

LIMITED VISIBILITY

THE CURRENT STATE OF CORPORATE DISCLOSURE ON LONG-TERM RISKS



TRAGEDY OF THE HORIZON PROGRAM
RESEARCH REPORT
SEPTEMBER 2017



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Cover photo: "Golden Gate Bridge Fog" by Jerome Dominici

ABOUT THE AUTHORS



2° Investing Initiative (2°ii) is a not-for-profit think tank working to align the financial sector with the 2°C climate goal and long-term investing needs. With offices in Paris, London, Berlin and New York, the Initiative engages a global network of over 40 partners and members, including financial institutions, investment researchers, asset managers, policymakers, research institutions, academics and NGOs. Our work primarily focuses on three pillars of finance - metrics and tools, investment processes, and financial regulation; the Tragedy of the Horizon project informs all three.

TIME HORIZON PROGRAM: In the course of its work on climate-related risks facing the finance sector, 2° Investing Initiative faces the question related to what Mark Carney, the governor of the Bank of England called “the tragedy of the horizon”: risks that are material for a physical asset (e.g. power plant) or a company (e.g. electric utility) are not necessarily material for their investors and are not necessarily priced in by financial analysts. As a response, we have initiated the ‘*Tragedy of the Horizon*’ research program. The objectives of the program are threefold:

- 1) **Informing the debate** by quantifying time horizons across the investment chain;
- 2) **Identifying the unintended consequences** of risk management practices focused on the short-term;
- 3) **Developing responses** in partnership with the two key stakeholder groups: investors and financial policymakers.

To date, the project team has published four papers, and has started implementing the related recommendations with investors, policy-makers and supervisory authorities :

- ***The long-term risk signal valley of death – Exploring the tragedy of the horizon***, 2Dii/Generation Foundation, Nov 2015. This short paper describes the time horizon mismatch across the entire investment chain. The key conclusion is a mismatch of timeframes regarding the financial materiality of risk between asset owners and developers with financial intermediaries. 
- ***All swans are black in the dark – How the short-term focus on financial analysis does not shed light on long term risks***, 2Dii/Generation Foundation, Feb 2017. This report (60 pages) concludes that while the net present value of stock and bond portfolios is primarily based on long term cash flows, equity research and credit rating analysts primarily focus on the risks that are likely to materialize in the next 3-5 years. 
- ***The long and winding road – How long-only equity managers turn over their portfolio every 1.7 years***, Mercer/2Dii/Generation, Feb 2017. This report (60 pages) find that 90% of long-only equity fund managers have an ‘investment horizon’ is shorter than 3 years, contributing to low demand from investors for long-term financial analysis. 
- ***Changing colors – Adaptive capacity of companies in the context of a transition to a low carbon economy***, 2dii/Co-firm/Allianz, July 2017. This short paper (10 pages) describes how to measure a company’s ability to adapt to long-term risks like the Energy Transition. 
- ***A time horizon mismatch – why climate risks do not fit into regulatory stress tests?***, 2dii, September 2017. This short paper (10 pages) addresses the possibility of integrating climate risk scenarios into regulatory stress tests. 

THIS REPORT: This report deals with the time horizon of corporate disclosure. The paper has been authored by Stan Dupre, Tricia Jamison and Brendan Burke, with inputs from Mona Naqvi and Jakob Thomä, all from the 2° Investing Initiative team. It also benefits from engagement with various organizations including WBCSD, KPMG, Deloitte, PricewaterhouseCoopers, Unilever, Royal Siam Cement Company, CLP Group, Philip Morris International, Arcadis NV, S&P Global, Kepler Chevreux, ClientEarth, American Bar Association, and Generation Investment Management. As an essential part of our research, we conducted workshops and seminars as well as interviews and a survey for corporate finance analysts. The conclusions of this report do not necessarily reflect the views expressed by the organizations consulted via workshops and interviews.

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GLOSSARY

Key concepts used in this report

Concept	Definition (for the purpose of this report)	See page
Long term risk disclosure	This concept, which is the topic of this report, includes the discussion of long-term risks and the publication of forward-looking data by companies, including investment plans, forecasts and targets .	10
Discussing risks	The “discussion” of risks involves an identification of the risk factors, the weak signals to monitor, the potential triggers, the likelihood of materialization for different time periods, and the potential financial impact of risks. It can be qualitative or quantitative.	29
Long term risks (aka ‘white swans in the dark’)	Non-linear, non-cyclical risks, only likely to materialize after 5 years. These risks are likely to be missed by a risk analysis focused on the short term even though weak signals are visible today and that investors can act on them today. Past examples include the subprime mortgage bubble, and automakers defeat practices for pollution tests. Potential current risks include energy transition risks and the disruptive impact of Artificial intelligence in various sectors like asset management.	28
Plans	<i>Plans</i> form part of the “guidance” communicated by issuers of securities to analysts. These forward-looking data include capital expenditures (\$), increase in production capacity (e.g. MW), R&D expenditures (\$), etc.	17
Targets	Targets are objectives set by management that are more ambitious than simple forecasts and less certain than plans. These forward-looking data include production level, sales, environmental indicators, etc.	22
Forecasts	Forecasts are not fully under the control of the company and depend on external factors. These forward-looking data include sales, production, costs, profits, as well as non financial metrics like CO ₂ emissions trajectories.	22
Corporate Guidance	Corporate guidance is disclosure from companies that is “forward-looking”, i.e. that covers future time periods. Guidance may be for the short- or long-term. Guidance can be issued along a number of different channels—e.g., regulatory filings, investor presentations, earnings calls—and to different target audiences including financial analysts, investors, or the general public.	17

EXECUTIVE SUMMARY FROM 2^o INVESTING INITIATIVE'S "LIMITED VISIBILITY: THE CURRENT STATE OF CORPORATE DISCLOSURE ON LONG-TERM RISKS"

This discussion paper extends the analysis of time horizons in financial markets, conducted as part of the *Tragedy of the Horizons project*, to 'long term risk disclosures' by companies. On the basis of corporate disclosures (including annual reports, regulatory filings, guidance to analysts, etc.) the paper analyzes how far in the future listed companies disclose their plans and financial forecasts, and how they discuss 'long term risks' that are only weak signals today but might disrupt their business model in 5, 10 or 20 years. The paper then assesses how disclosures might be improved using observations on current best disclosure practice, a comparison of corporate disclosures with internal practices, economic intelligence data and estimates by financial analysts.

The report represents the most comprehensive analysis of *corporate long-term financial disclosures to date*. The analysis included the review of 125 annual reports, 37 sustainability reports, 33 CDP survey responses, analyst estimates and corporate guidance collected on Bloomberg for over 1,000 companies, as well as qualitative interview questions with investors, CFOs, auditors and corporate lawyers. It analyzes three types of corporate reporting: raw activity data related to investments (with an emphasis on capital expenditure), financial forecasts (e.g. sales, EBIT), and discussion of risks. The sample of annual reports covers 10 countries.

The main conclusion of the paper is that the development of forward-looking financial disclosures over the past two decades has nearly exclusively focused on short-term time frames (next quarter to year).

KEY TAKEAWAYS

- 1 Corporate disclosure of **investment plans** are limited to **1-2 years**, even though companies usually establish plans for the next 5-10 years
- 2 Corporate disclosure of **financial forecasts** is limited to a **1 year timeframe** compared with estimates from financial analysts that usually cover the next 5 years.
- 3 Only about **5-10%** of companies analyzed **specifically discuss long-term risks** and only **25%** report on the sensitivity of their impairment test to adverse scenarios.
- 4 **Long-term risk disclosure is discouraged by a 'perfect storm'** formed by the combination of vague regulatory requirements, race to the bottom among peers, limited role of auditors, fear of litigation and limited demand from financial analysts.
- 5 This disclosure gap **inhibits the exploration and management of long-term risks** by corporate managers who are requested to focus on the short term and face legal risks if they create internal awareness of risks that they won't disclose
- 6 Our research and recent evolution of voluntary initiatives suggest the emergence of a **best practice framework** for long-term risk disclosure.
- 7 A mix of private sector and policy actions, including **targeted adjustments of mandatory and voluntary reporting requirements** can greatly help to promote best practices

1. CAPEX PLAN DISCLOSURE IS LIMITED. A review of annual reporting shows that only 50% of companies disclose their capital expenditure plans, and 90% of capex guidance by S&P500 companies was for a time horizon of 2 years or less (2002-2014). This contrasts with a survey of 37 publicly traded companies by 2^oii, which suggests an average 14.8 year time horizon of capital expenditure planning and the time horizon of local announcements and permits granted reflected in economic intelligence databases (5-10 years) (see Figure 1 at right).

2. FINANCIAL FORECASTS ARE SHORT-TERM FOCUSED. Even though financial analysts and economic intelligence data providers produce financial forecasts for the next 5 years and in some sectors up to 10 years, companies only disclose forecasts for the next quarter to year. This gap constrains the forecast period of DCF models and therefore increases the uncertainty of stock valuations by financial analysts.

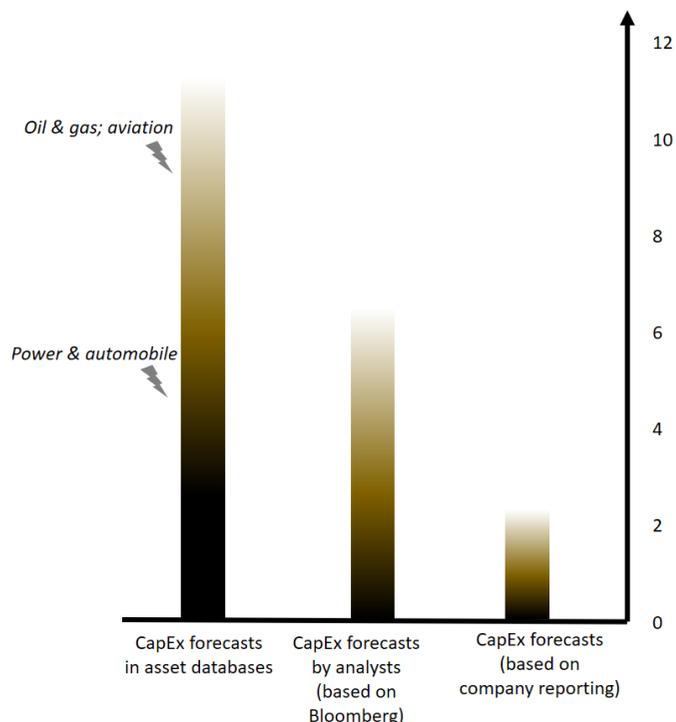
3. LONG-TERM RISK DISCUSSION IS INADEQUATE. Our review of financial risk disclosures has tracked ‘White Swans in the Dark’: the types of risks are likely to be missed by analysts focused on the next 1-3 years, even though weak signals are visible today (e.g. climate policy risks and the disruptive impact of Artificial Intelligence). Less than 10% of companies in our sample specifically discuss long-term risks. For instance, only 7% of MSCI World banks discuss the potential disruption of their business related to FinTech (robo-advisors, automation of asset management, etc.). Another example studied in this paper is risk disclosure from BP before and after the Deepwater Horizon accident: it shows that the related risks were described in a very generic and vague way, contradicting the recommendations from the Securities and Exchange Commission.

4. VIABILITY STATEMENTS ARE LIMITED TO 3 YEAR TIME HORIZONS. ‘Viability statements’ that discuss the resilience of the business model to adverse scenarios only exist in the UK and South Africa and are usually limited to a 3 years time frame (maximum 5 years).

5. IMPAIRMENT TEST RESULTS ARE RARELY DISCLOSED. This gap in long-term risk analysis is also reflected in the disclosure of impairment tests – that necessarily imply forecasts on cash flows from the asset tested: only 6% of companies in our sample provide quantitative results of sensitivity/scenario analysis. This contrasts with the results of our survey that suggests that 53% of companies perform such analysis internally – see Figure 2 (at right).

Figure 1: The time horizon of corporate capital expenditure plans and disclosure

Disclosure of capex plans is significantly more short-term than actual plans and forecasts by analysts

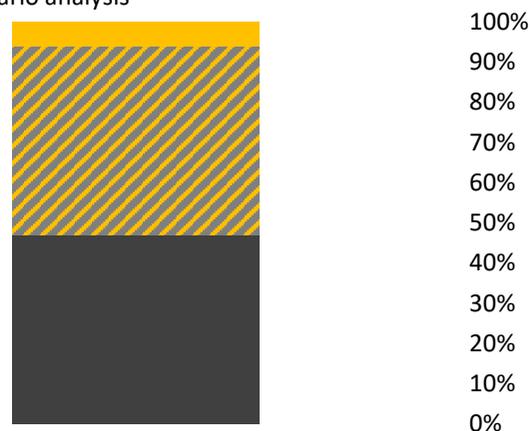


Source: Authors

Figure 2: Scenario analysis in annual reports and filings and according to company surveys

Only 6% of companies currently disclose scenario analysis

- 6% of companies disclose the results of scenario analysis
- 53% of corporate survey respondents do scenario analysis, at least for impairment tests
- 47% of Companies provide no evidence of internal and/or disclosed scenario analysis



Source: Authors. N=125 Global Companies

6. HOW LONG TERM RISK DISCLOSURE GETS CLOUDED...



FAVORABLE WINDS
Pressure from civil society, voluntary ESG disclosure standards, economic intelligence databases

LARGELY AVOIDED BY PEERS

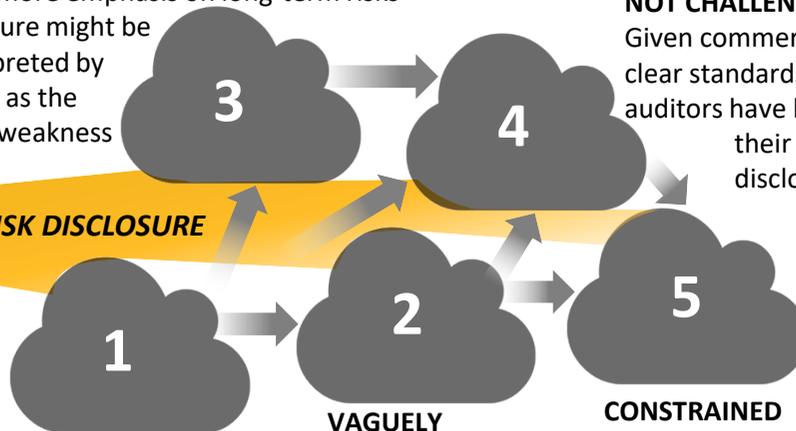
Competitors do the bare minimum because more emphasis on long-term risks in disclosure might be misinterpreted by investors as the sign of a weakness

NOT CHALLENGED BY AUDITORS

Given commercial pressures and the lack of clear standards and regulatory oversight, auditors have limited license to challenge their clients on long-term risk disclosure



LONG TERM RISK DISCLOSURE



1 NOT REQUESTED BY ANALYSTS

Most questions from analysts focus on the short term

2 VAGUELY REGULATED

Mandatory requirements are short-term focused and only evolve if a crisis occurs

5 CONSTRAINED BY LEGAL DEPT.

In the US, companies can be held liable for incorrect forward-looking statements. The fear of lawsuits leads to watering down long-term disclosures.



LONG TERM INVESTORS

Source: Authors

7. THIS PERFECT STORM INHIBITS LONG-TERM RISK ASSESSMENT BY CORPORATE MANAGERS...

IN THEORY: long-term risk management attracts long-term investors

Long-term investors with buy and hold strategies are looking for a better valuation of long-term cash flows

They disclose the risks and plans to analysts to help them better model future cash flows

It is in their interest to assess these long term risks to inform investment plans and strategy

Companies owning long-term assets face long-term risks

Reward

Reward

IN PRACTICE: the short-term focus of investors discourages long-term risk management

90% of equity investors turn over their portfolio in less than 3 years

Limited demand for long-term financial risk analysis

Nobody challenges companies on their lack of long term risk disclosure

Regulations do not require reporting on long term risks

Analysts do not ask questions about long term risks

Legal departments advise companies to:

- Stick to 'Disclaimer Style' reporting

- Disclose material risks to investors

Companies have no incentive to report on long term risks

Companies have an incentive not to explore long-term risks

8. BEST PRACTICE FRAMEWORK. Based on our findings, we submit to consultation a draft ‘best practice’ framework (table 1) and a set of ‘low hanging fruit’ policy-actions (table 2) to support better long-term risk corporate disclosure. Complementary actions involve supporting the development of ‘user groups’ for this type of data and ease the access and use of big data as a way to pressure companies who do not disclose.

Table 1. Suggested long term risk disclosure best practice framework

Topic	Current best practices	Recommendations to go further
Identification and discussion of long term risks	Following the example of the best viability statements, companies can discuss the key factors of potential disruption for the next 5 years, build a set of 3-5 scenarios and report both qualitatively and quantitatively on the impact of their key financial indicators	In certain industries with long-term assets and visibility (e.g. energy, power, aviation) the timeframe can be extended to 10 or 15 years. Reporting companies can also support the standardization of sector-specific scenarios to allow comparability
Description of impairment tests assumptions	Best reporters discuss the impact of different scenarios on the results of the impairment tests, as well as the assumptions behind each scenario and the reason for prioritizing one	The selection of scenarios can be linked to identified long-term risks and be reflected in assumptions and sensitivity adjustments used to calculate impairments and fair value measurements for assets. In sectors exposed to policy risks (e.g. climate goals, phase out from nuclear), companies can link scenarios with achievement of policy objectives (e.g. 2° scenario).
Forward-looking disclosure of investment plans	A few best reporters publish consolidated capital expenditure plans for the next 3-5 years and discuss the impacts on production capacity.	Companies can align their level of disclosure on what is already available in economic intelligence databases, by extending the time horizon when there is enough visibility and providing asset-level results. They can discuss the misalignment of their plans with public policy goals (e.g. climate)
Financial forecasts and targets	A very limited number of reporters provide forecasts for the next 5 years for their central scenarios. Some of them set targets on operational indicators (e.g. sales) and environmental impacts (e.g. CO2 emissions)	Companies can increase the horizon of their forecasts to 5 years at least and/or align it with the forecast period of analysts in the industry. They can provide the results of sensitivity analysis and discuss the misalignment with policy goals and corporate targets.

9. RECOMMENDATIONS TO POLICY-MAKERS AND STANDARD SETTERS

Table 2. Recommendations regarding the long-term risk disclosure regulatory framework

Topic	Current best practices	Questions to be addressed by policy-makers
Clarifying the investment horizon	At best, existing regulations clarify that the user of the disclosure is a ‘long-term reasonable shareholder’	Clarify the investment strategy and the related time horizon: is disclosure supposed to inform an investor with a ‘buy and hold’ strategy or the average fund manager with a <2 year horizon?
Clarifying the target audience	ESG-related requirements have started to introduce the idea that companies also report to other stakeholders	Beyond the investors, is the company supposed to discuss the viability of its business in general and understand the implications for other stakeholders?
Set a minimum level of precision on the description of risks	Many market authorities have published notes calling for more precision on financial risk identification and description	Why is this dimension of requirements not enforced? The market authorities can set up an internal team or partner with the private sector to monitor compliance, fine-tune guidance, and help level-up the playing field to counter balance the ‘perfect storm’.
Apply the principle of equal access to information to asset level data	The information available in asset-level databases is not directly disclosed by companies to investors	Regulators could review the state of information available (e.g. read this report) and consider recommending companies to at least disclose to investors what is publicly available, but difficult to access.

PART I

HOW DO FINANCIAL ANALYSTS USE FORWARD-LOOKING DISCLOSURE?

SECTION SPOTLIGHT

- Companies disclose forward-looking information and discuss long term risks through several channels: regulatory filings, annual and sustainability reports, guidance to analysts, disclosure to NGOs, and other public information including press releases and news.
- Forward-looking disclosures directly feed valuation models used by analysts
- This paper analyses corporate disclosure to understand the the timeframe associated with risk discussion and forward-looking disclosures

1.1 OVERVIEW OF FORWARD-LOOKING CORPORATE DISCLOSURE

Why do companies voluntarily disclose forward-looking information? Since the 1990s, US publicly listed companies have increasingly offered earnings guidance to satisfy investors' demand for increased transparency.¹ Offering earnings guidance could attract more analysts to cover the company and ultimately investors. This rationale holds for other voluntary disclosure items. Forward-looking information can make companies more attractive to investors.

How do companies disclose forward-looking information? The following summarizes the key channels:

- 1) Guidance to analysts and investors.** Companies provide guidance to analysts and investors through multiple channels, including earnings announcements, earnings calls, and investor roadshows. Most guidance to analysts currently is short-term focused.
- 2) Regulatory filings.** Companies disclose forward-looking information in various parts of their filings. The exact sections within the reports vary across jurisdictions (see Fig 1 below), but overall it is possible to distinguish the management discussion of mostly qualitative information (e.g. risk factors, viability of business), accounting items that are based on forecasts (impairments), description of investment plans, and forecasts of operational indicators.
- 3) Sustainability reports.** Increasingly, large companies publish sustainability reports or sustainability sections in their annual reports

(which are then known as integrated reports). These reports usually provide forward-looking information such as GHG emissions targets and investment plans related to green technologies. The provision of this information is regulated in a number of jurisdictions (e.g. France, Europe) but the official guidance is flexible on forward-looking items.

