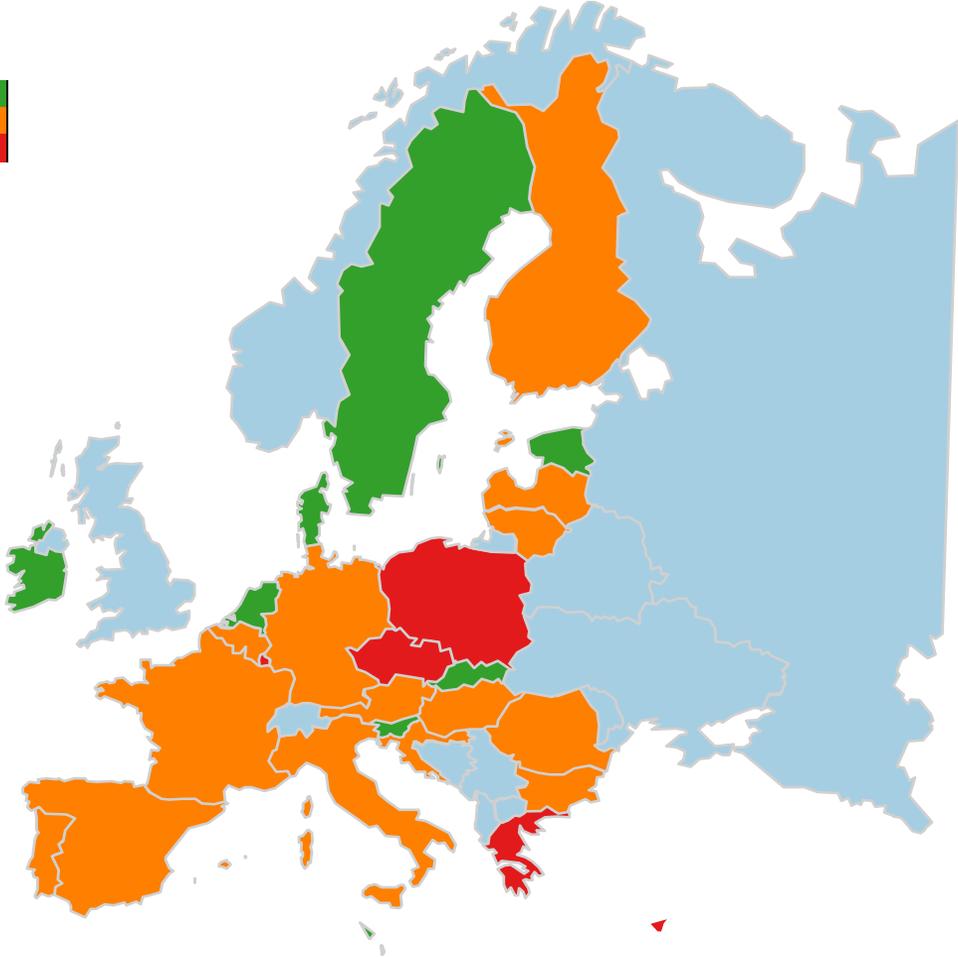


Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only. Based on 4596 European Union public firms in S&P Global Market Intelligence's database. ¹ Carbon tax and (where applicable) abatement costs.