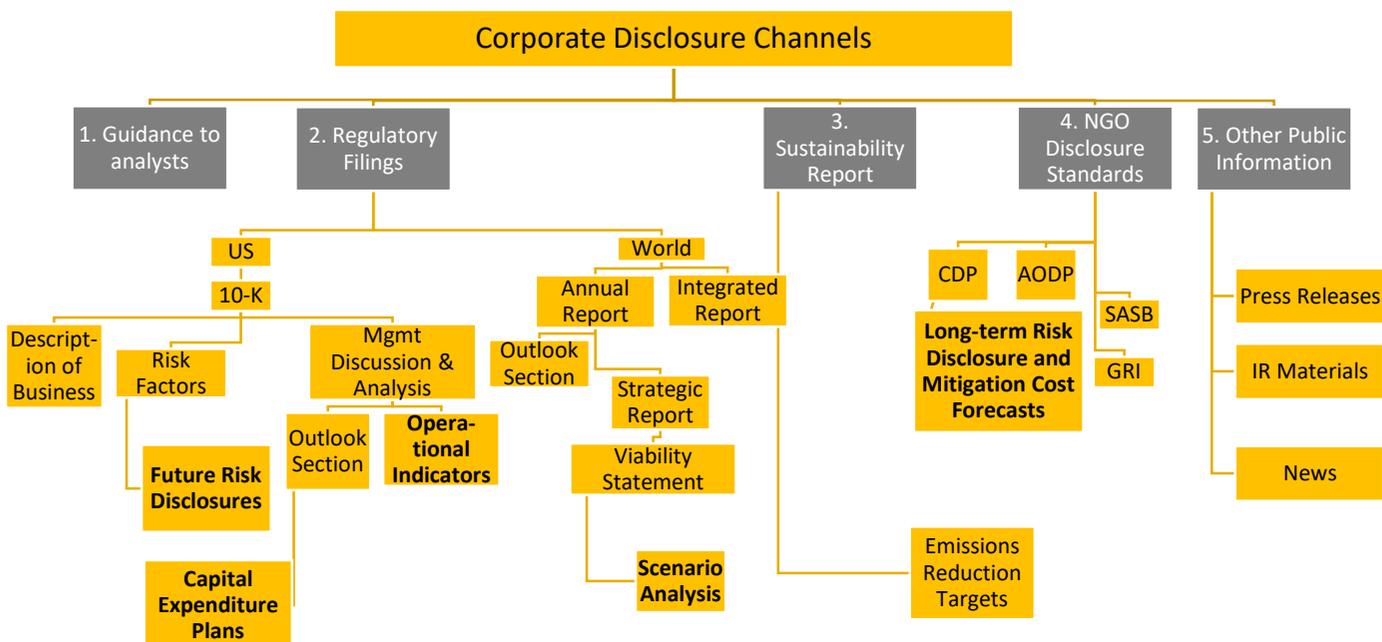
- 4) Disclosure to NGOs.** A number of NGOs and ESG data providers survey large companies on their performance related to Environmental, Social, and Governance (ESG) issues. The most prominent players in this field include CDP, GRI, SASB, and AODP (see below). Similar to sustainability reports, most disclosure items are backward-looking, but reporting standards increasingly focus on investment plans, targets, and scenarios.

- 5) Other public information.** Finally, companies provide a range of disclosure through 'informal' mechanisms (e.g. press releases)

Globally, the legal environment has evolved to encourage companies to disclose forecasts. In the US, for example, forecast disclosure has been allowed in mandatory filings by the US SEC since 1973. In 1979, the US SEC provided "safe harbor" against lawsuits for firms making financial forecasts in "good faith." In 1996 the US Congress broadened this, making it tougher to sue companies for inaccurate forecasts. From the mid-1990s to 2004, KKS Advisors and the Generation Foundation found that the number of companies releasing earnings guidance increased from 10-15% to 50%.² In 2000, the US SEC introduced Regulation Fair Disclosure which requires that all material corporate disclosures—regardless of initial channel and audience—be made public, usually via Form 8-K. On this basis, forward-looking data is increasingly becoming available for use by analysts.

Figure 1: Channels of Corporate Disclosure

The time horizon of forward-looking disclosure can be constrained by the format through which it is disseminated



Source: 2dii from survey of 237 Company Annual Reports. Forward-looking items are in bold.

1.2. HOW DO ANALYSTS ACTUALLY USE FORWARD-LOOKING DATA?

Financial Analyst Workflow. Equity and credit research analysts create primary research outputs such as earnings estimates, target prices, and credit ratings, as well as qualitative assessments of a company's prospects. Underlying all these outputs is a company valuation, calculated from historical and projected data run through a quantitative model.

Cash is king. The value of a company is a function of the cash it is able to generate, after necessary investments have been made.³ The most common tool used to calculate future cash flows and produce quantitative analyst outputs is the Discounted Cash Flow (DCF) Model. In its most basic form, the 2-Stage DCF model is driven by 4 inputs: a set of explicit future cash flow forecasts, the length of time over which those explicit forecasts are made (i.e., the length of Stage 1), the assumed growth rate of cash flows into perpetuity after this period (i.e., Stage 2), and the discount rate used to discount them (see Figure 1 on next page).

Model inputs. To make projections, analysts incorporate historical data from company filings, corporate guidance, current and future industry and macroeconomic trends, and any information unique to the analyst or organization. Corporate guidance on company activity, financial performance, and key risks are an important inputs for projections. Much of this guidance is collected by financial data platforms such as Bloomberg, Eikon, and Factset. These platforms pull information from various sources and translate it into structured, quantitative data points that are comparable across companies and can be plugged into DCF models. In addition, financial analysts are increasingly accessing corporate investment data through economic intelligence databases (e.g. asset databases that collect information on assets, investment plans and production).⁴

DCF projections. In a 2-stage DCF model, Enterprise Value is calculated as the sum of the explicit cash flow forecasts from Stage 1 and the terminal value from Stage 2. Stage 1 cash flow forecasts rely on projections of financial statement line items such as Sales, Operating Expenses, Capital Expenditures, tax rates and an analyst's determination of the number of years to forecast.⁵ The terminal value of the company from the end of Stage 1 is based on the value of the final forecasted cash flow from Stage 1, the discount rate applied to the company's cash flows, and the expected growth rate to perpetuity.⁶

Less disclosure implies more assumptions and more risk to investors. In the absence of corporate guidance from companies, in many cases analysts' most justifiable default assumption is that individual line items and cash flows – and the risk associated with those cash flows – will either remain constant or grow along the current historical trend. This potentially leaves investors exposed to losses that could have been incorporated in valuation modelling – White Swans in The Dark.⁷

Figure 1: Comments on the Importance of Forward-looking Information in Financial Analysis

“Stock analysts need to forecast revenue and growth to project what expected earnings will be.”

Kristina Zucchi, CFA

“Is there room to double sales in the next 5 years?”

Question asked of every company by institutional fund manager with \$150 billion AUM

“CFA Institute has sought better disclosures regarding management's assumptions, judgments, and estimates included in forward-looking measurements as well as better cash flow information to assess both the reasonableness of such assumptions, judgments, and estimates and the organization's ultimate realization of cash flows.”

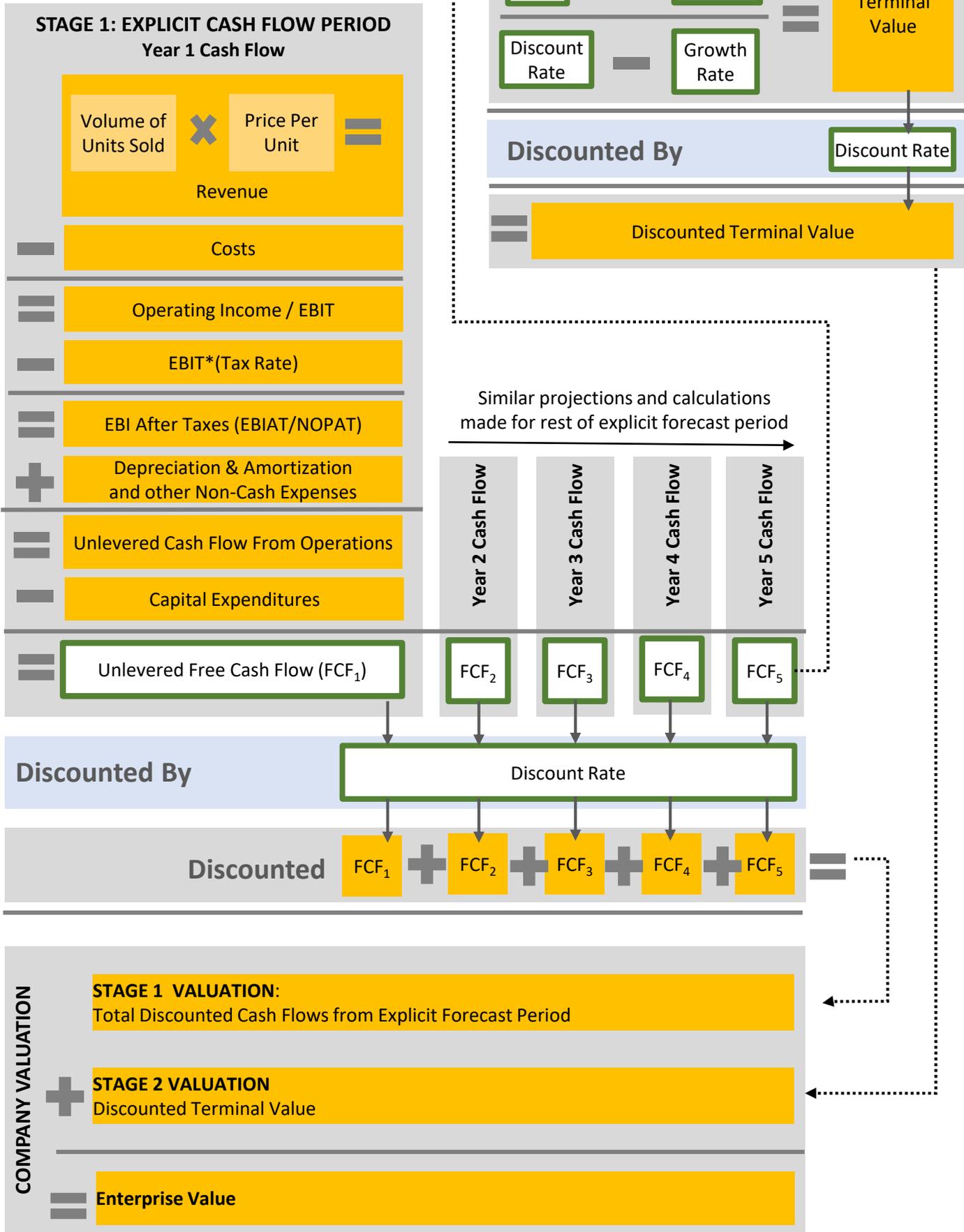
Sandra J. Peters, CPA, CFA; Head of Financial Reporting Policy, CFA Institute

“The notion that the value of a business is a function of its expected cash flows is deeply engrained in finance...While this principle is intuitive and easily proved, measuring excess returns has proved to be difficult to do.”

Aswath Damodaran, Stern School of Business

Figure 1: Basic 2-Stage DCF Model Calculations and Inputs

Note: Numerous variations including multi-stage models exist. Generally, more complex models allow for more granular assumptions about growth and growth drivers in each stage. Ultimately, all rely on a terminal value calculation.



Source: 2dii from Bloomberg XDCF template, Literature Review and Workshops with Analysts

1.3. RESEARCH OUTLINE

Our analysis. Without forward-looking information on companies, analysts have much less ability to accurately model a company’s net present value and investors have a greater risk of losses from a ‘White Swan in the Dark’ materializing. Given the importance of forward-looking information in the investment allocation chain, this report assesses the time horizon of currently available corporate activity, financial, and risk information. To do so, we drew on multiple sources including mandatory filings, voluntary reporting, corporate guidance, analyst estimates, and asset-level databases. In addition, annual reports were assessed qualitatively to understand the context in which forward-looking data is presented. Figure 1 below summarizes the scope of the analysis by type of information, indicators/topic assessed, and data sources.

Taxonomy of Information Assessed. The following sections assess the current state of the following types of forward-looking company information:

- 1) **Information on corporate activity.** Capital expenditure plans, asset impairments, production plans.
- 2) **Corporate financial information.** Forecasts of various sales, cost, and profitability indicators that describe the financial health of operations.
- 3) **Corporate risk discussions.** Discussions of financial risks the company faces, the potential quantitative impact of these risks on company performance (e.g through scenario or sensitivity analysis), and potential mitigation measures or activities designed to take advantage of risks and opportunities.

Types of Data. The following types of data are used in our analysis:

- 1) **Analyst Estimates and Company Guidance.** The Bloomberg platform aggregates external and in-house estimates and guidance for a large global universe of equities.
- 2) **Mandatory Corporate Reports.** Mandatory annual reports are available on company websites and were sampled on the basis of market capitalization across global markets.
- 3) **Voluntary Corporate Reports.** Companies voluntarily offer additional disclosure including Sustainability Reports, Integrated Reports, and responses to Surveys.
- 4) **Asset-Level Databases.** Economic intelligence is available on individual company assets through government databases and commercial data providers. It is aggregated from multiple sources and is usually a combination of corporate disclosure and some amount of proprietary modeling.
- 5) **Survey data.** The authors conducted a survey of the Finance Departments of 37 corporate members of the World Business Council for Sustainable Development.

Figure 1 on the next page describes the data types, sources, and sample sizes used in the analysis.

Figure 1: Research Roadmap for Assessing the State of Forward-Looking Disclosure

Report Section	Type of Information	Specific Indicators/Topics	Type of Data Used
Part 2: Corporate disclosure of planned investments (p. 16-20)	Corporate Activity Data	<ul style="list-style-type: none"> • Capital expenditures • Asset impairments • Production Plans 	<ul style="list-style-type: none"> • Company Guidance • Analyst Estimates • Global Annual Reports • Asset-Level Databases • WBCSD Survey
Part 3: Corporate disclosure of financial forecasts (p. 21-26)	Corporate Financial Data	<ul style="list-style-type: none"> • Sales • Costs • Profitability 	<ul style="list-style-type: none"> • Company Guidance • Analyst Estimates • Global Annual Reports
Part 4: Corporate risk disclosure (p. 27-37)	Corporate Risks	<ul style="list-style-type: none"> • Long-term risks • Viability Statements 	<ul style="list-style-type: none"> • US 10K Risk Factors and MD&A Section • Global Annual Reports • Sustainability Reports • CDP Reports

Figure 1: Overview of Data Used in Analysis

Type of Data Used	Provider	Description of Sample
Company Guidance and Analyst Estimates	Bloomberg	N = 1,304,100 data points. <ul style="list-style-type: none"> 1,610 MSCIWorld Index constituents as of 4/17/2017. next 30 future fiscal years (FY1-FY30) Bloomberg Estimates (BEST) fields for 13 indicators Company Estimates (CEST) fields for 14 indicators Additionally, evaluated the 27 indicators for the next 20 future fiscal quarters (FQ1-FQ20) for 405 MSCIWorld constituents for context on availability of short-term estimates and guidance.
Asset-level Oil and Gas Field Production Data	GlobalData	25,000 oil & gas fields (2015-2025)
Asset-level Utility Capacity Data	GlobalData	~100,000 power plant units (2015-2025)
Asset-level Automobile Production Data	Ward's Auto	~95 million cars annual production (2015-2025)
Mandatory Corporate Reporting	Company	Global Annual Reports (N=125 companies) <ul style="list-style-type: none"> Top 100 of MSCI World by market capitalization, with selection informed by adequate sector and geographic representation 25 additional WBCSD members. US 10-Ks (N=110 companies) Top 100 of S&P 500 by market capitalization, informed by sector representation
Voluntary Corporate Reporting	Company, CDP	Sustainability Reports (N=37) <ul style="list-style-type: none"> Standalone sustainability report of all companies in the annual report sample, if one was published on their web site. CDP Reports (N=33) <ul style="list-style-type: none"> CDP Climate report of all companies in annual report sample, if it exists on CDP web site.
WBCSD Member Survey		Finance Department survey with 37 companies responding.

Source: Asset-Level data and climate-related financial analysis: a market survey. 2Dii 2017

Bloomberg sample. Our quantitative analysis utilized annual Company Guidance and Bloomberg Analyst Estimates available via the Bloomberg terminal for MSCIWorld index members. The data used in this report is a “snapshot” of available estimates and guidance as of June 2017.

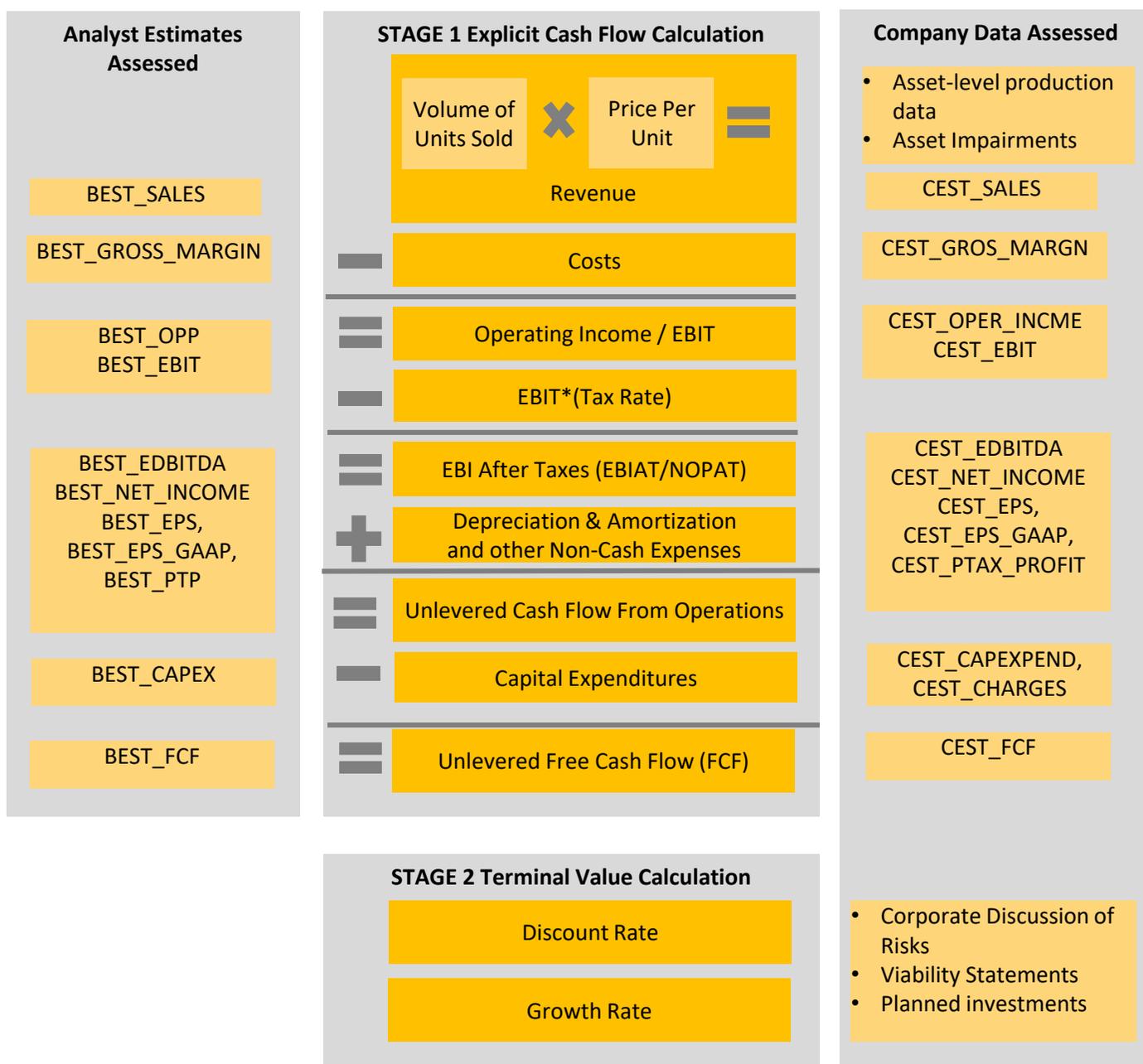
The specific indicators covered by this report were ones that mapped to DCF valuation inputs. For clarity this paper focuses on the 22 indicators with a clear BEST/CEST pairing, yielding 11 analyst estimate/corporate guidance indicator “groups” (e.g., the CapEx indicator group discussed in Part II uses BEST_CAPEX and CEST_CAPEXPEND fields). Where applicable, results from the non-paired indicators are referenced in the text. See Appendix 1 for full list of Bloomberg fields and definitions.

Additionally, 20 quarters (FQ1-FQ20) of estimates and guidance were reviewed for a subset of MSCIWorld constituents (n=405) to obtain a more complete view of available near-term forward-looking data. Given the long-term focus of this study, however, this report focuses on findings from longer-term, annual data which extends over a 30 year time horizon. Context provided by quarterly data will be referenced in the text where applicable.

Plugging it in. Figure 1 below shows how the elements of our assessment – analyst estimates and company guidance fields from Bloomberg, production data from asset-level databases, and risk disclosures from company reporting – could be incorporated into common DCF models. The Bloomberg BEST and CEST fields are mapped to DCF elements below. Forward-looking production data in asset databases can inform the volume projections needed to calculate segment-level revenue. Company disclosure of risks and the viability of ongoing operations can alter the perceived riskiness of a company’s future cash flows, which may impact its discount rate via an increased cost of capital.

Discussion of risks and overall viability, as well as planned capital expenditures, can inform the selection of the growth rate to perpetuity. Increased risks on the horizon may dampen analysts’ assessment of longer-term growth prospects. Further, a company with capital expenditures lower than the level deemed necessary to maintain a company’s existing physical stock, or less than its industry peers, may decrease expected returns on new investment, and therefore the expected growth rate.

Figure 1: How Data in 2dii Assessment is Used By Financial Analysts



Source: 2dii from Bloomberg XDCF template, Literature Review and Workshops with Analysts

PART II

DISCLOSURE OF INVESTMENT PLANS

SECTION SPOTLIGHT

- **Companies rarely disclose more than 1 year of capital expenditure (CapEx) guidance**
- **Economic intelligence databases provide capex data for at least the next 3 years at the physical asset level**
- **Financial analysts estimate capex for the next 3-5 years**
- **The quality and horizon of disclosure varies across sectors, with utilities providing the most forward looking guidance.**

2.1 PLANNED CAPITAL EXPENDITURES

Disclosures of planned capital expenditures are one way for investors to assess a company's ability to sustain revenues in the future. To generate shareholder value, corporate management teams deploy human and physical capital to generate returns for shareholders. While some sectors deplete capital more quickly than others during the normal course of operations, in order to maintain revenues over a long period of time capital must be replenished or replaced when new opportunities or risks arise. Capital investments are a temporal trade-off: they require a cash outflow today for returns in the future. In general, management teams will target capital expenditures where they see opportunities for future returns.⁸ Disclosure of planned capital expenditures provides a view of management's strategy for the future that investors can evaluate in the context of expected industry and macroeconomic conditions.

Disclosure of planned capital expenditures is particularly important for capital-intensive sectors. Capital-intensive sectors require large amounts of capital relative to labor in the production process. Figure 1 (at right) shows capital intensity (Net Fixed Assets / Sales) across a sample of sectors. Energy and Utilities have the highest capital intensity; successful companies in these sectors have larger ongoing capital expenditures. Net fixed assets also generally have large upfront investment costs and long lifetimes—for example, the average age of a retiring power plant in the US is 38 years.⁹ For investors in these sectors, visibility on planned capital expenditures is particularly important as capital allocation mistakes can be expensive and long-lived.

Understanding planned capital expenditures is particularly important for financial analysts covering these sectors because the larger ratio of capital expenditures to revenues or earnings means that getting capital expenditure forecasts wrong has a larger impact on cash flow forecasts and therefore valuation (see Figure 2 below). Further, capital expenditures tend to be “lumpy” and do not grow along a linear trend or correlated with another line item such as sales, making it more difficult for analysts to forecast in the absence of company guidance.¹⁰

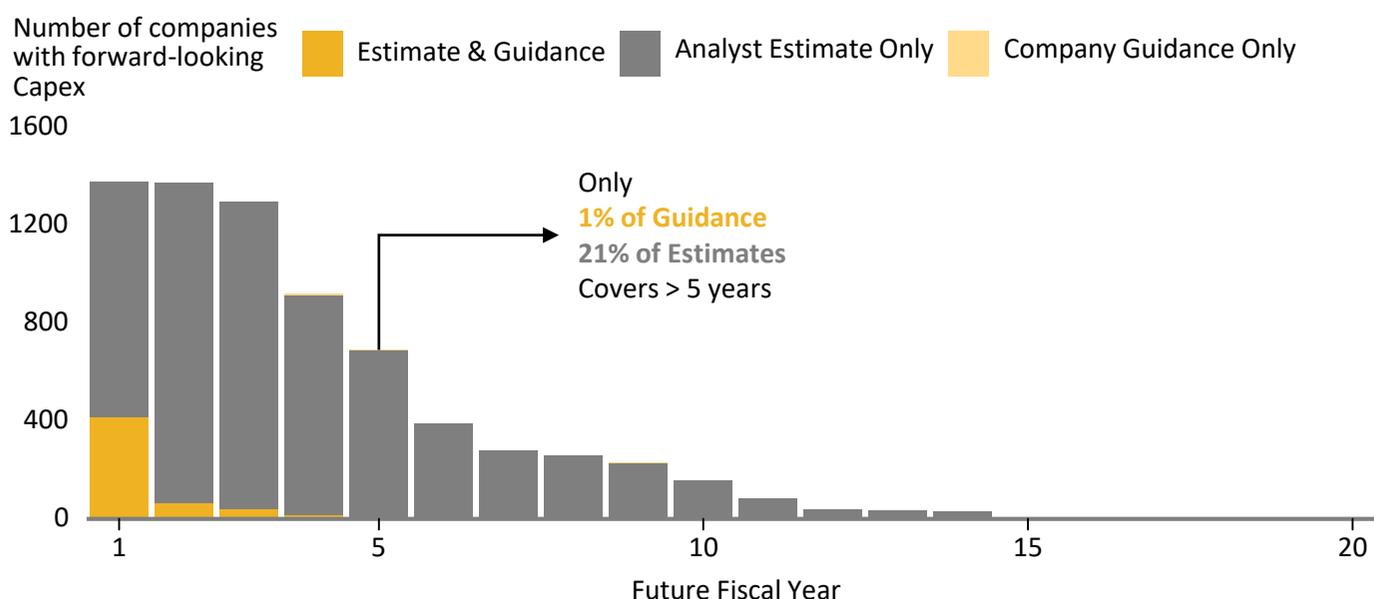
Figure 1: Median CapEx Ratios for Sample of Companies in Selected Sectors, 2016

Accurate CapEx forecasts are particularly important for companies in the Energy and Utilities sector.

GICS Sector	Capital Intensity	Capital Expenditure / Free Cash Flow
Energy	2.46	-4.67
Utilities	1.42	-9.01
Consumer Staples	0.24	-0.54
Industrials	0.24	-0.73
Consumer Discretionary	0.22	-0.33
Healthcare	0.22	-0.88
Financials	0.13	-0.10

Source: Bloomberg `NET_FIXED_ASSET_TURN`, `CAPITAL_EXPEND`, `CF_FREE_CASH_FLOW` fields for $n=100$ companies per GICS sector, FY 2016.

Figure 2: Availability of MSCIWorld Constituents' Analyst Estimates and Corporate Guidance for Planned Capital Expenditures



Source: Bloomberg `BEST_CAPEX` and `CEST_CAPEXPEND` fields for MSCIWorld constituents for FY1-FY30 ($n=1,610$). No capital expenditure estimates or guidance were available in Bloomberg beyond FY20.

Corporate guidance on planned capital expenditures is focused on next year. Of MSCIWorld Index constituents, over 2/3 of all capital expenditure guidance was issued for one year in the future, and just 1% percent of guidance covered beyond year 5. This is in line with 2dii findings from a survey of annual reports (see right).

Analyst estimates exist for many more companies than those that offer guidance. For one year in the future, there were nearly three times as many analysts providing estimates for capital expenditures than companies providing guidance, and this multiple grows with the time horizon. Particularly beyond Year 5, minimal corporate guidance is available as an input for analyst estimates. While this may mean that analyst estimates are based on assumptions of continuing trends, it also may be due to analysts using data from other sources. Figure 1 below compares the time horizon of CapEx guidance with average length of explicit forecasts from a sample of Morningstar DCF models. With the exception of Utilities, no guidance was available by the end of the explicit forecast period.

Availability of guidance differs across sectors, while estimates are more consistent. Somewhat in line with differences in capital intensity, there are large between-sector differences in the amount and timing of CapEx

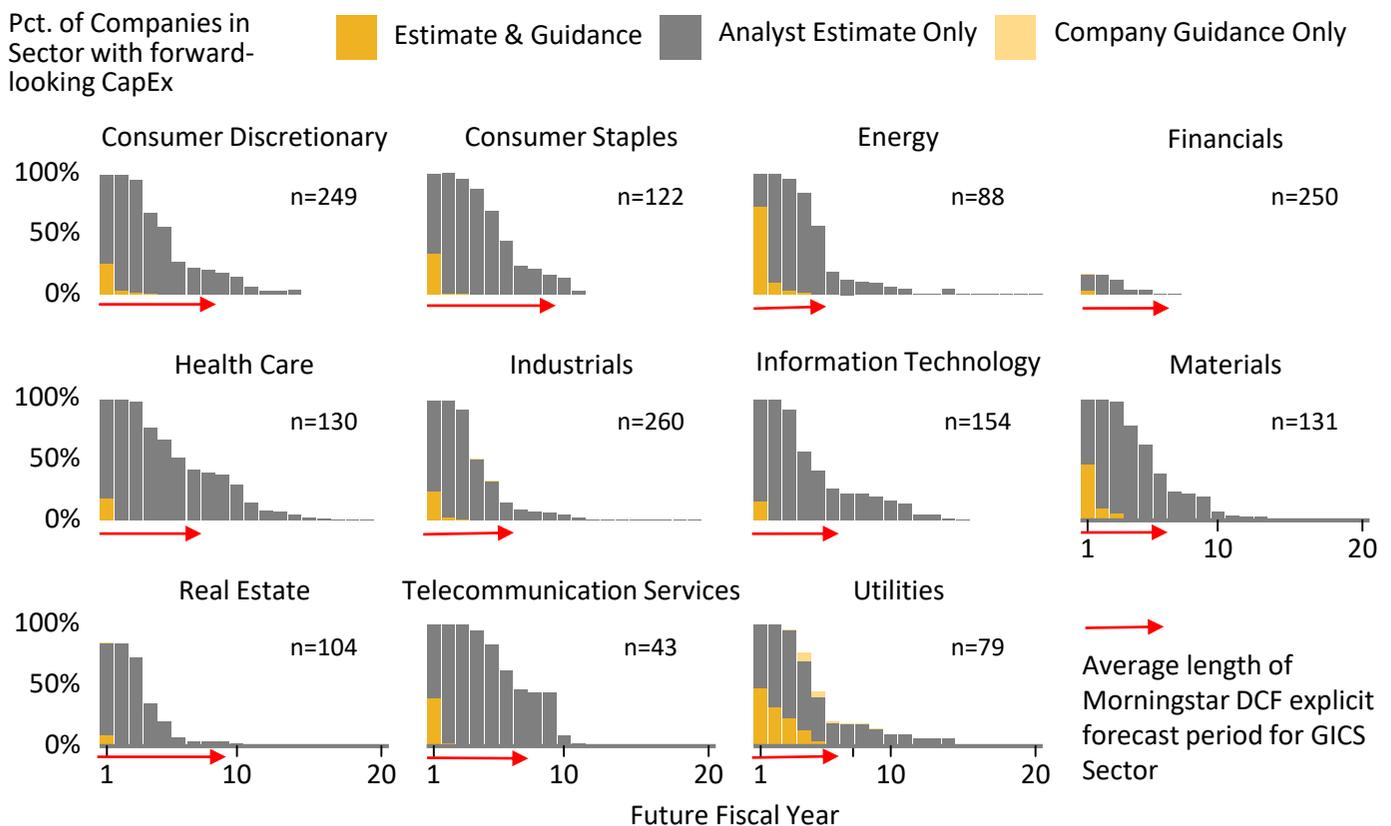
Disclosure of Planned Capital Expenditure In Corporate Reporting

- In 2dii's analysis of Global Annual Reports, only 55% of companies disclosed planned capital expenditures and only one disclosure was for a horizon beyond 5 years.
- Voluntary sources of planned capital expenditures are no more forward-looking. The average time horizon of capital expenditure disclosure from the sample of Sustainability Reports was 3.3 years.
- Reports from German and French companies in our sample were more likely to disclose capital expenditures with a time frame than counterparts from US and the UK.

guidance (See Fig 1 below). Utilities provided the most guidance, while the financial sector provides the least. In contrast to guidance, the existence of analyst estimates is quite consistent: estimates existed for capital expenditures for nearly every company for 3 years in the future.

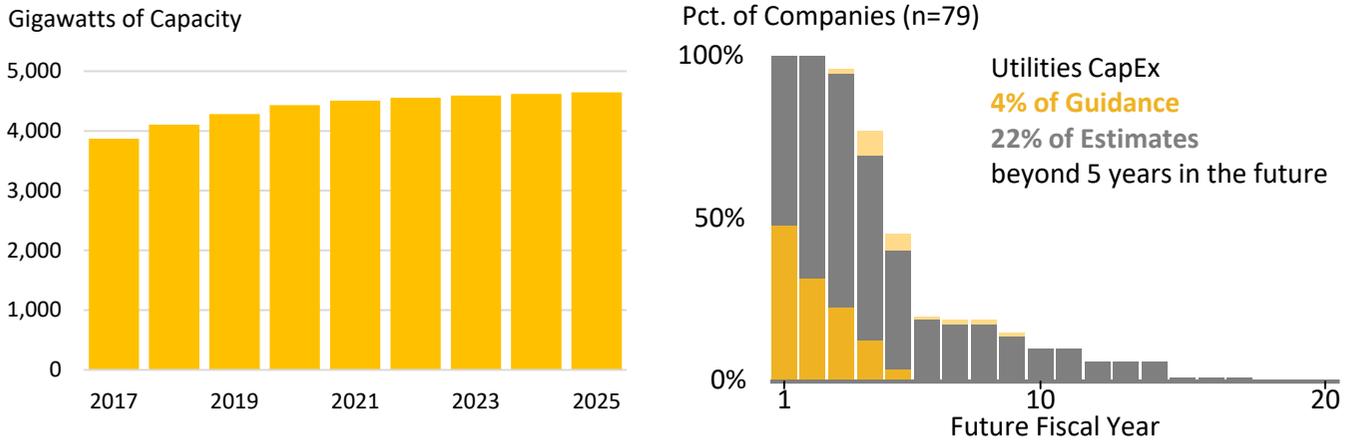
Figure 1: MSCIWorld Constituents' Availability of Analyst Estimates and Company Guidance for Planned Capital Expenditures by GICS Sector

For CapEx there is more between-sector variation in the amount of corporate guidance than in the number of analyst estimates provided.



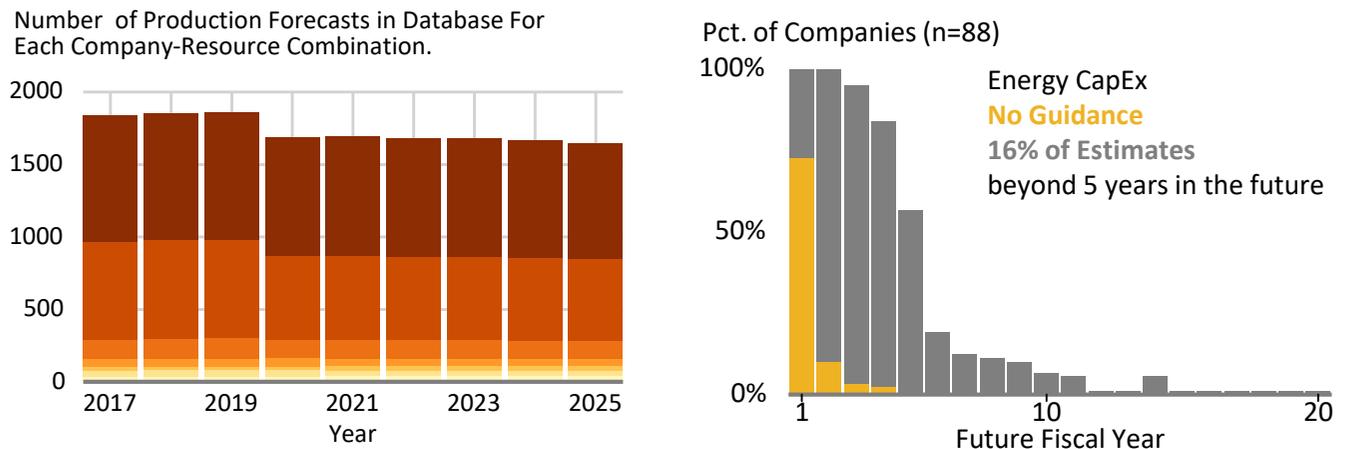
Source: Bloomberg BEST_CAPEX and CEST_CAPEXPEND fields for MSCIWorld constituents for FY1-FY30 (n=1,610). No estimates or guidance were available in Bloomberg beyond FY20. Sample sizes are given for sectors. Morningstar sample consists of n=873 Discounted Cash Flow models (using Standard and non-Standard Stage 2 methodologies) with first projected year from 2013-2018. See Appendix for details on Morningstar sample.

Figure 1: Time Horizon of GlobalData Power Plant Capacity Forecasts Compared to Time Horizon of Analyst Estimates and Bloomberg Guidance for Capital Expenditures in Utilities Sector



Source: GlobalData oil & gas field-level production projections (left). Bloomberg BEST_CAPEX and CEST_CAPEXPEND fields for MSCIWorld constituents in GICS Utilities sector for FY1-FY30 (n=79).

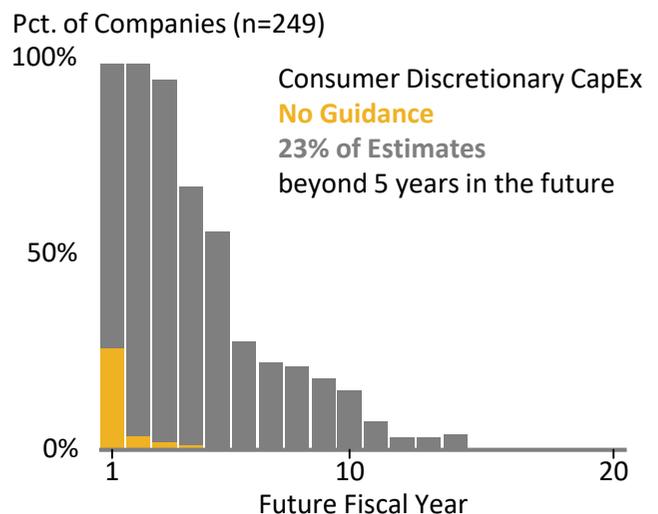
Figure 2: Time Horizon of GlobalData Oil & Gas Field Production Forecasts Compared to Time Horizon of Analyst Estimates and Bloomberg Guidance for Capital Expenditures in Energy Sector



Source: GlobalData global utility capacity projections. Bar segments from top to bottom: Conventional Oil, Conventional Gas, Heavy Oil, Unconventional Gas, CBM, Unconventional Oil, Oil Sands, Biogenic (left). Bloomberg BEST_CAPEX and CEST_CAPEXPEND fields for MSCIWorld constituents in GICS Energy sector for FY1-FY30 (n=88).

Figure 3: Extent of Passenger Vehicle Production Forecasts in Ward's Auto Database Compared to Time Horizon of Analyst Estimates and Bloomberg Guidance for Capital Expenditures in Consumer Discretionary Sector

Year	No. of Brand Owners	No. of Brand Names	No. of Name-plates
2017	128	205	1462
2018	130	206	1471
2019	130	204	1485
2020	130	204	1479
2021	130	204	1471
2022	130	204	1467
2023	129	203	1460



Source: Ward's Auto Database - Passenger Vehicle Production Forecasts (left). Bloomberg BEST_CAPEX and CEST_CAPEXPEND fields for MSCIWorld constituents in GICS Consumer Discretionary sector for FY1-FY30 (n=249).

Production plans and capital expenditures found in asset-level databases are somewhat more forward-looking than the data in mandatory disclosures. For physical asset-focused sectors such as energy, aviation, auto, and utilities, economic intelligence databases aggregate forward-looking information on production capacity, investment, and production plans from global and local corporate announcements, as well as press releases, news reports, public databases on permits (see Fig. 1, 2, 3 previous page). Unlike analyst forecasts this forward-looking data only provides a snapshot of ‘what is planned and known to date’: figures 2 and 3 on the previous page thus exhibit a decline in production after three years. They are therefore useful to quantify the technology locked-in effect but are not a proxy for production forecasts after this 3 year timeframe, unless combined with modeled estimates.

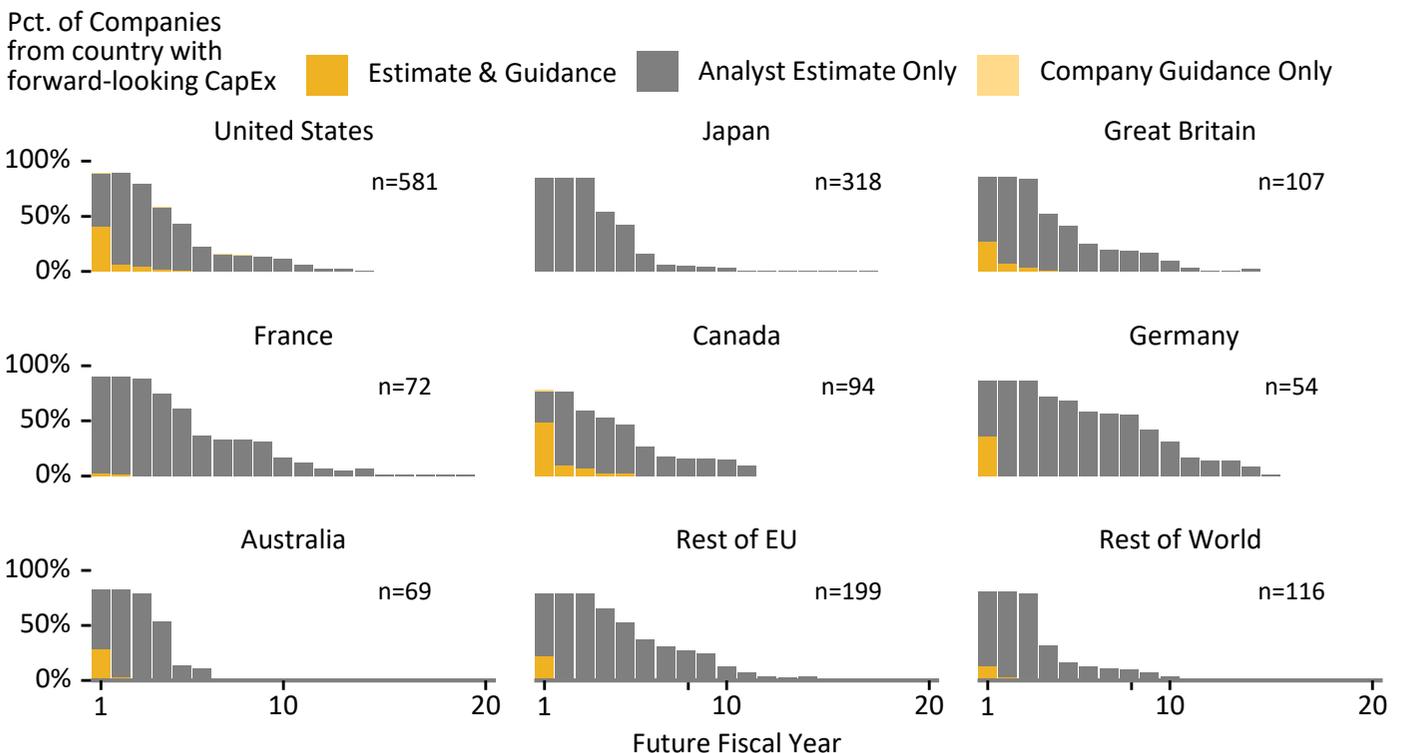
Our market survey shows that this data is primarily available at the plant and country level, and mostly used by competitors for business intelligence purposes.⁴ Up to now, financial analysts and investors barely used them, but they are expressing a growing interest, particularly in the context of climate risk analysis⁵ – for which locked-in effect matters. To enable use by analysts, the plant-level data needs to be matched with corporate owners, parent companies and financial securities, and then made available on a financial data platform. The matching for stock and corporate bond markets in key energy-related sectors has only been performed in 2015-16 by 2Dii and will be

available on financial data platforms from 2017-18 onwards.

Disclosure of planned capital expenditures is largely the result of mandatory requirements for companies to discuss foreseeable material impacts on future financial performance. In the US, there is currently no definition of “forward-looking statements” in US GAAP, and therefore planned CapEx is not required in mandatory financial statements.¹¹ Beyond the financial statements themselves, the MD&A section of the US 10-K requires that companies discuss known trends or uncertainties reasonably likely to occur and have material effects, as well as a company’s ability to meet long-term capital obligations. Companies are left to interpret what these general rules imply for disclosure of specific planned CapEx, and over what timeframe. This is also the case in the UK’s Strategic Report.¹² Again, the materiality of CapEx to “future” prospects is to a certain extent left up to the company to decide. These differences are consistent with our corporate guidance sample, which shows a large proportion of German and UK companies providing guidance in Year 1 - Figure 1.

Implication: Mismatch between the time horizon of planned capital expenditures disclosed by companies and the time horizon of valuation models. Current guidance on planned capital expenditures often lags behind analyst forecast periods and rarely covers a time period that accounts for a majority of the enterprise value calculated by valuation models (see Fig.1 page 18).