- 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

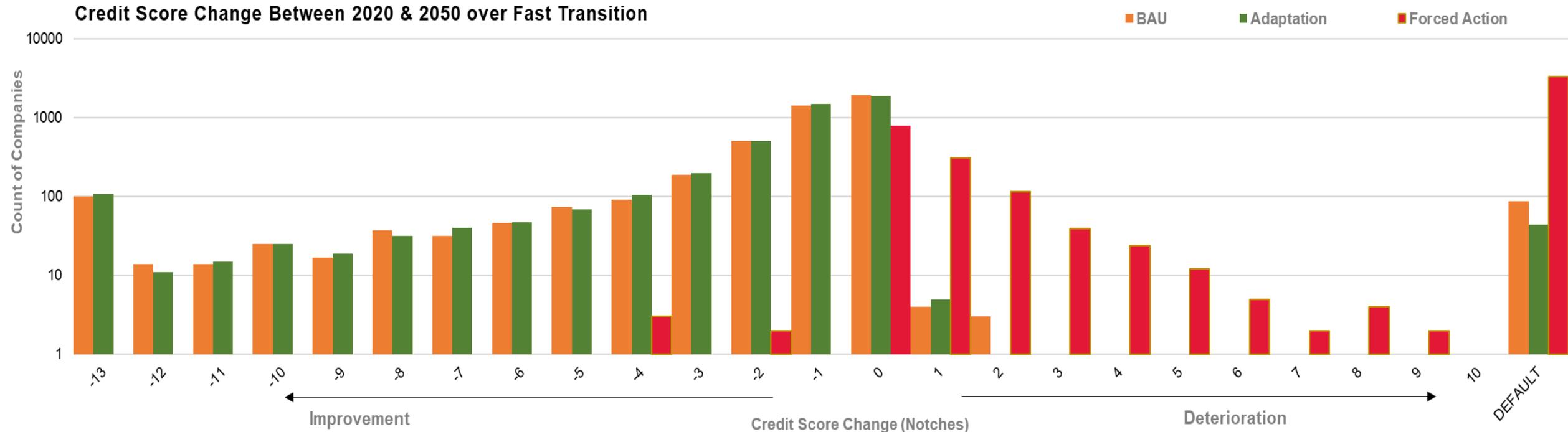
Abatement costs estimate as fraction of (projected) total revenues
(over fast transition, by 2050)



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)

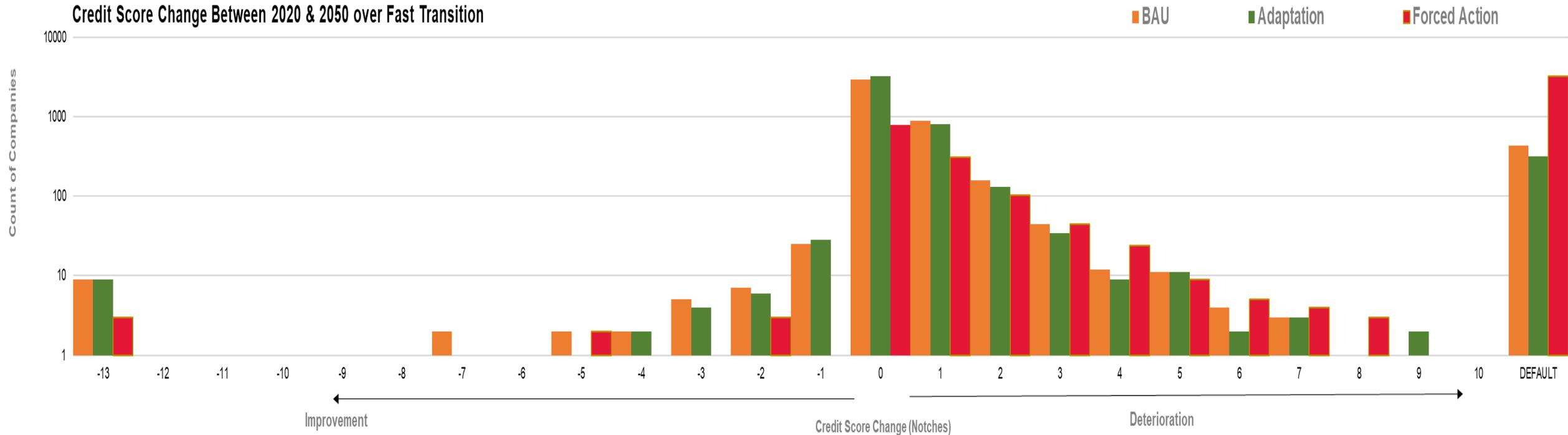
Forced Action: carbon tax increase; governments enforce carbon emission reduction,¹ inducing hefty revenue losses (linked to asset stranding).

- 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.