Figure 1: MSCIWorld Constituents’ Available Analyst Estimates and Company Guidance for Planned Capital Expenditures by Country of Domicile / Group



Source: Bloomberg BEST_CAPEX and CEST_CAPEXPEND fields for MSCIWorld constituents for FY1-FY30 (n=1,610). No estimates or guidance were available in Bloomberg beyond FY20. Top 7 countries (by count of companies) in MSCIWorld shown here, with sample sizes. “Rest of EU” consists of all EU members except GB, FR, and DE. “Rest of World” is all remaining MSCIWorld constituents.



PART III

DISCLOSURE OF FINANCIAL FORECASTS

SECTION SPOTLIGHT

- **Financial forecast disclosure mainly focuses on the next year**
- **Financial analyst estimates usually extend to 3-5 years**
- **The explicit forecast period of some analyst DCF models may extend 10 years, depending on the sector**

3.1. FINANCIAL FORECASTS

Financial forecasts provide crucial insight to investors.

Operational indicators such as sales and costs show how a company is performing, and forward-looking forecasts of these indicators can demonstrate how a company is likely to perform in the future. Profitability forecasts are direct statements of management’s or analysts’ view of how an investment will perform over the time period. Details on the indicators we included in our analysis are in Appendix 1.

Financial forecasts on sales and costs can be used as direct inputs into analysts’ DCF models.

A key input to DCF models are the initial years of explicit cash flow forecasts (see Section 1). Producing an estimate for yearly free cash flow (FCF) requires projecting numerous financial statement line items in as much detail as possible. Analysts will never have all the information available internally within a company; guidance that companies do provide for line items results in DCF models that more accurately match a company’s reality. The accuracy of these explicit cash flow forecasts is particularly crucial to the performance of the model overall, as the final year’s explicit cash flow forecast is used to calculate terminal value, which in a 2nd sample of equity research models commonly made up roughly 2/3 of enterprise value.

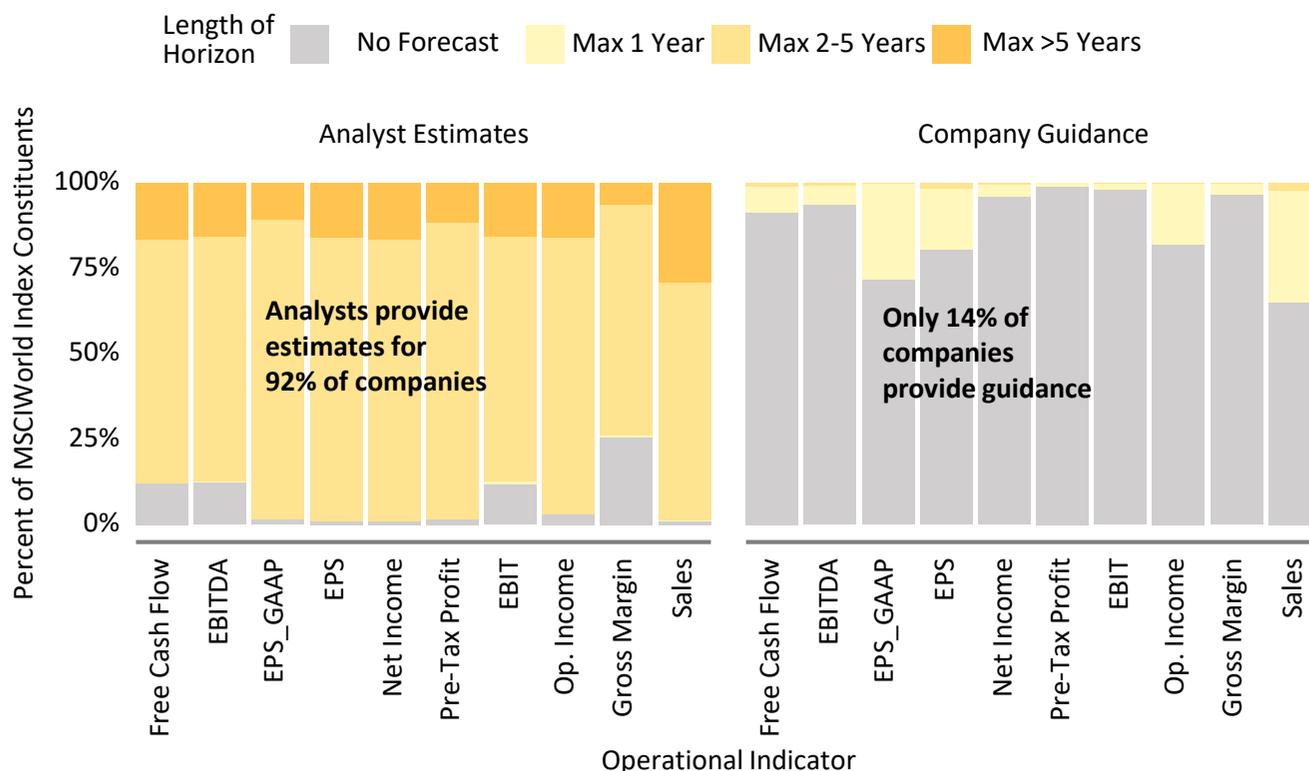
Availability of forward-looking estimates and guidance on operational indicators.

We collected the analyst estimates and corporate guidance available in Bloomberg for MSCIWorld constituents during June 2017. Overall, Sales was the indicator with the most available estimates and guidance, followed by EPS, Net Income, and Operating Income.

For the 10 operational indicators we examined, two gaps emerged:

- **Availability gap:** Across all 10 indicators, analysts provided estimates for an average of 92% of companies, while only 14% of companies provided any guidance at all. Sales and EPS_GAAP were the only indicators where more than 20% of companies provided guidance of 1 year or more.
- **Time horizon gap:** When corporate guidance is provided, it is for a much shorter period than analyst estimates. Across all 10 indicators, analysts provided three years or more of estimates for an average of 87% of companies; the percentage of companies providing 3 years or more of guidance is .6%. When corporate guidance is provided, 94% of the time it is for one year in the future.

Figure 1: Availability and Time Horizon of Analyst Estimates and Company Guidance for MSCIWorld Constituents, by Selected Operational Indicators

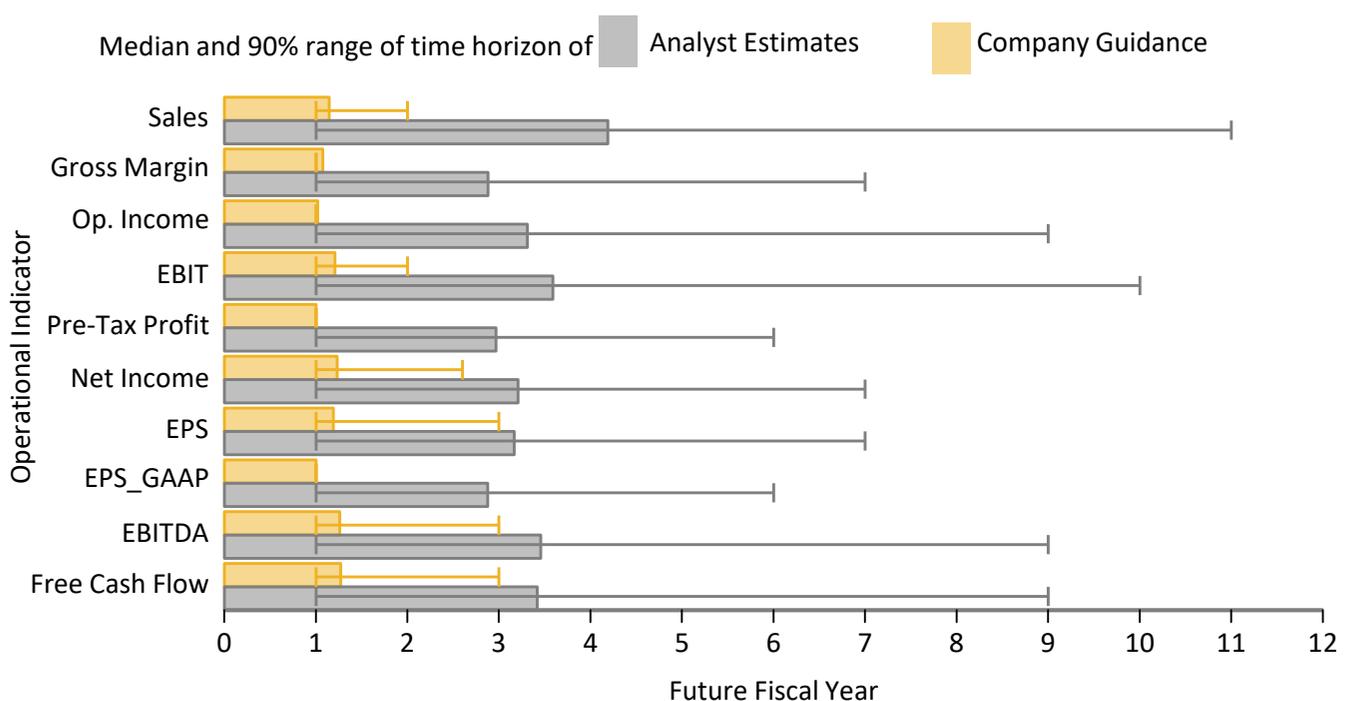


Source: Selected Bloomberg operational indicator fields (BEST and CEST) for MSCIWorld constituents for FY1-FY30. For each indicator (vertical bar), n=1,610. See Appendix for field names and descriptions.

Implication: time horizon mismatch. As shown in Figure 1 below, the time horizon gap between the available analyst estimates and corporate guidance is stark across all 10 indicators. Figure 1 plots the median value of available analyst estimates and guidance along with the range of 90% of the data, with non-existent or “zero-length” forecasts are removed. Analysts principally make the most forward-looking forecasts on sales and earnings indicators. For sales, analysts average four years of forecasts and as many as 11 years with in the 90% reference range.

Companies never offer this many years of forecasts, only extending as far as 2 years of sales forecasts within the 90% reference range, and just over 1 year on average. Across all indicators, the median time horizon of analyst estimates exceeds the median of corporate guidance by a factor of nearly 3. This mismatch limits analysts’ visibility into how and where a company expects to grow over time, limiting the analyst’s ability to accurately quantify the impact of long-term risks on future cash flows.

Figure 1: Time Horizon Gap Between Analyst Estimates and Company Guidance for MSCIWorld Constituents by Selected Operational Indicators



Source: Selected Bloomberg operational indicator fields (BEST and CEST) for MSCIWorld constituents for FY1-FY30 (n=1,610). Sample size varies by availability of estimates for each indicator; entries where no estimate or guidance was provided are dropped from median and range calculations. See Appendix 1 for field names and descriptions.

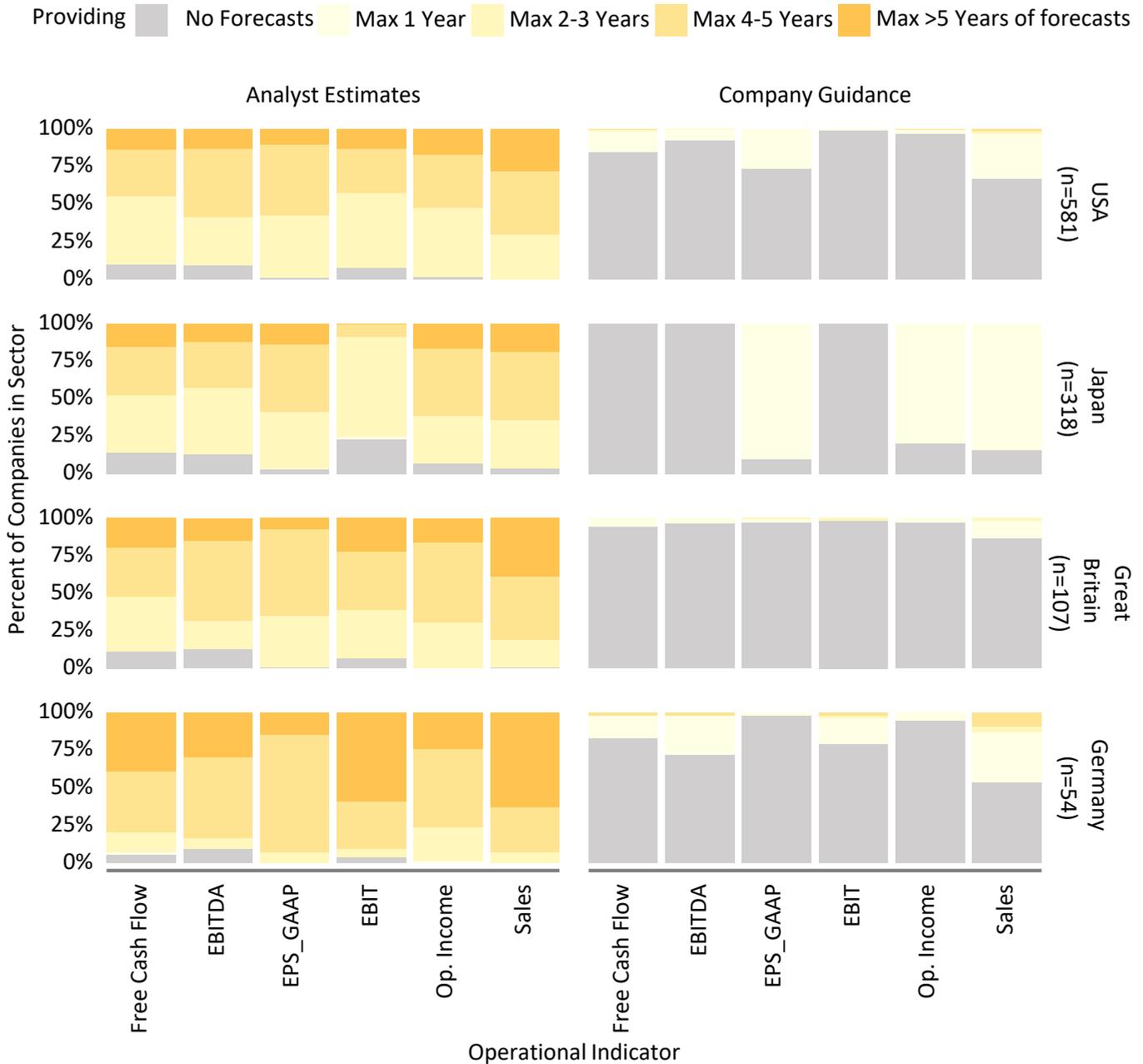
Companies domiciled in certain countries provide more guidance than others. There are significant variations in the length of the time horizon gap for various indicators across countries. Companies domiciled in the US, Japan and Germany provide the most forward-looking guidance, partly due to disclosure regulation (page 42).

To understand whether disclosure time horizons could be explained by country-specific rules, we disaggregated the sample of operational indicators by countries of domicile to see if estimates and guidance varied across jurisdictions. Figure 1 on the following page shows results for a subset of operational indicators for the US, Japan, Great Britain, and Germany. The indicators and countries shown had the most variation in the time horizon of estimates and

guidance compared with the rest of the sample. The higher percentage of guidance in Japan and Germany relates to the disclosure standards in those countries. In Japan, companies file Integrated Reports that include quantitative forecasts to back up their long-term value creation thesis. This is reflected in the high percentage of 1-year guidance for Sales, Operating Income, and EPS (GAAP). In Germany, the Corporate Governance Code requires a description of the business outlook which commonly involves multi-year forecasts.

Guidance from German companies not only has a longer time horizon than guidance from other countries, the time horizon of analyst estimates for German companies is also relatively longer-term.

Figure 1: Availability and Length of the Time Horizon of Analyst Estimates and Company Guidance for MSCI Constituents from Selected Countries of Domicile, across Selected Operational Indicators



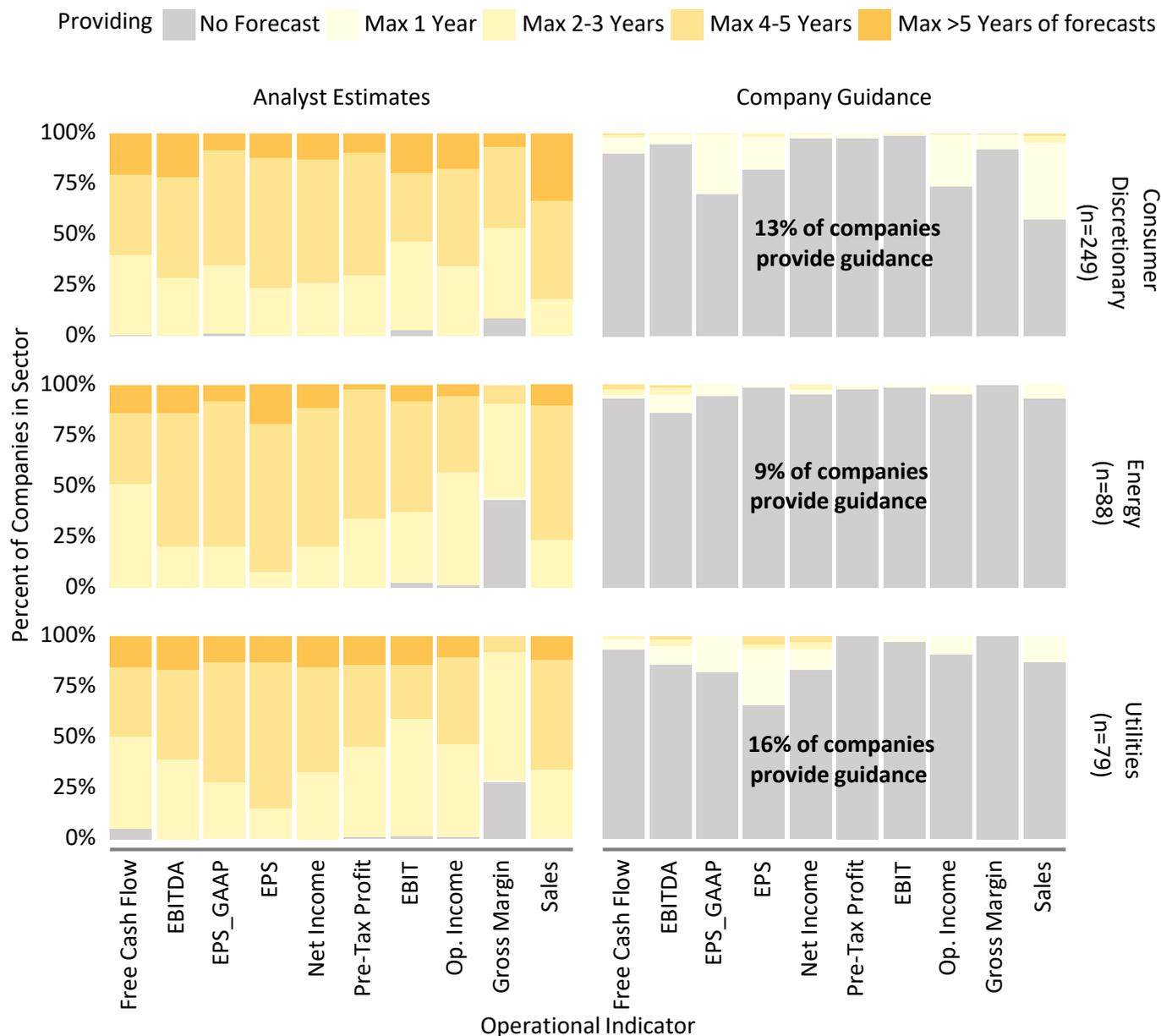
Source: Selected Bloomberg operational indicator fields (BEST and CEST) for MSCIWorld Constituents in the US, Japan, Great Britain, and Germany. Sample of size of each vertical bar varies by country and is given on the graph. See Appendix 1 for Bloomberg field names and descriptions.

A significant portion of available estimates for Sales, EBIT, EBITDA, and Free Cash Flow extend 5 years or more into the future, much longer than for other countries. While this can not be attributed to the horizon of available forward-looking guidance (which though long relative to other countries is still quite short relative to estimates), it does not disprove the assertion that analysts will provide longer term forecasts if better company data is available.

Companies can voluntarily offer forward-looking sales and earnings guidance but rarely do. The shortage of data is likely connected to the lack of mandatory requirements on operational indicator forecasts in each country.

Among sectors, electric utilities offer the most forward-looking guidance. To identify the effect of sectors on operational indicator forecasts, we looked at Consumer Discretionary, Energy, and Utilities forecasts within the MSCI World (see Fig. 1 next page). Electric utilities that benefit from visibility on investments and activity provide more forecasts. 34% of utilities disclosed at least one year of Earnings Per Share forecasts and 43% of Consumer Discretionary companies disclosed one year or more of sales forecasts. Surprisingly, few Energy companies disclosed forecasts, perhaps because of the volatility of the sector. This discrepancy among sectors indicates that the time horizon gap between analyst estimates and corporate guidance varies considerably across sectors as well as by type of indicator.

Figure 1: Availability and Length of the Time Horizon of Analyst Estimates and Company Guidance for MSCI Constituents from Consumer Discretionary, Energy, and Utilities sectors



Source: Selected Bloomberg operational indicator fields (BEST and CEST) for MSCIWorld Constituents in the Utilities, Energy, and Consumer Discretionary sectors. Sample of size of each vertical bar varies by sector and is given on the graph. See Appendix for Bloomberg field names and descriptions.

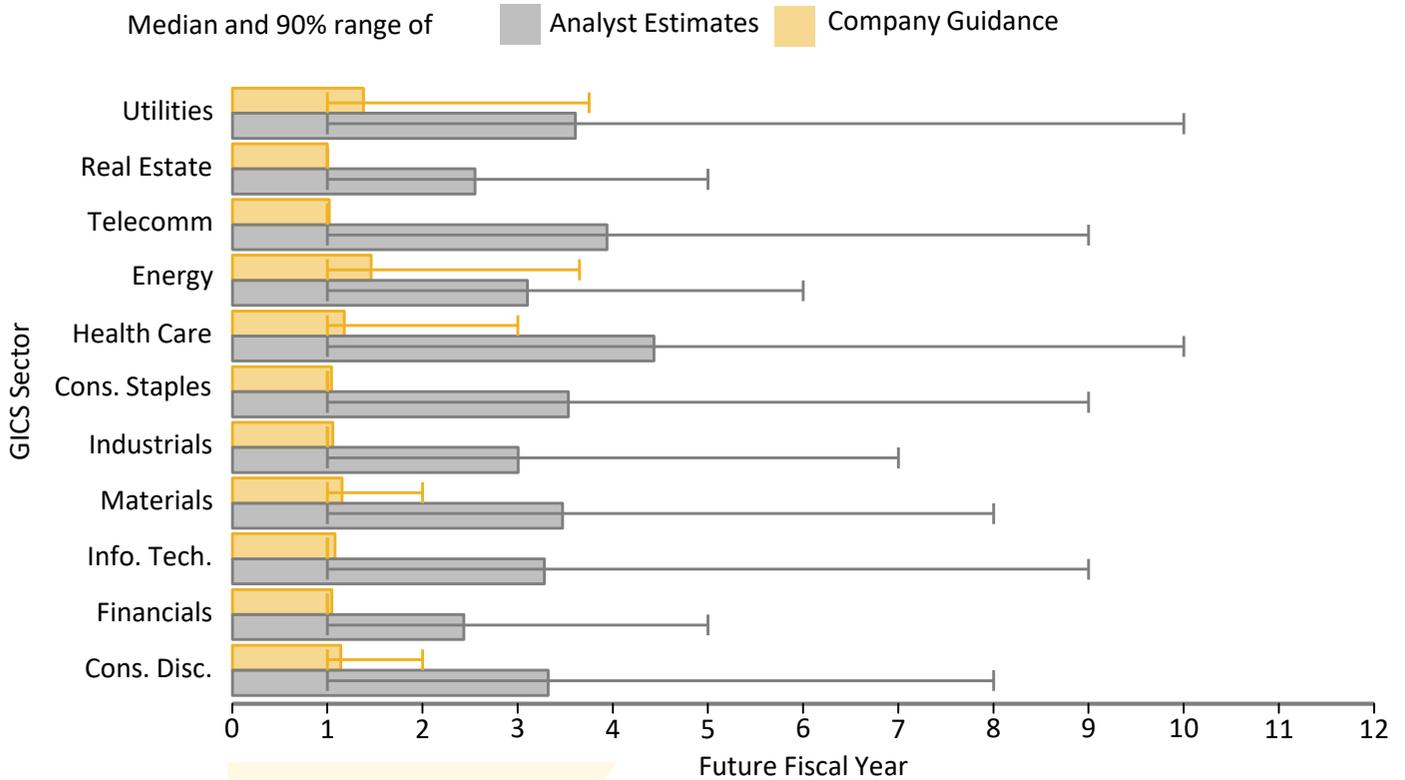
Sector-level time horizon gap. Figure 1 on the next page shows the median and 90% range of the time horizon of available analyst estimates and corporate guidance by GICS Sector (again, “zero-length” horizons are removed when calculating the summary statistics). Similar to the indicator time horizon chart, the time horizon of available analyst estimates is roughly 3 times as long as the time horizon of available corporate guidance. This gap is particularly pronounced for Healthcare and Telecomms, for which analysts provide estimates nearly 4 years into the future.

Implication: Poor Visibility for Financial Analysis. Given the minimal availability and short time horizon of corporate guidance, analysts must make forecasts with relatively low visibility on a company’s future plans. Figure 2 on the next page shows the time horizon of the accumulation of Enterprise Value from 2dii’s sample of

Morningstar DCF models in shades of gray, with the gray getting darker as the percent of total enterprise value increases. The average length of the explicit forecast period used by Morningstar is also shown (black box), which often, but not always, covers the time period required to accumulate 25-30% of Enterprise Value. Finally, from the Bloomberg data described earlier in this section, the average years of analyst estimates and company guidance for each sector is plotted as well (again, with zero-length horizons removed).

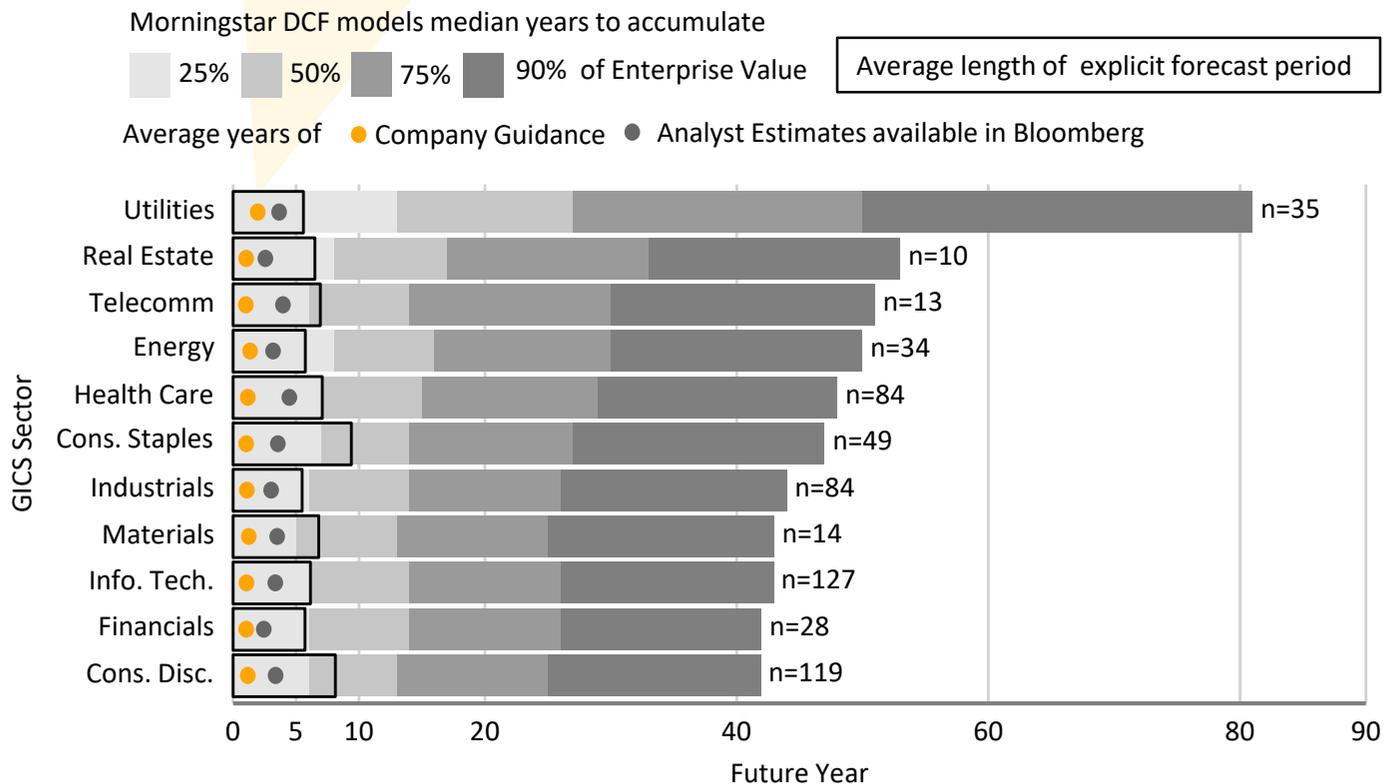
Across all sectors, the average time horizon of available corporate guidance covers less than 10% of Enterprise Value. Investors and analysts lack “first person” visibility from companies themselves for nearly 90% of Enterprise Value.

Figure 1 : MSCIWorld Constituents' Median and 90% Range of Available Analyst Estimates and Company Guidance for Selected Operational Indicators, by GICS Sector



Source: Selected Bloomberg operational indicator fields (BEST and CEST) for MSCIWorld constituents for FY1-FY30 (n=1,610). For each horizontal bar, n=1610 and then “zero-length” horizon entries are dropped from mean and range calculations. See Appendix for field names and descriptions.

Figure 2: Time Horizon of Accumulation of Enterprise Value in Sample of Morningstar DCF Models, Compared to Average Length of Available Analyst Estimates and Corporate Guidance for MSCIWorld constituents in Bloomberg, by GICS Sector.



Source: Sample of Morningstar DCF models (n=597); sample size by sector as noted on graph. Selected Bloomberg operational indicator fields (BEST and CEST) for MSCIWorld constituents for FY1-FY30 (n=1,610). For each horizontal bar, n=1610 and then “zero-length” horizon entries are dropped from mean and range calculations. See Appendix for field names and descriptions.

PART IV

DISCLOSURE OF LONG-TERM RISKS

SECTION SPOTLIGHT

- We call *'White Swans in the Dark'* non-linear, non-cyclical risks likely to materialize after 5 years. These risks are likely to be missed by risk analysis focused on the short term, even though weak signals are visible today that investors could act on.
- In annual reports and regulatory filings the description of risks is in most cases vague and focused on the short term. The viability of the business model is only discussed in a few countries and usually limited to a 3 year outlook.
- Accounting standards require disclosure of impairment tests in financial statements. However there are no disclosure requirements for the key assumptions made when estimating future cash flows for the assets tested. Most companies do not disclose these assumptions.

4.1 WHAT DO WE CALL LONG-TERM RISKS?

Black swans, gray swans and white swans in the dark.

Several major risks identified in the global risk literature can be considered immaterial to investors (not a swan), unpredictable from an analyst’s point of view (black swan), or too costly to assess (gray swan). Yet, many major risks fall into our category of ‘White Swans in the Dark.’ Past examples such as the subprime crisis or the more recent VW emissions fraud suggest that some of these ‘black swans’ might actually be predictable but missed by financial analysts due to their long-term, non-linear, non-cyclical profile.¹⁴ In other words these swans are ‘white’ but left ‘in the dark’ due to the short-term focus of financial analysis and indirectly the gaps in corporate risk disclosure. Current examples of such risks that are likely to get mispriced include energy transition risks and the dis-

-ruptive impact of artificial intelligence and automation for services and transportation.¹⁵ Importantly, this type of event risk is actionable from an investor’s point of view: they can manage their risk exposure by adjusting their investment strategy or influencing the investee’s risk management before the risk materializes.

Non-linear, non-cyclical risks, only likely to materialize after 5 years. Our research categorizes these risks into three sub-categories (See Fig. 1 below). that share the same characteristics: they are likely to materialize in a non-linear way (limiting the relevance of short-term forecast extrapolation), they are non-cyclical (limiting the use of past data) and they are likely to materialize after five years (making these swans fly under analysts’ radars).

Fig. 1: Our Taxonomy: Classifying ‘White Swans in the Dark’ by their Risk Profiles

White Swans in the Dark exhibit common patterns of risk vs. time

Type of Risk	Definition	Risk Profile
Slow-Building	<ul style="list-style-type: none"> Risks are slow to build at first but gain momentum over time so the expected impact of an event risk grows at a greater-than-linear rate over time. Linear cash flow projections neglect the non-linear trajectory of the risk. 	
De-Anchoring	<ul style="list-style-type: none"> Status quo relies on artificial or regulatory safeguards or barrier(s) to competition. If barriers are removed, the risk to the future cash flows of incumbents spikes dramatically. Linear cash-flow projections assume an artificial ‘risk anchor’, and thus do not account for the potential that it could be removed. 	
Point-in-Time	<ul style="list-style-type: none"> Probability of a high-impact event occurring in the short-term is low, but almost certain to materialize at some unforeseen point-in-time over the long-term. Linear cash flow projections do not take such high-impact events with low immediate probability into account. 	

Source: 2°ii and the Generation Foundation, “All Swans are Black in the Dark,” 2017

4.2 IDENTIFICATION OF LONG-TERM RISK FACTORS

Companies are generally vague about the risks they are facing and the time horizons over which they are likely to materialize. In their annual reports, companies offer risk factors that could affect the forward-looking statements made in their reports. But in general, these risks are non-specific, qualitative, and short-term focused. For this reason, previous research has found that risk disclosure is typically “boilerplate,” or generic and vague.

When companies use specific language to discuss risk mitigation efforts and/or changes in the nature of the risk, those disclosures tend to be minimal...and are overshadowed by the prevalent use of vague boilerplate language throughout the risk factor disclosures.

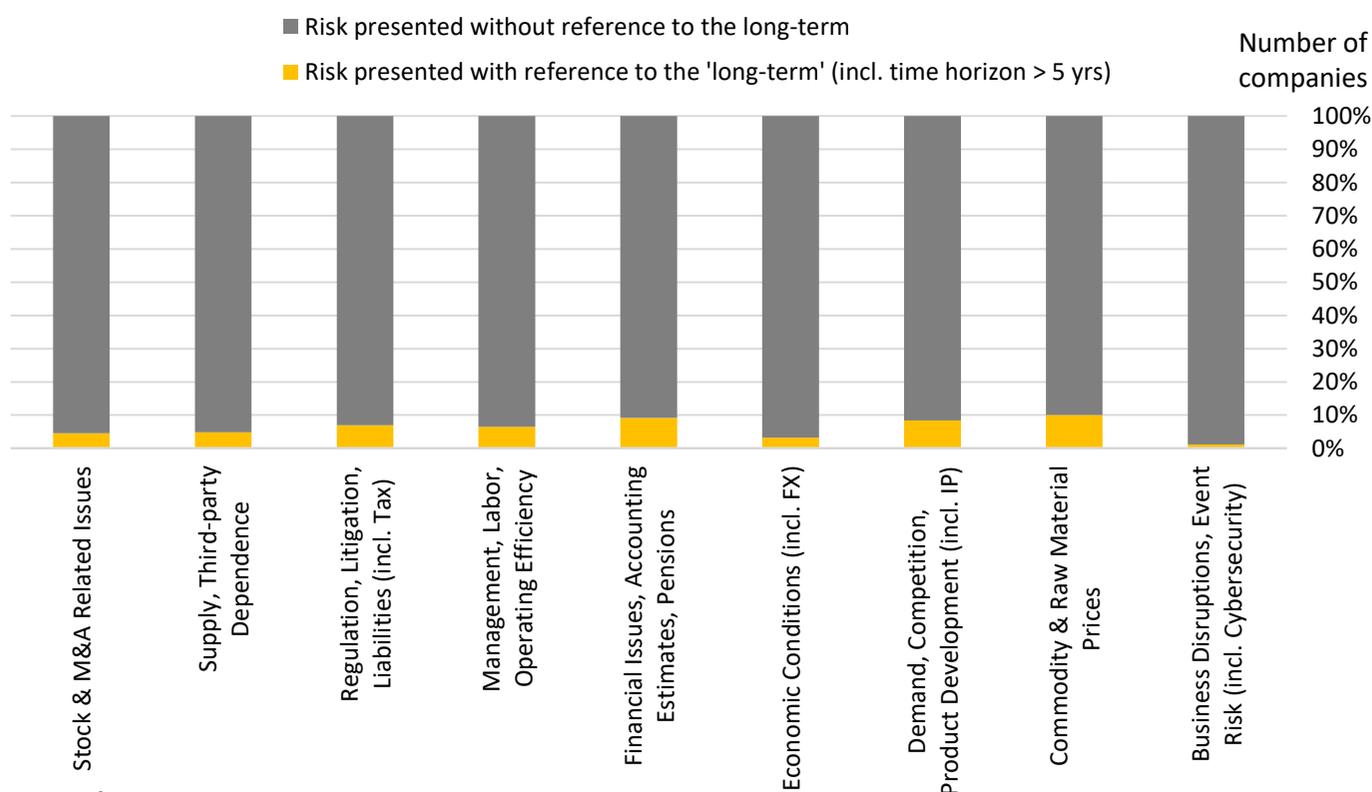
IIRC Institute, “The Corporate Risk Factor Disclosure Landscape,” 2016

Companies rarely disclose long-term risks with specific timeframes. To extend previous research to the question of time horizon, we reviewed a sample of US 10-K reports to understand whether the risks listed within were short-term or long-term. After manually counting these risks, we found that only 5% of risks were discussed with an explicit time frame (see below). This lack of specificity as well as the very similar levels of disclosure across sectors and regions may be reflective of the “boilerplate” nature of mandatory risk disclosure.

Of these risks with specific timeframes, few risks described extend beyond a time horizon of 5 years. The variable ‘reference to the long-term’ points to risks that are described in connection with a timeframe that extends beyond 5 years (i.e. beyond 2020 from the point of view of the analyzed 10Ks which are published at the end of 2015). Indicative for such risks with a timeframe beyond 5 years is a description that highlights, for example, regulation that will certainly or maybe be implemented in 2021, emissions reduction targets that must be achieved by 2030; industry developments that are likely to materialize over the next 10 years or in the coming decade, etc.

We looked for such risks in 100 10-Ks for US companies but found that few risks were connected to the long-term. In this study, we focused on US 10-Ks to ensure comparability of requirements and common practices. Overall, we found that only 5% of risks were mentioned with a generic reference to the long-term, while only 1% of companies mentioned a specific time frame beyond 5 years (see below). Risks most referenced beyond 5 years included Demand, Commodity Prices, and Accounting Estimates, but these examples were in a small minority of reports. No companies disclosed risks of business disruptions that might evolve beyond 5 years such as an industrial accident like an oil spill. Thus, investors are not receiving details on risks likely to materialize beyond 5 years in the US and likely other jurisdictions as well.

Percentage of 10-K Reports Mentioning Long-Term Risks



Source: 2^oii review of 100 US 10-K reports from the S&P 500

In the 100 reports, there were 19 examples of regulatory forward-looking risks with specific timeframes beyond 5 years. Based on the higher proportion of regulatory and litigation risks among long-term risks, we reviewed the topics of long-term regulatory risks. Our analysis found that regulation and litigation risks are often tied to specific events like the passage of a law or resolution of a lawsuit. For example, Ford discloses specific emissions regulations that could affect its cash flows in 10 years (see right).¹⁶ In the Utilities and Auto sectors, risks resulting from regulatory action on greenhouse gas emissions are particularly emphasized.

In fact, most of the specific timeframes given to regulation and litigation are related to greenhouse gas regulation. Of the 19 examples, 11 are related to greenhouse gas emissions regulation. These risks are likely to develop in 2025 and beyond, or in more than 10 years. These risks are principally faced in the Oil & Gas and Utilities sectors but are also seen in the mining and aviation sectors. The focus on climate regulation relative to other regulatory risks could also be related to pressure groups, the threat of proxy action on climate, and the recent focus of financial regulators (e.g. creation of the Taskforce of Climate-related Financial Disclosures by the Financial Stability Board).¹⁷

Figure 1: Example of Long-term Risk Disclosure with Specific Timeframe Beyond 5 Years

Ford Motor: “Governmental Standards, Vehicle Emissions Control: [...] We are particularly concerned about the commercial feasibility of meeting the 2022–2025 model year GHG and CAFE standards, and therefore the midterm evaluation process is very important to Ford and the auto industry. Ford’s ability to comply with the 2022–2025 model year standards remains unclear because of the many unknowns regarding technology into the future. We intend to be an active participant in the midterm evaluation process for these standards. [...] EPA and NHTSA are expected to finalize new rules in 2016 setting GHG and fuel economy standards for these vehicles, covering model years 2019–2027. As the heavy-duty standards increase in stringency, it may become more difficult to comply while continuing to offer a full lineup of heavy duty trucks.”

Insight from Interview

“A thorough discussion of a small number of key risks would be preferable to a very high-level presentation of all kinds of risk.” – An equity analyst

Figure 2: Time Horizon of Regulation and Litigation Risks in US 10-Ks

Industry	Company	Related to GHG regulation	Other environmental regulations	Utility rate regulation	Nuclear regulation	Federal licenses	U.S. Government Federal Drug Supply Chain Security Act
Consumer Goods	Ford	2025					
Oil and Gas	Cimarex Energy	2025					
Oil and Gas	Pioneer Natural Resources	2025					
Oil and Gas	Tesoro Group		2022				
Utilities	Dominion Resources			2022			
Utilities	Southern Company	2030					
Utilities	Exelon				2025	2055	
Utilities	Scana	2030					
Utilities	WEC Energy Group	2030					
Utilities	Amaran	2030		2022			
Healthcare	Perrigo						2023
Healthcare	Amgen					> 5 years	
Basic Materials	Freeport McMoran					2021, 2041	
Basic Materials	Newmont Mining	2025, 2060					
Consumer Services	American Airlines	2023					

Source: 2^oii review of 100 US 10-K reports from the S&P 500

CASE STUDY: BP DEEPWATER HORIZON

Before its Deepwater Horizon catastrophe, BP had multiple options for how to disclose its Process Safety Risks. They could have described the risks:

ACCURATELY WITH SPECIFIC INFORMATION

Keith Higgins, Director, Division of Corporation Finance, US SEC has asserted that “risk factors could be written better — less generic and more tailored — and they should explain how the risks would affect the company if they came to pass ... [and] allow investors to zero in on the material risk.” More tailored risk disclosures would make risks specific to the company and to individual projects that are likely to be affected by risks over time.

OR SAFELY TO PROTECT FROM LITIGATION

This approach involves non-specific risk disclosure to protect from forward-looking statements being proved false over time. The law firm Debevoise & Plimpton explains that “Properly drafted risk factors can act as a strong defense in the face of shareholder litigation should a material risk associated with investing in the company’s securities come to pass.” BP took this approach to allow it to defend itself against any safety risk that could materialize.

WHAT WAS DISCLOSED ABOUT SAFETY BEFORE THE ACCIDENT?

“Inherent in our operations are hazards that require continuous oversight and control. There are risks of technical integrity failure and loss of containment of hydrocarbons and other hazardous material at operating sites or pipelines. Failure to manage these risks could result in injury or loss of life, environmental damage, or loss of production and could result in regulatory action, legal liability and damage to our reputation.”¹⁸

WHAT HAPPENED?

11 Deaths	\$62 Billion in Costs
55% loss in shareholder value	\$1 billion loss in brand value

WHAT WAS DISCLOSED ABOUT SAFETY AFTER THE ACCIDENT?

“Our operations are often conducted in difficult or environmentally sensitive locations, in which the consequences of a spill, explosion, fire or other incident could be greater than in other locations. These operations are subject to various environmental laws, regulations and permits and the consequences of failure to comply with these requirements can include remediation obligations, penalties, loss of operating permits and other sanctions. Accordingly, inherent in our operations is the risk that if we fail to abide by environmental and safety and protection standards, such failure could lead to damage to the environment and could result in regulatory action, legal liability, material costs and damage to our reputation or licence to operate.

To help address health, safety, security, environmental and operations risks, and to provide a consistent framework within which the group can analyze the performance of its activities and identify and remediate shortfalls, BP implemented a group-wide operating management system (OMS). The embedding of OMS continues and following the Gulf of Mexico oil spill an enhanced S&OR function is being established, reporting directly to the group chief executive. There can be no assurance that OMS will adequately identify all process safety, personal safety and environmental risk or provide the correct mitigations, or that all operations will be in compliance with OMS at all times.”¹⁹

It took a crisis for BP to disclose specific information about oil spill risk and the mitigation actions it would take to address them. Giving more specific information before the crisis about the potential cash flow impacts of this long-term risk could have helped investors factor such a risk into BP’s valuation. As it is, investors were exposed to losses. An investigation into company disclosures can reveal whether other companies might be disclosing too little about the risks they are facing.