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

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

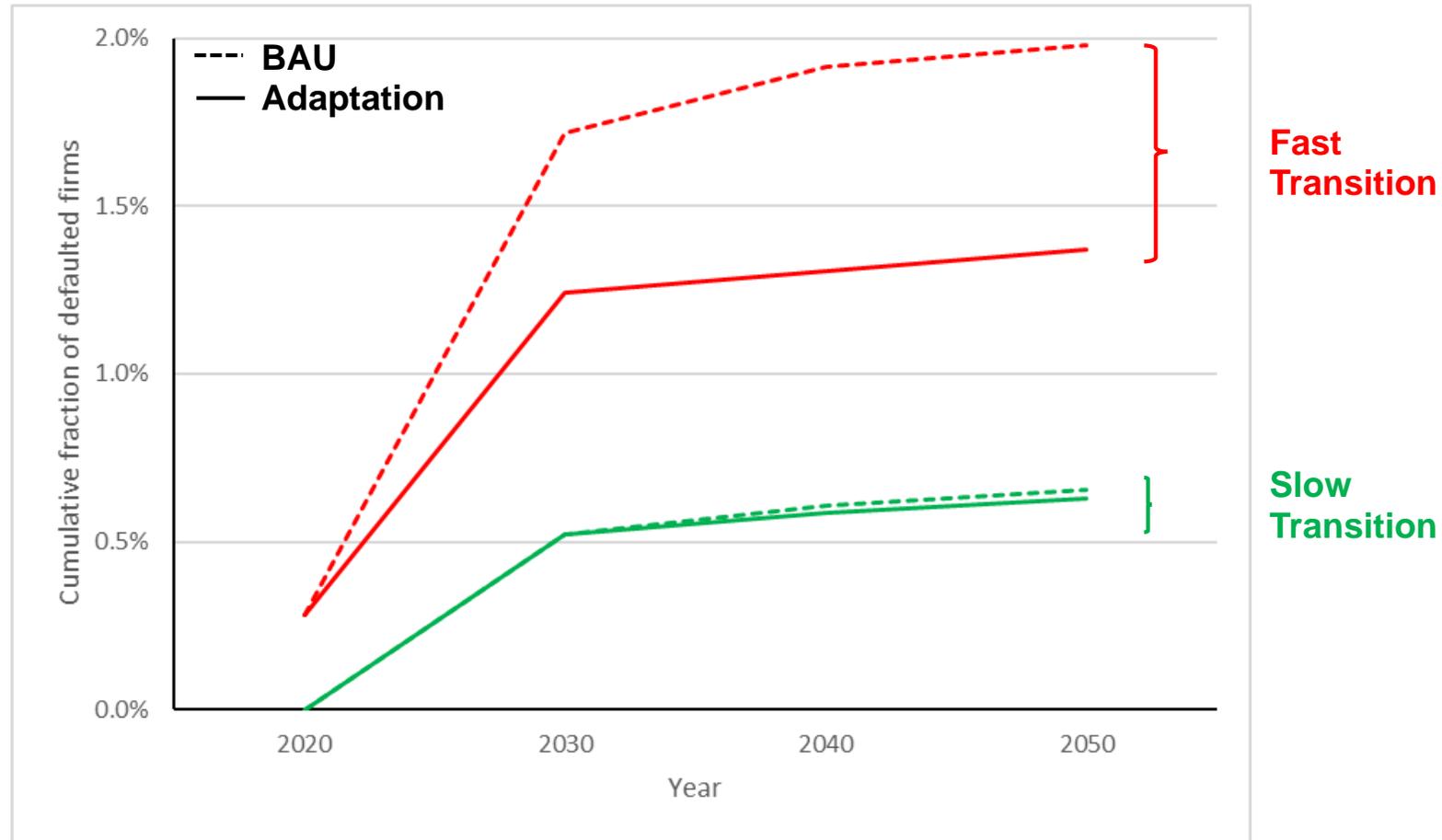
Forced Action: carbon tax increase; governments enforce carbon emission reduction,¹ inducing hefty revenue losses (linked to asset stranding).

- Neglecting additional defaults due to physical risk event losses.