CASE STUDY: RWE

Before its decline in share price, RWE had multiple options for how to disclose its Nuclear Policy and Renewable Energy Competition Risks. They could have described the risks:

ACCURATELY WITH SPECIFIC INFORMATION

Risk disclosure requirements were defined for RWE in 2001 by the German Accounting Standards Board's standard on Risk Reporting. This standard specifies the content and format of risk disclosures. Risk is interpreted as 'the possibility of a future negative impact on the economic position.' To define the risk, the company could have defined the potential negative impact stemming from an ongoing trend.

OR SAFELY TO PROTECT FROM COMPETITORS

A longitudinal study of German risk disclosure from 1999 to 2003 found that risks 'in most cases risks are described insufficiently', arguing 'it is usually impossible to distinguish the ... most important risks from those with less relevance.'²¹ Thus, risks can be described vaguely with little magnitude or probability given. This prevents companies from looking more affected by risks than their competitors.

WHAT WAS DISCLOSED ABOUT SLOW-BUILDING RENEWABLE ENERGY COMPETITION AND NUCLEAR POLICY WHEN THE RISK WAS BUILDING?

"The RWE Group's exposure to the constant change in the political, legal and social environment in which it does business can be expected to have a substantial impact on earnings. Lignite and hard coal power plants account for a significant portion of our electricity generation portfolio. This represents a substantial risk due to the EU-wide CO2 emissions trading system" (2009 Annual Report, page 101)

Renewable energy was not mentioned in the 2009 Annual Report Risk Section.

WHAT HAPPENED?

25% fall in wholesale electricity price
from 2008-2011

72% fall in Share price
from 2007 to 2011

WHAT WAS DISCLOSED ABOUT RISK FROM RENEWABLE ENERGY INTEGRATION AND NUCLEAR POLICY WHEN BANKRUPTCY WAS IMMINENT?

"As a utility, we plan our capital expenditure for periods extending over decades, making us especially dependent on reliable political framework conditions. However, we are witnessing an increasing trend towards regulatory intervention in the energy market. Due to the budgetary difficulties of numerous European countries, there is now an increased risk of governments imposing new burdens on the economy. This could particularly affect companies that are bound to certain locations, such as utilities. An example of this is the German nuclear fuel tax, which curtails our earnings considerably." (2011 Annual Report, page 91)

Lignite and hard coal power plants account for a significant proportion of our electricity generation portfolio. Our specific carbon dioxide emissions are therefore far above the sector average. The Western European electricity sector will hardly be allocated any free certificates in the third emissions trading period, which runs from 2013 to 2020. Therefore, the number of emission allowances we buy on the market will be much higher than before. By 2020, we aim to reduce our specific CO2 emissions to 0.62 metric tons per megawatt hour (MWh) of electricity generated compared to 0.79 metric tons in 2012, partly through the expansion of renewable energy and the continued modernisation of our conventional generation portfolio." (2012 Annual Report, page 92)

It took a combination of crises for RWE to disclose specific information about the likely impacts of government policy and renewable energy integration. Once the crisis occurred, RWE's risk disclosure included discussion of specific policies and mitigation actions, including renewable energy deployment, which were not mentioned before the crisis. Giving more specific information before the crisis about the potential cash flow impacts of this long-term risk could have helped investors factor such a risk into RWE's valuation. As it is, investors and society were exposed to losses.

CASE STUDY: PEABODY

Before its bankruptcy, Peabody had multiple options for how to disclose its Competition Risks from Natural Gas Prices. They could have described the risks:

ACCURATELY WITH SPECIFIC INFORMATION

Companies can disclose their key competitive pressures, as suggested by Item 503(c) of Regulation S-K. For example, Google disclosed a risk factor in its IPO registration statement declaring that it faces “significant competition from Microsoft and Yahoo.” The SEC also uses its comment letters to ask for “information investors need to assess the magnitude of the risk.”

OR SAFELY TO PROTECT FROM LITIGATION

Companies can disclose, obvious generic risks that could apply to any company in its industry, otherwise called boilerplate language. The use of boilerplate language can avoid giving probabilities of risks materializing and the actions companies would take if they did. This is reinforced by a lack of enforcement from the SEC on disruptive risks.²²

WHAT WAS DISCLOSED ABOUT SLOW-BUILDING RISK FROM NATURAL GAS PRICES WHEN THE RISK WAS BUILDING?

“Our profitability depends upon the prices we receive for our coal. Coal prices are dependent upon factors beyond our control, including: the availability and price of alternative fuels, such as natural gas, and alternative energy sources, such as Hydroelectric power” (2008 10-K)

WHAT HAPPENED?

Bankruptcy declared
in 2016

100% loss in
shareholder value

WHAT WAS DISCLOSED ABOUT RISK FROM NATURAL GAS PRICES WHEN BANKRUPTCY WAS IMMINENT?

“Thermal coal accounted for the majority of our coal sales during 2015. The majority of our sales of thermal coal were to electric power generators. The demand for coal consumed for electric power generation is affected by many of the factors described above, but primarily by (i) the overall demand for electricity; (ii) the availability, quality and price of competing fuels, such as natural gas, nuclear fuel, oil and alternative energy sources; (iii) increasingly stringent environmental and other governmental regulations; and (iv) the coal inventories of utilities. Gas-fueled generation has the potential to displace coal-fueled generation, particularly from older, less efficient coal-powered generators. Many of the new power plants in the U.S. may be fueled by natural gas because gas-fired plants are viewed as cheaper to construct and permits to construct these plants are easier to obtain as natural gas is seen as having a lower environmental impact than coal-fueled generators. Increasingly stringent regulations have also reduced the number of new power plants being built. These trends have reduced demand for our coal and the related prices. Any further reduction in the amount of coal consumed by electric power generators could reduce the price of coal that we mine and sell... Further declines in the price of natural gas, or continued low natural gas prices, could cause demand for coal to decrease and adversely affect the price of coal. Sustained periods of low natural gas prices or other fuels may also cause utilities to phase out or close existing coal-fired power plants or reduce construction of new coal-fired power plants, which could have a material adverse effect on demand and prices for our coal, thereby reducing our revenues and materially and adversely affecting our business and results of operations.” (2016 10-K)

It took a crisis for Peabody to disclose specific information about the likely impacts of lower natural gas prices. Giving more specific information before the crisis about the potential cash flow impacts of this long-term risk could have helped investors factor such a risk into Peabody’s valuation. As it is, investors were exposed to losses.

CASE STUDY: BANKS EXPOSED TO DISRUPTION BY FINTECH

“Fintech” is short for financial technology and describes an emerging industry around using technology and innovation to change the way financial services are executed and delivered. Fintech is rapidly threatening to upend the traditional delivery of financial services, with newcomers like ANT Financial Services Group in China rapidly growing a customer base of 450 million active annual users in just a few years. Arguably the past 2 years in particular have seen a rapid growth in the consciousness of ‘fintech’ by consumers, with a ten-fold increase in Google searches for the word ‘fintech’ between 2014 and 2016 (see figure below).

This threat is increasingly being recognized in the industry. According to a FinTech survey by PWC, 60% of asset and wealth managers fear losing business to FinTech companies. Despite this, at least a third do not engage with the industry to date and only a half consider it in their core strategy. The tail end of this can be dramatic, even if low probability event. Around 5-10% of respondents considered FinTech to potentially threaten upward of 61% of their total business within 5 years.

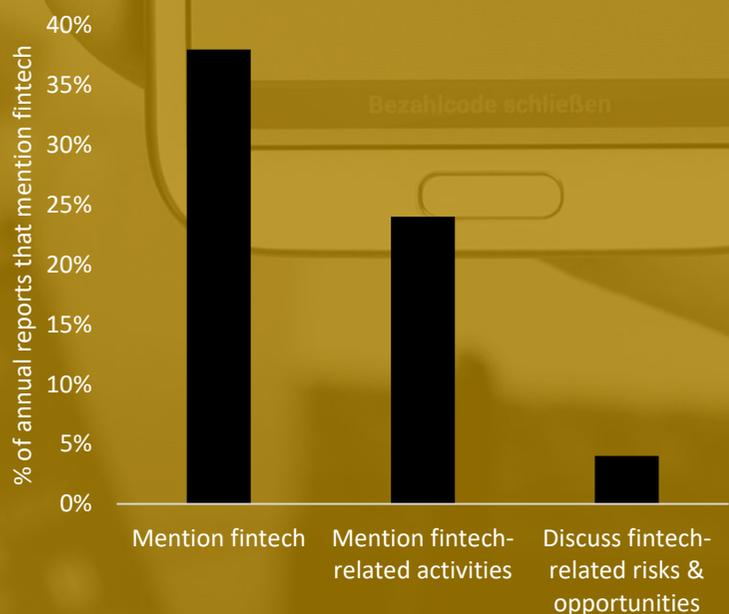
Frequency of ‘fintech’ searches on Google Search over the past 5 years



Despite this prominence, fintech is basically non-existent in financial disclosures. In a review of a sample of MSCI World companies classified as banks (based on ICB classification), only 38% even mention ‘fintech’ as a concept, and less than one-in-four discuss *any* fintech related activities. Within these groups that do mention this, these discussions are frequently limited to 1-2 sentences. Only 4% of banks discuss FinTech-related risks, with best practice examples by HSBC and Bankia. HSBC for example specifically mentions the risk of fintech to their business and discuss mitigating actions.

While these two examples are ‘best practice’, there is not a single annual report that discusses the potential scale of the impact of this trend on their business and financials. Barclays perhaps provides a counter-example when suggesting fintech is immaterial as a risk given the customers desire for “human interaction”. Such reporting starkly resembles that of Blockbuster and other physical retailers in the mid-2000s

References to fintech in MSCI World banks’ annual reports sample (n=50)



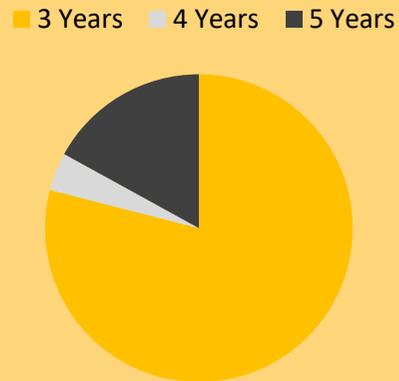
**BEST REGULATORY PRACTICE:
BUSINESS VIABILITY STATEMENTS**

Viability statements force companies to consider the factors that could undermine their business over long-term time horizons. In our sample of global annual reports, the most prominent examples of forward-looking disclosure were Viability Statements. When companies are asked to assess the viability of their business models, they are forced to consider factors that match our definition of ‘White swans in the dark’. These factors may be different than the risks that are listed in general risk reporting which as we have seen are often broad and generic. As part of this exercise, companies must employ forward-looking scenarios to assess the impact of such factors.

Viability statements are currently only required in the UK and South Africa. The Viability Statement was introduced to the UK Corporate Governance Code by the FRC in 2014. The FRC wanted a sense of whether companies were preparing for unexpected events.²³ The viability statement asks companies to “*explain in the annual report how they have assessed the prospects of the company, over what period they have done so and why they consider that period to be appropriate. The directors should state whether they have a reasonable expectation that the company will be able to continue in operation and meet its liabilities as they fall due over the period of their assessment, drawing attention to any qualifications or assumptions as necessary.*” 79% of companies select a 3 year time horizon (see Fig. 1 at right). South Africa uses the UK’s Corporate Governance Code and thus requires viability statements as well.

Viability statements inherently require scenario analysis. According to consultants from Deloitte, scenario analysis is “*likely to be the most popular level of analysis used outside of financial services in the early years.*”²⁴ This is borne out by the fact that 96% of Viability Statements at least mention a Scenario Analysis process. Companies vary in their ability to offer assumptions behind their viability statements. EY found that few companies were already thinking about principal risks to viability before the release of the standard in 2014. 77% of companies needed to develop a new process to disclose long-term viability in their reports, which was likely financial scenario analysis. (see Fig 2.). Most scenario analysis disclosure globally in our sample came through UK Viability Statements. Only one company using a code other than the UK’s reported on their viability – a Dutch company. South African companies also issue Viability Statements because their reporting code is a hybrid with the UK’s.²⁵ The assumptions behind scenario analysis, if disclosed’ can be used in analyst valuation methods (see right). Out of the 125 Annual Reports we reviewed, only 10 companies reported on their long-term viability. Of these 7 were from the UK and 2 from South Africa, which both rely on the FRC’s requirement on this topic. One reason for such a low level of scenario analysis in disclosure highlighted in our interviews was competition pressure not to disclose negative scenarios.

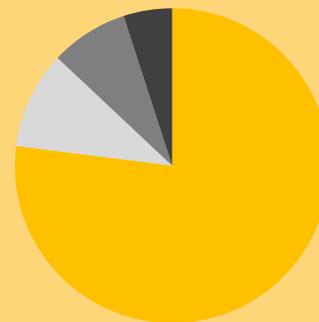
Figure 1: Time Horizon of Viability Assessment Period
The Time horizon of viability assessments is usually between 3-5 years



Source: KPMG, “*Longer-term viability statements,*” n=100 companies from the FTSE100 and FTSE 250

Figure 2: Proportion of companies needing to create new process to disclose long-term viability

- New process needed including additional management time
- Just an update to going concern assessments
- Fundamental change in how we assess and report on business viability
- Not sure



Source: EY, “*The Viability Statement,*” from a sample of FTSE 350 webinar participants

“For the [scenario analysis] data to be useful you need to understand why, first, they chose the scenario, second, what assumptions they take in Value-at-Risk, third, the probability of that scenario in their own risk management, and fourth, how they would respond to that. The more information along the four axes [the analyst has] the more usable the results of the scenario analysis are.”

Julie Raynaud, Senior Sustainability Research Analyst, Kepler Cheuvreux

CASE STUDY: FRESNILLO VIABILITY STATEMENT

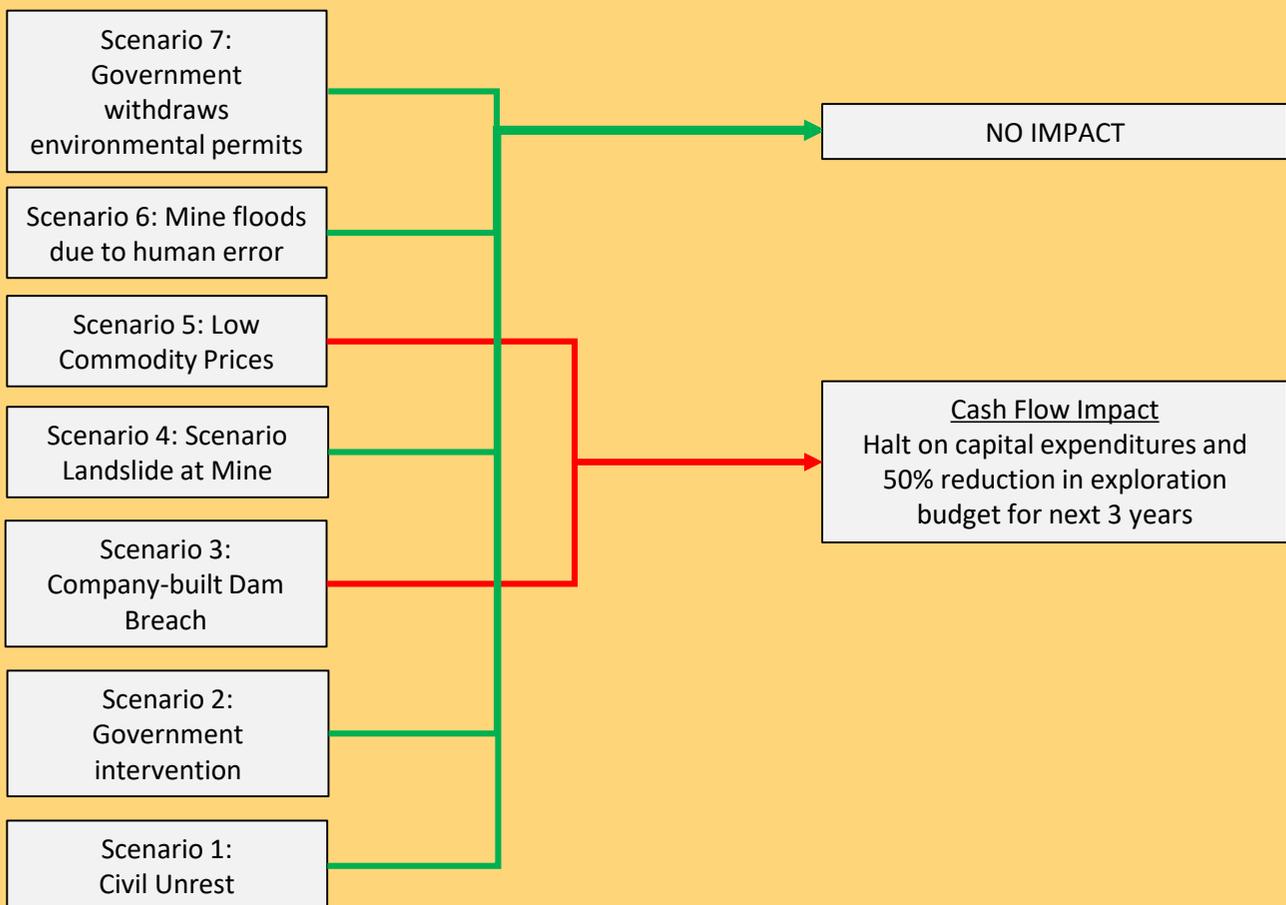
As a best practice in scenario analysis disclosure, Fresnillo isolates the most forward-looking risks to its balance sheet, groups them into 7 scenarios, discloses the assumptions behind them, and discloses which combination of scenarios would affect its cash flows. To respond to the UK’s Viability Statement requirement in its Strategic Report, the mining company Fresnillo PLC identified 7 scenarios and the cash flow impacts they might have over the next 5 years. This approach demonstrates the internal planning companies do for long-term risks and gives data on how the company would adapt to certain risks materializing.

Not all risks are equally impactful. To assess the effect of each risk, the company describes the risk and puts its balance sheet through a scenario analysis. The 7 risk scenarios are detailed in terms of the event and potential impact. Crucially, part of this scenario analysis combines different scenarios to show how risks can compound. The company tested each scenario in combination with the low commodity prices scenario to assess the scenarios’ effects in multiple environments. After testing the interrelations between risks, the company found only one combinations of scenarios that would place notable stress on cash flows is a combination of scenarios 3 and 5 below.

Following from its scenario analysis, Fresnillo identifies the specific actions it will take if long-term risks materialize. If Scenario 3 and 5 combine, the company says, “In addition to suspending capital expenditure, a further mitigating action could include a 50% reduction in the exploration budget for the first three years.”²⁶ This gives investors guidance as to what the balance sheet implications of highly probable point-in-time risks will be.

Further, the company discloses the risk management practices that would be used to address the risks. In addition to typical risk management practices, the company indicates that the scenario analysis fundamentally has affected their internal controls. They indicate that based on the scenario analysis, “certain actions for the reinforcement of controls and their monitoring have been identified and will be implemented to further strengthen the control environment.”²⁵ While it is not clear what these actions are, investors can inquire about them, and it is clear that the exercise of meeting the Viability Statement requirement improved the company’s risk management practices. This best practice shows that disclosure requirements can encourage companies to undertake and disclose scenario analysis.

Figure 1: The Materiality of Scenario-Based Risk in Fresnillo’s Viability Statement



Source: Fresnillo 2015 Annual Report, pages 48-49

4.3 ASSET STRANDING

Impairment tests are forward-looking statements that can reveal potential stranded assets when they rely on discounted cash flows. Companies use several methods to determine the value of their assets, only one of which is forward-looking: discounted cash flows. In this case, companies can use diverse forward-looking assumptions to value their assets and determine impairments. The methods are:

Comparables methods. These methods involve comparing the value of transactions and company cash flows to similar examples in the same sector (see Figure 1). In the case of transactions, looking at transactions of similar assets or companies can show how valuable a certain asset is. In the case of companies, the valuation of similar companies can show what the future cash flows of the companies are worth. For example, the EBITDA multiples of similar companies can be used to determine whether a company is worth the amount of its assets.

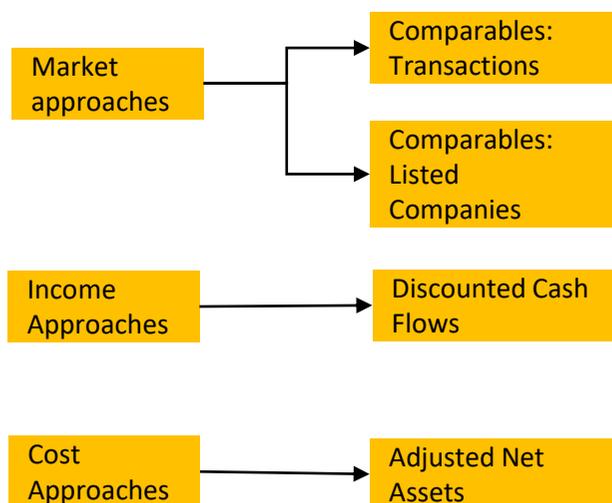
Adjusted net assets. This approach relies on revising past valuations based on current market values for assets that have prices. It does not require forward-looking estimates.

Discounted cash flow models. DCF models include forward-looking assumptions about cash flows many years into the future, although the explicit modelling of these cash flows will be frequently limited to less than 5 years, with a subsequent extrapolation in line with a fixed terminal growth rate.²⁷ This method relies on a discount rate and an expected growth rate, both of which are typically sourced from external parties like the IMF. The cash flows themselves are based on forward-looking assumptions about capital investments and revenues. Here, companies can offer a range of possible outcomes.

Companies do not disclose the results of sensitivity analysis. To calculate impairments using a DCF, companies must select a central long-run growth scenario with which to value their assets. However, they can also test the value of their assets under multiple future scenarios. A survey of a small sample of large listed companies showed that most companies use sensitivity analysis in their impairment tests and that over 40% of companies use stress tests and scenario analysis in their impairment tests (see right). This survey combined with the analysis of disclosure on the next page suggest that companies do not disclose key assumptions and outputs available internally.

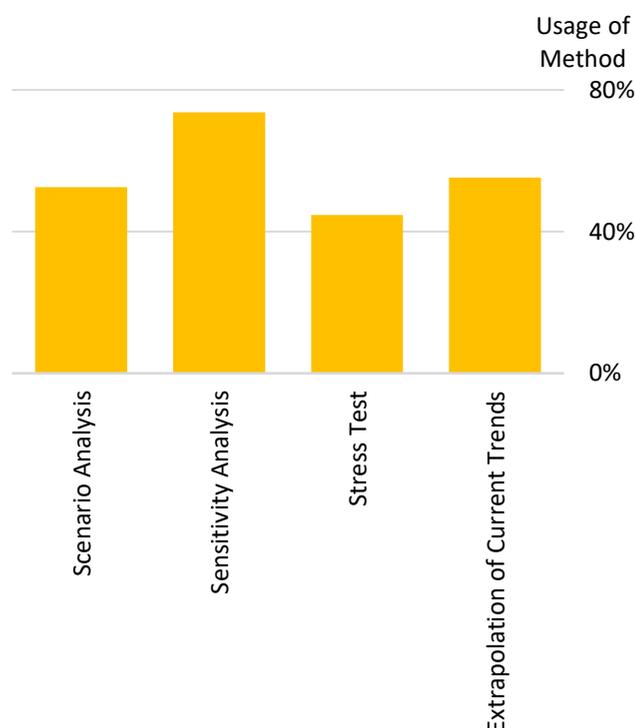
Companies are not required to disclose the assumptions behind their impairment tests. While companies can disclose the assumptions behind their impairment tests on a voluntary basis, there are no specific requirements for what they need to disclose.²⁸

Figure 1: Asset valuation methods under IFRS



Source: EY, "Impairment of long-lived assets, goodwill and intangible assets: US GAAP and IFRS," 2011.

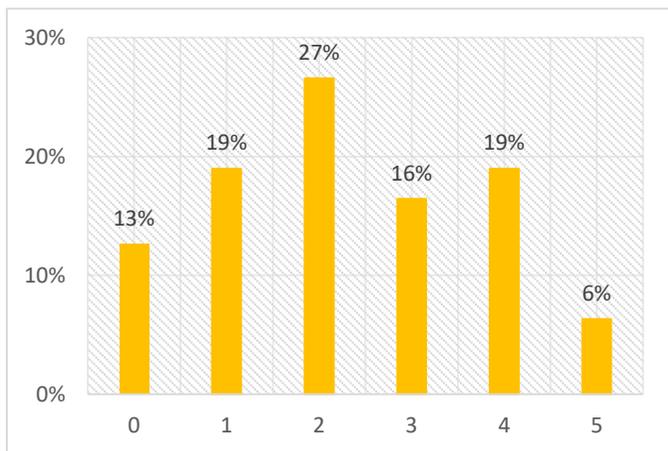
Figure 2: Frequency of Internal Model Usage in Impairment Tests



Source: 2dii Survey of WBCSD Member Finance Departments, n=37 global publicly traded companies

Figure 1: Impairment Test Assumption Quality Score

Few companies disclose the scenarios they use in calculating impairments



Assessing the transparency on impairment tests. To understand more precisely what companies disclose for impairment test assumptions, we examine and score 117 annual reports/10-K on a global scale. The 0–5 scoring is based on whether and to what extent companies disclose:

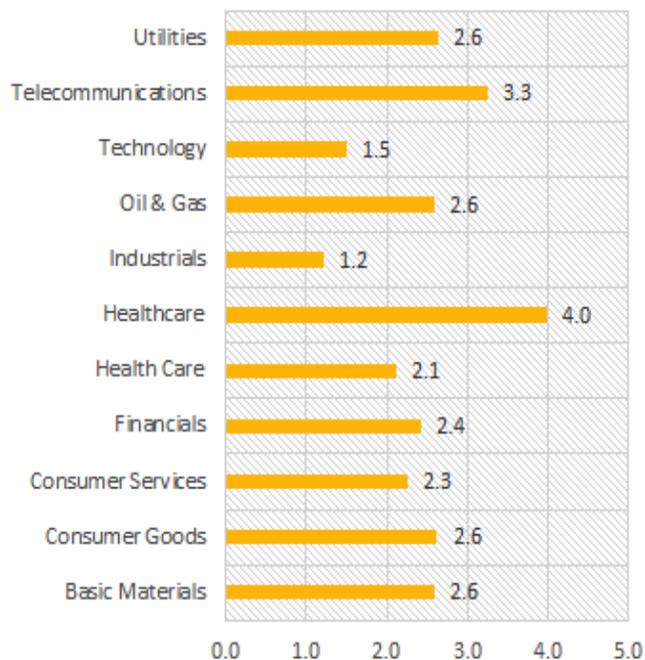
Score	0	1	2	3	4	5
Scenario analysis (quantitative)						X
Sensitivity analysis (quantitative)					X	X
Quantitative assumption				X	X	X
Qualitative assumption			X	X	X	X
Have impairment tests		X	X	X	X	X

The average score of impairment test assumptions disclosures is only 2.3. This result indicates that companies still stuck in the range between disclosing qualitative assumptions (*declaring they make assumptions about asset valuations, but do not state what the assumptions are*) and quantitative assumptions (*clearly stating the numerical assumptions made but no sensitivity or scenarios analysis*). Strikingly, 13% companies in our sample do not disclose anything about impairment tests, which violates accounting standards. Most of them are located in OECD countries such Japan and Spain. Only 25% of companies conduct quantitative sensitivity or scenario analysis. These tests acknowledge future uncertainties, and introduce more comprehensive disclosure of the impact of different assumptions on the amount written off. However, they are far from a common practice.

Many companies use scenario analysis internally but do not report the results. Particularly, over 40% of companies surveyed state they use stress tests and scenario analysis for impairment tests; but we find only 25% of them disclose such information in their 10-K reports (see previous page).

Figure 2: Average Impairment Test Assumption Quality Score by Industry

Most industries score around 2.3, while Technology sector has the lowest quality impairment tests.



Source: 2dii 10-K Report Sample (n=117) based on text search for ‘impairment test’.

Example of a ‘4’ – Deutsche Telekom

Sensitivity analysis on:

- Discount rate (decrease or increase by 50%)
- Cash flow (decrease or increase by 5%)
- Sustainable growth rate (decrease or increase by 50 basis points)

Example of a ‘5’ – Engie

Scenario analysis on:

*“Various transformational scenarios were considered concerning nuclear power generation in Belgium: the **disappearance of the entire nuclear component from the portfolio in 2025** after 50 years of operation in the case of Tihange 1, Doel 1 and Doel 2...**In this scenario, the impairment risk would represent around €2,700 million.**”*

The disclosure gap on scenario analysis in impairment tests suggests a challenge for the FSB Task Force on Climate-Related Financial disclosures recommendations. While the TCFD recommends scenario analysis, the existing disclosure suggests this type of scenario analysis almost never takes place in current reporting frameworks, bar a few outliers. Thus, the implementation of the TCFD’s scenario analysis recommendation can be focused on impairment tests.

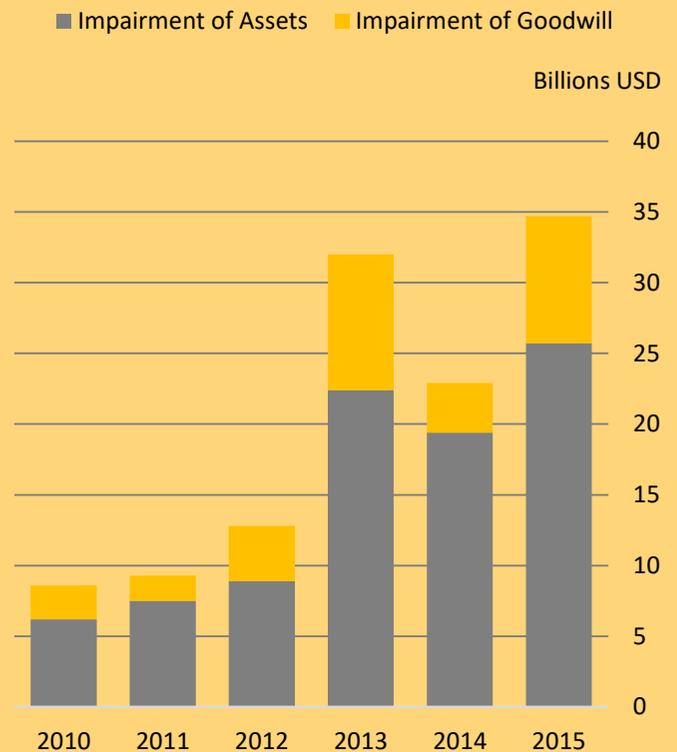
CASE STUDY: ANALYSIS OF ASSET STRANDING

In energy-related sectors, companies are increasingly facing stranded assets as a result of 'White Swan' risks. Over the past 10 years, oil producers and utilities have been exposed to risks that caused the value of their assets to become less than their market value. This phenomenon creates "stranded assets" or assets that are prematurely written down and rendered unusable.²⁹ In Oil & Gas, this trend largely stemmed from a low oil price due to the shale boom and a slowdown in the Chinese economy.³⁰ Utilities, particularly in Europe, have written down generation assets because of renewable energy capacity growth, low GDP growth, energy efficiency policies, and low commodity prices.³¹ These trends reduced the value of production assets in both sectors.

As a result, increasing levels of impairments were recorded in both sectors. Once these risks materialized, companies were forced to write down assets on their balance sheets. Impairments in European Utilities averaged \$7.7 billion USD from 2010 to 2012 but ballooned to over \$20 billion USD from 2013 to 2014 (see Figure 1). European utilities wrote down \$35 billion in assets in 2015 due to renewable energy growth. The reduction in book value for German utilities in particular led to heavy losses for investors. In the US Oil & Gas sector, the crash in oil prices in 2015 led to an explosion in impairments, as the oil price increase assumed in shale speculation never materialized. US Oil & Gas companies wrote down \$140 billion in assets in 2015 due to lower oil demand and the shale boom (see Figure 2).

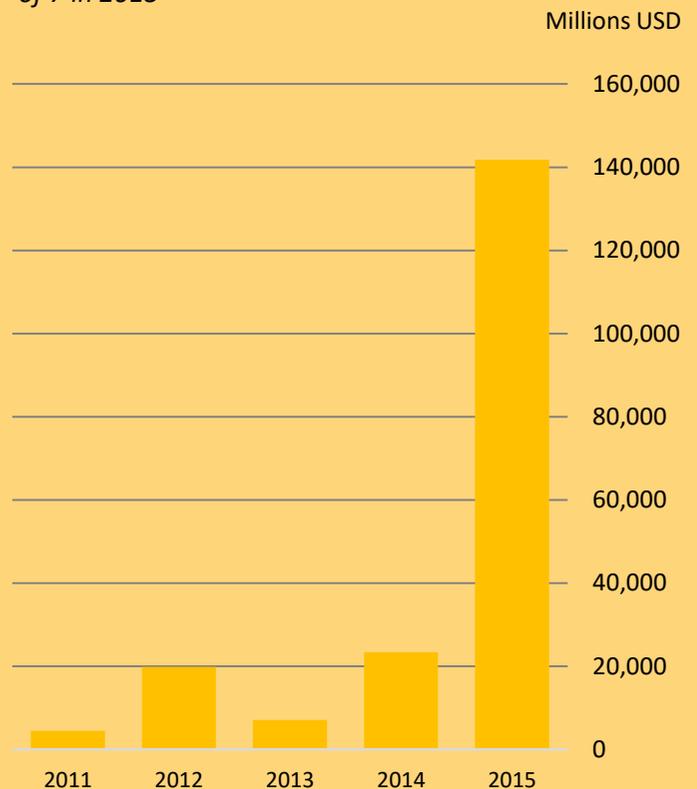
Analysts do not have clear insight into the calculations behind impairments, giving them limited visibility into asset stranding. Impairment tests require future cash flow projections, but impairment loss recognition may not be based on the projection. Despite slight differences, both GAAP and IFRS require certain long-lived and/or investment assets to go through regular impairment tests and recognize losses if their carrying amount (book value) exceeds 'fair value' (market value) or future cash flow value. While IFRS adopters can recognize impairment losses for the difference between future cash flows and carrying amount, GAAP practitioners only use the cash flow projection to determine whether a loss exists, and recognize the loss based on fair value. In other words, future cash flow projections relating to impairments are not always reflected in GAAP-based financial statements. This means that companies may not record impairments until their assets have lost all market value, which is too late for investors to divest. National regulators do not explicitly require disclosures of impairment tests but accounting standards boards do as part of balance sheet disclosure but do not require the disclosure of the method used.³² For this reason, the Financial Reporting Review Panel refers to impairment disclosures as "among the weakest areas of disclosures."³³ Policymakers can create more transparency on stranded risks by requiring impairment test assumption disclosure.

Figure 1: Impairments in European Utilities
Utilities impairments tripled from 2012 to 2013



Source: EY, "Impairment of Long-Lived Assets"

Figure 2: Impairments in Oil & Gas Assets, US
Oil & Gas Impairments increased by a factor of 7 in 2015



Source: EY, "Impairment of Long-Lived Assets"



PART V

OBSTACLES TO LONG-TERM RISK DISCLOSURE

SECTION SPOTLIGHT

- The analysis of best disclosure practices compared with CFO survey results and available economic intelligence data show there is a significant room for progress
- Corporate long-term risk and forward-looking information disclosure is blocked by a ‘perfect storm’
- The main factors include limited requests from analysts, vague legal requirements, a competitive race to the bottom, the limited role of auditors, and censorship from legal departments

5.1 THE PERFECT STORM CLOUDING THE DISCLOSURE HORIZON

Gaps in disclosure. Our analysis suggests that corporate long-term risk disclosure can be improved in a number of ways:

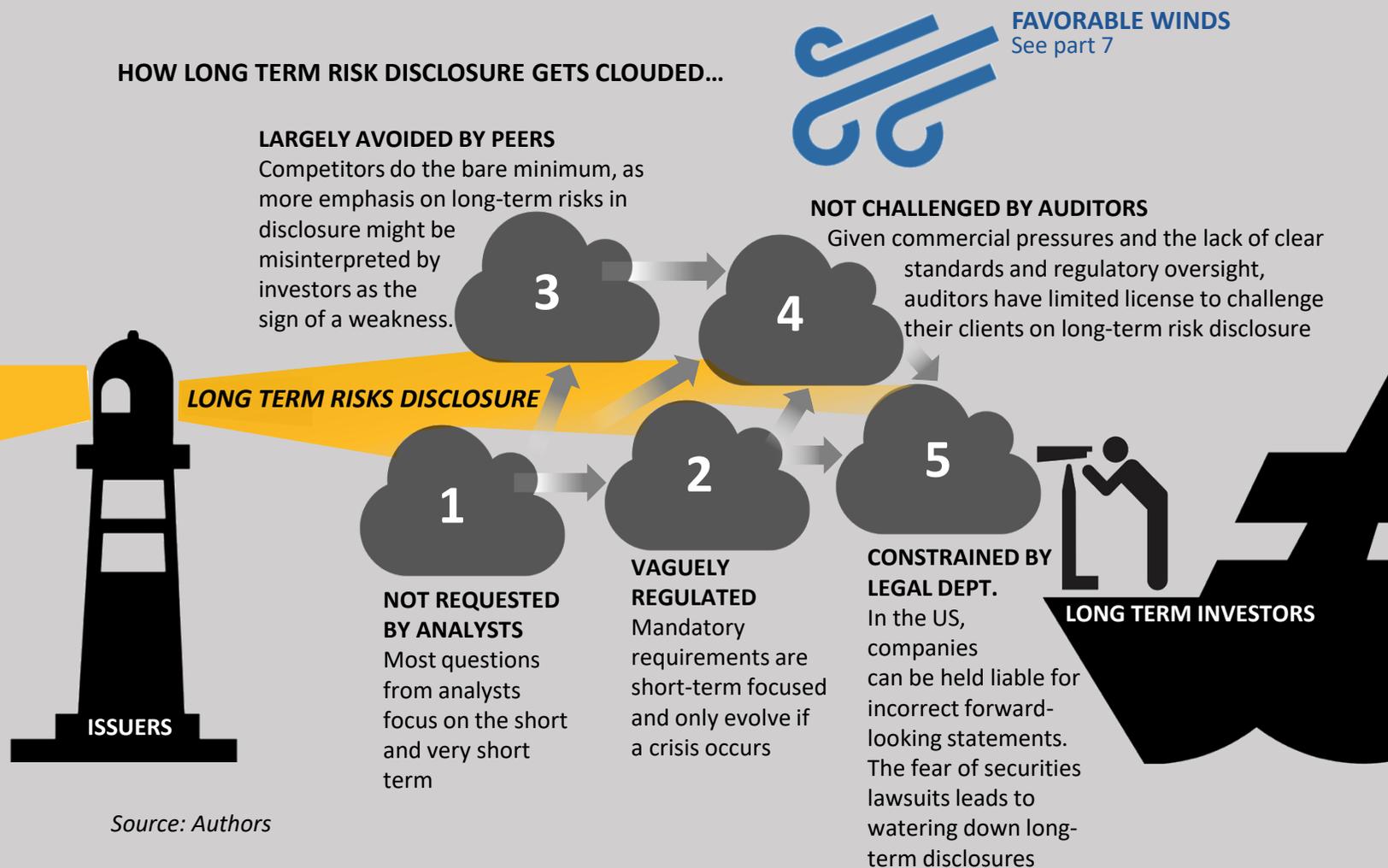
- **Identification of risks.** The disclosure of long-term risks is usually very limited and generic. Only companies listed in the UK and South Africa discuss the viability of their business, usually with short term time frames.
- **Use of scenario analysis.** Based on our analysis of company reports, only a small percentage of companies disclose the results of scenario analysis done for impairment tests.
- **Limited adoption of best practices.** Our quantitative analysis suggests that only a small percentage of listed companies provide forward-looking data and forecasts, usually limited to a couple of years.

Limited methodological obstacles. According to the interviews and based on the analysis of best practices, this situation seems primarily related to exogenous obstacles to disclosure, rather than methodological challenges within companies. For instance 40% of companies in our sample use scenario analysis for their impairment tests, but only 25% report to some degree on the results (page 36). Our survey suggests similar results for for capital expenditure planning, with the time frame for internal planning longer than the time frame disclosed (page 25).

Combination of external obstacles. A number of external obstacles have been identified through the survey and follow-up interviews with financial and risk departments, as well as interviews with consultants, auditors, financial analysts and law firms.

Overall, the disclosure of long-term risks seems to be prevented by a combination of factors that create a 'perfect storm' described below (Figure 1). On the other hand, some favorable winds seem to drive changes, such as the increasing pressure from NGOs and SRI investors and the development of big data. Each of these factors is further explored in the following pages.

Figure 1: The 'Perfect Storm' Inhibiting Long-term Risk Disclosure



5.2. LIMITED REQUESTS FROM ANALYSTS

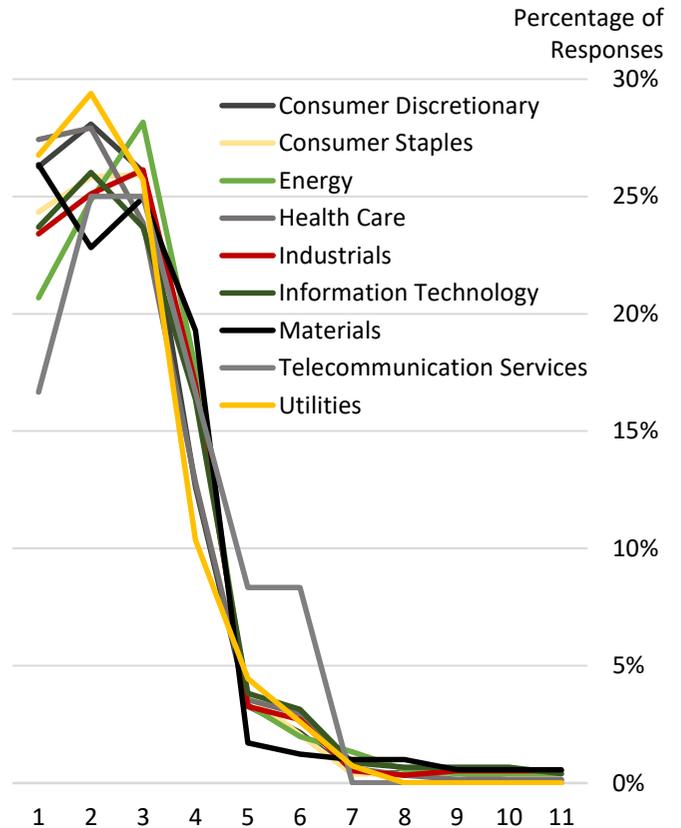
The findings from our previous papers (focused on the time horizon of financial analysts and equity managers) suggest that the lack of demand for long term analysis could be one of the main obstacles to corporate reporting of long-term risks.

Barely any long-term investors. Our paper on the time horizon of long-only equity managers found that on average they turn their portfolio over every 1.7 years, with 90% turning it over in less than 3 years. Even if the turnover can be shorter than the average for some industries (See Fig. 1), interviews conducted with analysts suggest that this focus on the short term greatly reduces the demand for long-term risk analysis.

Analysts respond to the demand. Financial analysis is ‘calibrated’ on a specific time horizon. Financial analysts provide a target price (equities) or rate the risk of default (bonds). Given the variability of these metrics over time, analysts need to adjust their recommendations over a specific timeframe if they want to maximize accuracy. Equity research analysts usually provide a 1 year target. Credit rating analysts, on average, change 1/3 of their investment grade ratings over a 3 year period.³¹ This bias towards the short term has in turn major implications on the questions asked by analysts during meetings with the management of the companies they invest in. Our interviews suggest that analyst very rarely ask questions on risks that are only likely to materialize after 5 years.