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

Estimated Transition Scenarios: European Union Public Firms

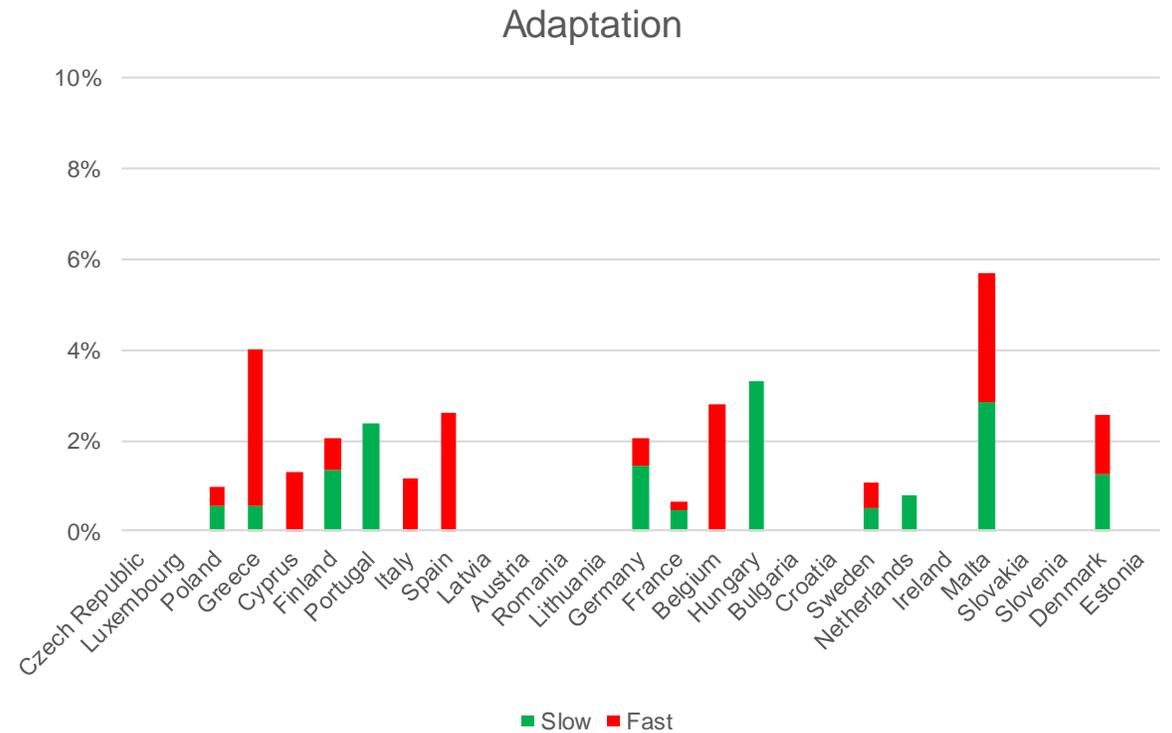
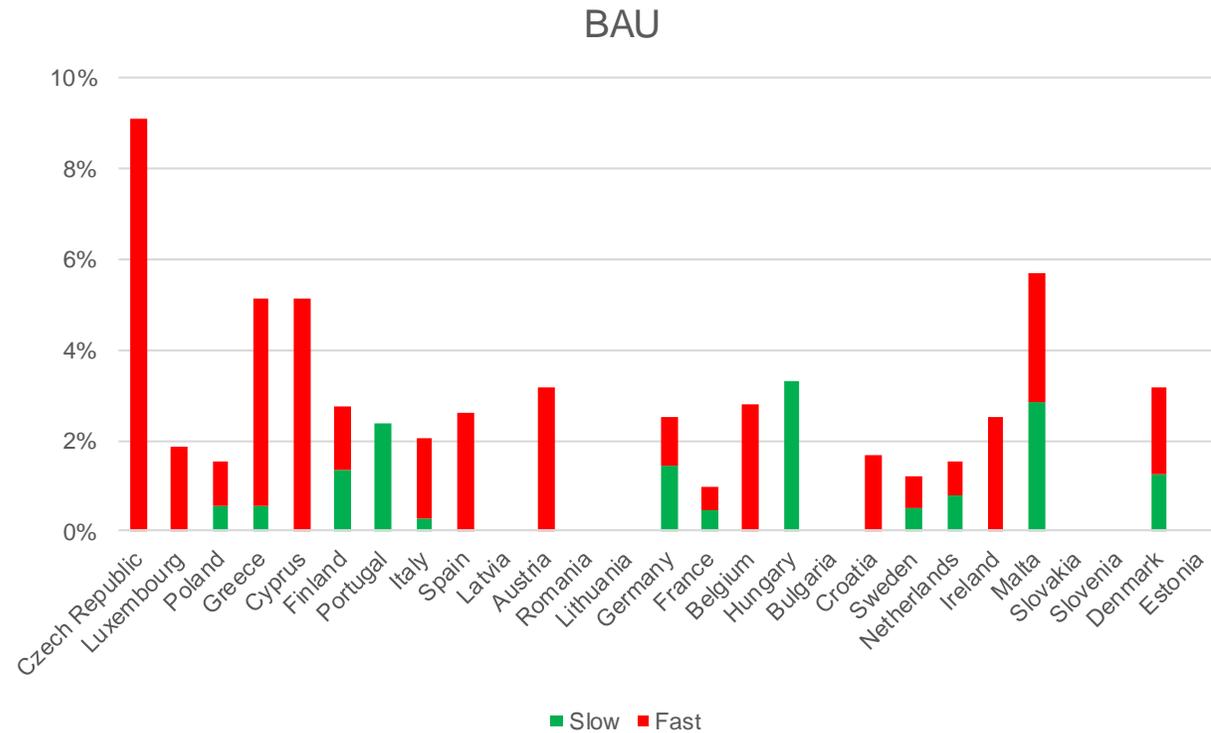
Technical¹ Defaults



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

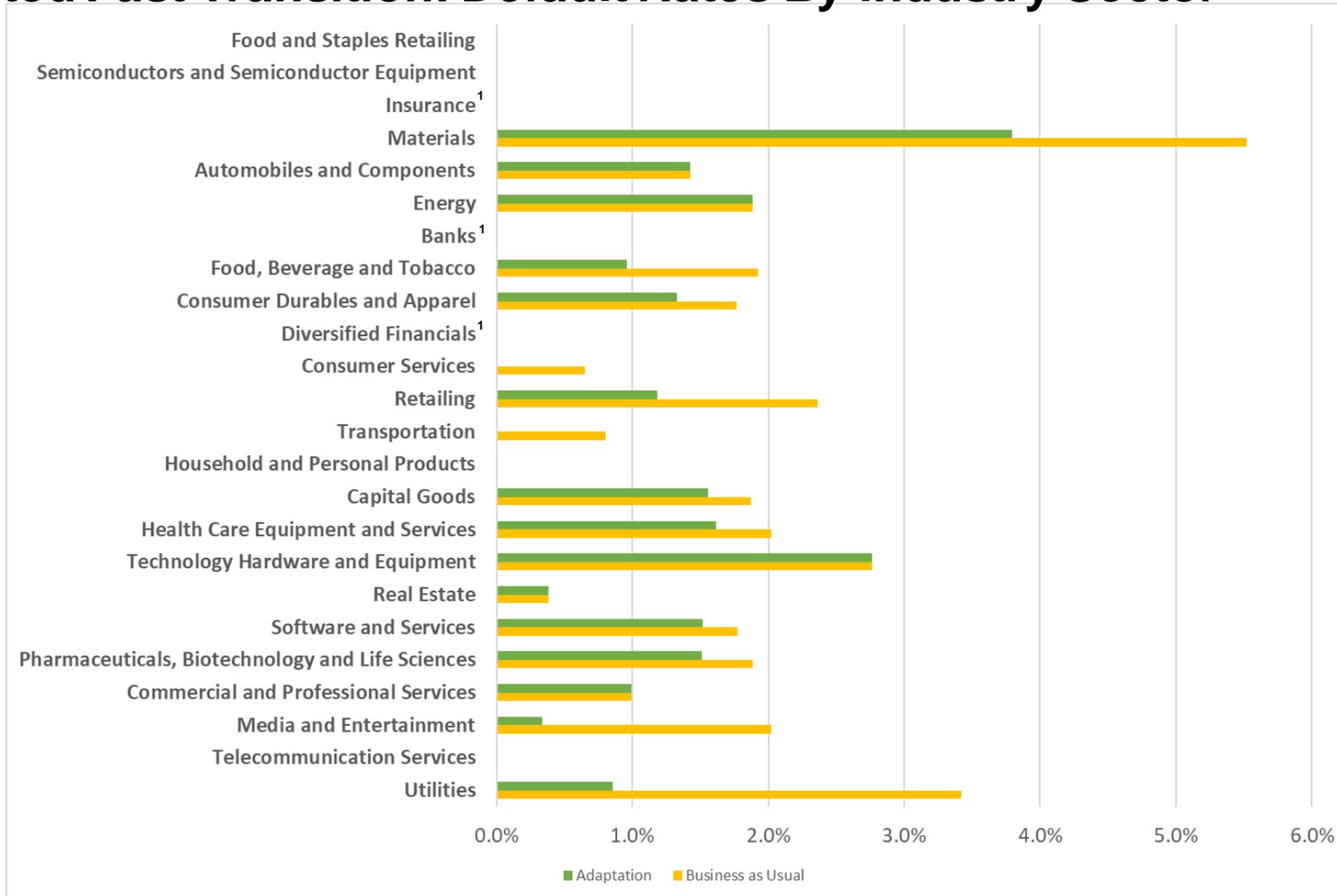


Source: S&P Global Market Intelligence (As of August 31st, 2020). For illustrative purposes only. Based on a sample of 4596 European Union public firms in S&P Global Market Intelligence's database.

- 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.

THANK YOU!

Copyright © 2020 by S&P Global Market Intelligence, a division of S&P Global Inc. All rights reserved.

These materials have been prepared solely for information purposes based upon information generally available to the public and from sources believed to be reliable. No content (including index data, ratings, credit-related analyses and data, research, model, software or other application or output therefrom) or any part thereof (Content) may be modified, reverse engineered, reproduced or distributed in any form by any means, or stored in a database or retrieval system, without the prior written permission of S&P Global Market Intelligence or its affiliates (collectively, S&P Global). The Content shall not be used for any unlawful or unauthorized purposes. S&P Global and any third-party providers, (collectively S&P Global Parties) do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Global Parties are not responsible for any errors or omissions, regardless of the cause, for the results obtained from the use of the Content. THE CONTENT IS PROVIDED ON "AS IS" BASIS. S&P GLOBAL PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT'S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Global Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs or losses caused by negligence) in connection with any use of the Content even if advised of the possibility of such damages.

S&P Global Market Intelligence's opinions, quotes and credit-related and other analyses are statements of opinion as of the date they are expressed and not statements of fact or recommendations to purchase, hold, or sell any securities or to make any investment decisions, and do not address the suitability of any security. S&P Global Market Intelligence assumes no obligation to update the Content following publication in any form or format. The Content should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. S&P Global Market Intelligence does not act as a fiduciary or an investment advisor except where registered as such. S&P Global keeps certain activities of its divisions separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain divisions of S&P Global may have information that is not available to other S&P Global divisions. S&P Global has established policies and procedures to maintain the confidentiality of certain non-public information received in connection with each analytical process.

S&P Global Ratings does not contribute to or participate in the creation of credit scores generated by S&P Global Market Intelligence. Lowercase nomenclature is used to differentiate S&P Global Market Intelligence PD credit model scores from the credit ratings issued by S&P Global Ratings.

S&P Global may receive compensation for its ratings and certain analyses, normally from issuers or underwriters of securities or from obligors. S&P Global reserves the right to disseminate its opinions and analyses. S&P Global's public ratings and analyses are made available on its Web sites, www.standardandpoors.com (free of charge) and www.ratingsdirect.com (subscription), and may be distributed through other means, including via S&P Global publications and third-party redistributors. Additional information about our ratings fees is available at www.standardandpoors.com/usratingsfees.