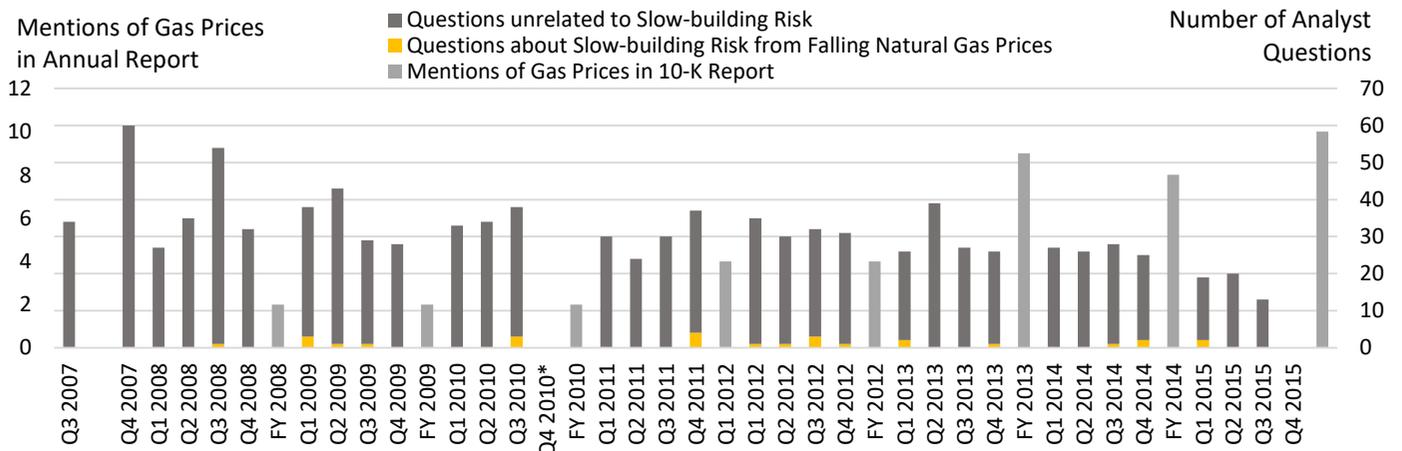
Analysts rarely ask questions about long-term risks. Analysts focus their conversations with management on short-term metrics such as currency risk and new projects. Long-term risks are rarely covered. Our longitudinal study of analyst transcripts for BP, Peabody, Volkswagen, and RWE showed that only 3% of analyst questions relate to long-term risks. For example, despite the weak signals of coal-to-gas switching beginning in 2005, analysts did not ask Peabody about the risk until 2008 and devoted no more than 3 questions about Peabody’s response to the trend until Q4 of 2011, once the price of natural gas had already fallen below the price of coal, signaling an irreversible decline for Peabody’s domestic coal business (see below). This means that companies do not have to disclose their long-term risk adaptation plans to analysts during calls, and more broadly feel no pressure from analysts to enhance their risk registers on the topic.

Fig. 1: Analyst Cash Flow Forecast Entries in Bloomberg Terminal by Forecast Year



Source: 2dii & the Generation Foundation 2017, “All Swans are Black in the Dark,” from Bloomberg Data 2015

Fig. 2: Proportion of Peabody Earnings Call Questions about Slow-building Risk, 2007-2015



Source: 2dii Analysis of Transcripts from Seekingalpha.com

5.3 VAGUE LEGAL REQUIREMENTS

In most countries the mandatory corporate disclosure requirements are primarily designed to inform investors. Given the limited requests from analysts (see previous page), regulators have not been incentivized to prescribe specific disclosure to companies on long-term risks. Therefore, reporting frameworks are mostly backward-looking.

Regulations are designed for shareholders. Even though corporate reporting can serve multiple purposes (e.g. calculating taxes, informing stakeholders), most legal frameworks reviewed are primarily designed to inform ‘investors.’ In the US, the Supreme Court has determined that a fact is material to investors if there is “a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the ‘total mix’ of information made available.”³⁴

Who is this investor and what is his/her time horizon?

The US Exchange Act (1934) clarifies part of the question, defining the investor as “long-term investors who depend on equity investments to meet their financial goals.”³⁵ It however does not provide assumptions on the critical question of the time horizon of this investor. In practice, mandatory disclosure frameworks are designed and implemented (technical guidance, monitoring, investigations, sanctions, etc.) to respond to the demands of average equity managers, who have relatively short term horizons (see previous page). Our review of regulatory documents and letters from market authorities shows that the expectations on long-term risk disclosures are indeed limited and that the time horizon is almost always referenced vaguely.³⁶

Globally, there are very few forward-looking mandatory disclosure requirements. A review of standards from 10 major jurisdictions (see next pages) revealed that forward-looking requirements are only available in a very limited number of cases. For instance, US SEC requirements place no timeframe on risk reporting and only ask for specific forward-looking goals around inflation risk and contractual obligations.³⁷ In the UK, the FRC has recently added a *Viability Statement* to the Strategic Report (see page 33). However, companies can limit their analysis to a 1 year time horizon. In the EU, regulations require ESG disclosure but do not specify a timeframe.³⁸ As is logical, companies only disclose what they are asked to, so a lack of forward-looking information likely stems from a lack of regulation. Additionally, there is an “oversight and enforcement gap” on long-term risk disclosure in the UK, according to Alice Garton from ClientEarth, given the reliance of the FRC on investors.

Table 1: Examples of Forward-looking Disclosure Requirements

Jurisdiction	Forward-looking Requirements	Time Horizon
United States	Inflation risk	3 years.
	Contractual obligations	5 years.
	Capital expenditures	Not specified
	Risk factors	Not specified.
United Kingdom	Viability Statement	At least 12 months
South Africa	Company must disclose process for managing risk including key metrics, targets and objectives.	Strategy should include 'shorter, medium and longer term' prospects.
European Union	Companies should describe 'current and foreseeable impacts' for ESG concerns.	No specific time frames required.

Source: Publicly Available Disclosure Requirements

Accounting norms (GAAP and IFRS) focus on the past.

While some future estimates are embedded in financial statements, this is only done as a means to better recognize the impact of past events, and not to provide more visibility on the future. The scope of long-term estimates is also very limited. Financial reporting generally aims to aid users in assessing “the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise.”³⁹ However, both GAAP and IFRS make it clear that financial reports only provide basic information such as past performance and existing resources and claims against the entity, so that users could make their own projections. Particularly, GAAP and IFRS do not require annual impairment tests of long-lived physical assets, unless the conditions for impairments arise.⁴⁰ If companies do not have to test their assets for impairments until they are actually impaired, investors have no forewarning of stranded assets.

Sustainability reporting frameworks are not necessarily more forward-looking. Sustainability reporting does not necessarily explicitly come with longer disclosure time frames. Like financial accounting standards, most sustainability frameworks (see Fig 2 on the next page) have a one-year reporting period (SASB) or only very vague reference to the long term (IIRC, GRI). SASB explicitly cautions against forward-looking estimates. Our conversation with their Technical Director highlighted that the more a standard deviates from the one-year mandatory reporting convention, the less likely it is to be formalized.

Table 1: Examples of Long-term Estimates in Financial Statements (based on GAAP and IFRS)

The topics on which accounting standards require long-term estimates are limited

	Estimate items	Remarks
Income Statement & Balance Sheet	Lifetime of depreciable assets	Usually unchanged after initial estimate
	Some impairment loss	Depending on asset nature and lifetime
	Long-term contracts	If any
	Litigation and other long-term provisions (i.e. loss reserves)	If any
Statement of Cash Flow	n/a, because the purpose of statement is to convert the accrual-based income statement to a cash-based statement (i.e. to eliminate future estimates made in the B/S and I/S)	

Table 2: Long-term Estimates in reporting frameworks by country (source: Authors)

The indicators on which disclosure regulations require long-term estimates are limited

Countries in our Sample	Disclosure Requirements	Capital Expenditure	Viability Statement	Operational Indicators	Risk Factors	Impairment Test Assumptions
United States	Forms 10-K, 10-Q, and 8-K	None	None	Consolidated Financial Statements	Factors that could make the offering risky	None
South Africa	Stock Exchange Requirement: JSE	None	Expectation of continued operations over a defined time period	Consolidated Financial Statements	Risks to business model, future performance, solvency, or liquidity	None
United Kingdom	UK Corporate Governance Code	None	Expectation of continued operations over a defined time period	Consolidated Financial Statements	Risks to business model, future performance, solvency, or liquidity and how they are being managed	None
Australia	Corporations Act 2001 and Australian Securities Exchange (ASX) listing rules	None	None	Consolidated Financial Statements	Main Risks and Uncertainties	None
Belgium	Companies Code	None	None	Consolidated Financial Statements	Main Risks and Uncertainties	None
Canada	Canadian Form AIF	Effect of environmental protection requirements on CapEx	None	Consolidated Financial Statements	Risk Factors	None
Denmark	Danish Financial Statements Act	None	None	Consolidated Financial Statements	Main Risks and Uncertainties	None
Finland	Finnish Corporate Governance Code	None	None	Consolidated Financial Statements	Risk Management Section	None

Countries in our Sample	Disclosure Requirements	Capital Expenditure	Viability Statement	Operational Indicators	Risk Factors	Impairment Test Assumptions
France	Commercial Code	None	None	Financial Statements	Main Risks and Uncertainties	None
Netherlands	Dutch Civil Code	None	None	Future Obligations	Main Risks and Uncertainties	None
Germany	Corporate Governance + Commercial + Sustainability Codes	Forecasts for at least 1 year (GAS 20)	None	Forecasts for at least 1 year (GAS 20)	Main Risks and Uncertainties	None
Ireland	Companies Act 2014 of Ireland	None	None	Consolidated Financial Statements	Principal Risks and Uncertainties	None
Italy	Corporate Governance Code	None	None	Consolidated Financial Statements	None	None
Japan	Companies Act	None	None	Consolidated Financial Statements	None	None
Switzerland	Swiss Code	None	None	Consolidated Financial Statements	Internal control system report	None

Table 3: Relative Time Horizons of Voluntary Disclosure Frameworks

No voluntary disclosure framework requires specific time horizons for long-term disclosures

	SASB	GRI	IIRC	CDP
Reporting timeframe	1 year	Any chosen reporting period (usually 1 year)	Unspecified	1 year
Ask for forward-looking disclosure?	Cautions against forward-looking statements	Report activities with their short-term and long-term impacts	“Strategic focus and future orientation” is a guiding principle	Ask companies to self-report instead of mandating a horizon
Require specific time horizon?	Unspecified	Mostly unspecified	Unspecified	Self-report horizons of: <ul style="list-style-type: none"> • Risk assessment • Targets & initiatives
		Except: e.g. 3–5 years goals of key risks and opportunities	Because: “the definition of long term varies across different companies”.	Expect: e.g. mitigation cost over 6 years

Source: Authors from sustainability Frameworks

Table 4: Forward-looking items in the TCFD report

Disclosure item	Recommended time frame
Description of risks and opportunities	“short, medium and long term” – <i>Not defined</i>
Describe the impact of different scenarios on the organization’s businesses, strategy and financial planning	Description of the scenarios used, and how “financial planning” (e.g. operating cost and revenues, capex, acquisitions and divestments). Describe “the time period used”.
Target related to GHG emissions and other impacts	“specify the time frame”

5.4 PEERS: RACE TO THE BOTTOM

In the absence of demand from investors or stringent regulatory obligations, our research suggests that multiple factors create a 'race to the bottom' within each sector, in terms of long-term risk disclosure.

Alignment of practices by sector. Our analysis of disclosure practices in parts 2-4 suggests that the time horizon of disclosure tends to align by sector (page 20). To a certain extent, this phenomenon can be explained by the degree of uncertainty of forecasts and plans that is specific to each sector. However a closer look shows that this factor alone cannot explain the alignment of practices by sector: our survey of financial departments shows that they do not fully disclose their plans and results of their risk analysis (page 37), and financial analysts are usually able to provide estimates on longer time frames than companies (page 26). That suggests that other factors influence the alignment of practices.

Avoid disclosing sensitive data to competitors. The fear of creating competitive disadvantage was a common reason for not disclosing. Companies can lose their competitive positioning if they disclose too much information about their product plans. In industries with low levels of product differentiation, if a firm discloses forecasts of higher future demand, its competitors might increase their production to protect their market share. Disclosures of product innovation investments could lead competitors to quickly match these plans. Academic research shows that more innovative industries are less likely to disclose information than more established industries due to the strategic nature of their information.⁴¹ The fear of competition seems therefore to be a valid argument for limiting the horizon of disclosure for investment plans and forecasts. However, the analysis of economic intelligence databases in certain sectors show that the information disclosed by companies is less precise and shorter than what is actually available to competitors (See Case Studies: page 59).

General herding culture in corporate disclosure. Empirically, companies disclose earnings surprises at similar times to insulate themselves from market reaction. If competitors report earnings shortfalls at the same time, analysts are less likely to assign blame to specific management teams and more likely to attribute the losses to sector-wide underperformance. This approach seems to also apply to long-term risk disclosures. Indeed, a company that extends its horizon of disclosure is likely to disclose bad news and negative trends first. Our series of interviews with corporate managers showed that they were ready to provide better disclosure on long-term risks, but did not want to move first.

The role of auditors. Besides the general culture of a sector, it seems that the responsibilities and practices of auditors also tend to reinforce this herding effect since auditors may use the reports of peers as a benchmark to validate the lack of omission of material risks and the relevance of the scenarios used (see page 47).

Insight from Interviews

The Finance Department of a company with a nearly \$150 Billion Market Cap indicated that they would like to follow the recommendations of the Task Force on Climate-related Financial Disclosures, one of which is to disclose the results of 2° climate scenario analysis, but would not be willing to disclose the results of scenario analysis due to competitive pressure. Other companies might not disclose the financial effects of this scenario and so could make the company look worse. To report scenario analysis results, its competitors would also need to disclose this information to remove the competitive gap, making scenario analysis disclosure a collective action problem.

Further, a cement company indicated that they would “disclose the impact of scenario analysis but not but the timeframe over which it would be relevant or the assumptions of the scenario” to preserve its competitive position.

5.5 LIMITED SCOPE FOR AUDITORS

Auditors cannot challenge their clients on long-term risk disclosure since they do not have the mandate to do so and peer companies do not report.

Auditors only check compliance with existing standards. In theory, auditors do not push companies to disclose any more data on risks and revenues than is required by accounting standards. Auditors provide reasonable assurance that financial statements are free from material misstatements, and prepared in accordance with the applicable financial reporting framework.⁴² Therefore, auditors mainly focus on detecting frauds and errors in financial statements, rather than challenging their clients on the analysis of risks and the relevance of their scenarios and forecasts.

Auditors are not supposed to ensure that long-term risks are correctly reported. Historically, auditors have played a limited role in reviewing or challenging management on disclosures about forward looking information and long-term risks. The most updated International Standard on Auditing 720 (Revised), effective December 15, 2016, re-states that auditors are *not* responsible for other information disclosed in the annual reports beyond the financial statements, such as the management report and chairman’s statement (see below right).⁴³ In the US, this same principle is supported by AS 2710. In this context, the discussion of long-term risks, the viability of the business and most forecasts are not challenged by auditors.

Limited responsibility and ability. Auditors are however required to *understand* the business risks faced by the companies to detect frauds and errors. In the United States, Auditing Standard No.12 mandates auditors to obtain an understanding of the business risks that may result in material misstatement.⁴⁴ However, their ability to do so is in practice limited. A recent study by PwC shows that internal auditors do not have the capabilities or responsibilities to evaluate the disruptive risks facing companies. In the same study, PwC surveyed stakeholders working with internal audit teams: the results shows that only 24% of traditional internal auditors identify the potential for a disruptive event to occur and only 27% assess the ability to respond to disruption risk.⁴⁵ One explanation for this, in addition to the limited role of auditors, is that auditors may not have sufficient skills to address disruption. 55% of clients think that internal auditors lack the skills to understand business disruption. Our interviews revealed that external auditors look for two kinds of risks: 1) Those that derive from imminent changes to accounting standards and regulations and 2) the client’s own concerns. Auditors do not appear to be looking out for exogenous long-term risks.

Average market practices as a standard. At the end of the day, the main way for auditors to verify the lack of omissions regarding disruptive risks and the relevance of the scenarios used is to check for consistency with the information published by companies from the same sector. Both the responsibility of the auditors and their approach in practice therefore contribute to the ‘*race to the bottom*’ described on page 46.

Quotes from Interviews

“Our assessment on business risks is a means instead of an end. We may modify our testing process, for example by increasing the number of samples, if the business risk is high.”

– Elaine Li, Associate, PwC

“Auditors are focused on those risks that potentially affect the financial statements”

– Matt Chapman, Senior Manager, KPMG

“We can’t account for [a long-term risk] until it happens.”

– Partner, Public Company Auditing, Big 4 Accounting Firm

INTERNATIONAL STANDARD ON AUDITING 720 (REVISED) THE AUDITOR’S RESPONSIBILITIES RELATING TO OTHER INFORMATION

14. The auditor shall read the other information and, in doing so shall: (Ref: Para. A23–A24) (a) **Consider whether there is a material inconsistency between the other information and the financial statements.** As the basis for this consideration, the auditor shall, to evaluate their consistency, compare selected amounts or other items in the other information (that are intended to be the same as, to summarize, or to provide greater detail about, the amounts or other items in the financial statements) with such amounts or other items in the financial statements; and (Ref: Para. A25–A29) (b) **Consider whether there is a material inconsistency between the other information and the auditor’s knowledge obtained in the audit, in the context of audit evidence obtained and conclusions reached in the audit.** (Ref: Para. A30–A36) 15. While reading the other information in accordance with paragraph 14, the auditor shall remain alert for indications that the other information not related to the financial statements or the auditor’s knowledge obtained in the audit appears to be materially misstated. (Ref: Para. A24, A37–A38)

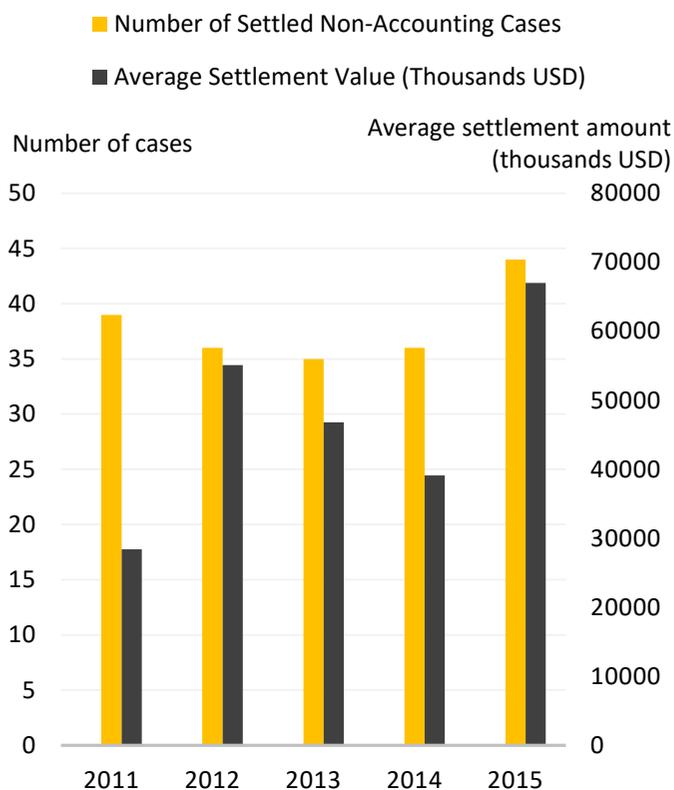
5.6. FEAR OF LAWSUITS

Given somewhat vague legal obligations and the limited demand from analysts regarding long-term risk disclosure on the one hand, and the risk of getting sued in case of misrepresentation on the other hand, legal departments push for broad and unspecific disclosure on long-term risk.

Precise discussion of long-term risks exposes companies to litigation. This risk is particularly pronounced in the US, where the Securities Exchange Act of 1934 imposes liability on companies for misstatements and omissions of a material fact. It exposed companies to security litigation risks (See Fig 1 at right). The more precise the description of risks are, the more visible an omission would be if the risk materializes. For reports we reviewed, the risk section therefore becomes a ‘disclaimer’. The advice from the law firm Debevoise & Plimpton illustrates this approach: *“properly drafted risk factors can act as a strong defense in the face of shareholder litigation should a material risk associated with investing in the company’s securities come to pass.”*⁴⁶ They provide a generic list of emerging risks, vaguely defined, that should be mentioned as well as advise management to engage the company’s legal team on risks. Instead of risk management or financial planning departments writing risks, law firms become directly involved with the formulation and drafting of risks to protect against litigation. This means that companies may not be forthright and specific about their risk disclosure because the main purpose is to protect against litigation, not to inform investors.

Forward-looking disclosure exposes companies to unnecessary additional legal risks. Through case law, courts clarified that companies cannot be sued for forward-looking statements that ‘bespeak caution.’ A company can ‘bespeak caution’ by disclosing specific risks that can materially affect forward-looking statements.⁴⁷ However, these cautionary disclosures cannot be ‘boilerplate,’ which refers to generic language, and must be tailored to the particular facts and circumstances. These requirements make forward-looking statements risky because courts can interpret disclaimers as boilerplate and thus not cautionary statements. This doctrine was supplemented by the Private Securities Litigation Reform Act that protects forward-looking statements that are: *“Accompanied by meaningful cautionary language Immaterial”* and *“Made without knowledge that they were false.”*⁴⁸ This clarification increases the burden for companies to prove the accuracy or immateriality of its forward-looking statements and makes companies less likely to make forward-looking statements overall.

Fig 1: Number of Securities Fraud Cases and Settlements post-Private Securities Litigation Reform Act, 1996-2004



Source: PwC 2015 Litigation Study

No upside, huge downside. At the end of the day, corporate executives are strongly incentivized to let the legal department define the scope and ambition of the legal section(s) discussing long-term risks. In turn, legal departments have no incentive to seek better disclosure on these topics and are in most cases only evaluated on their ability to protect the company from legal risks. In the absence of demand from analysts, constraints from regulators or requests from auditors, there is usually limited incentives to oppose the voice of the legal department internally. The empirical evidence, interviews conducted, and the analysis of the reports all point to the conclusion that legal departments add the final touch to the ‘perfect storm’ described on page 41.

Omissions of Known Trends and Uncertainties

The Supreme Court has granted certiorari to a case *Leidos v. Indiana Public Retirement System*, which questions whether companies can be held liable for omissions of ‘known trends and uncertainties’ in the Management Discussion section. Currently they can, which deters companies from analyzing long-term trends.

PART VI

IMPLICATIONS, POSITIVE TRENDS AND RECOMMENDATIONS

SECTION SPOTLIGHT

- The ‘perfect storm’ blocking long term risk disclosure inhibits companies to manage long-term risks internally
- The focus on the short term might lead to mispricing of long term risks by financial analysts and misallocation of capital by capital markets
- However long-term risk disclosure benefits from favorable winds including the demand for disclosure from pressure group, the evolution of disclosure standards on climate-related risks, and the pressure for economic intelligence data providers
- Our research suggest the emergence of a best practice framework in terms of disclosure. The paper develops a set of recommendations for policy-makers and standard setters to promote this framework

6.1. DISCOURAGING LONG TERM RISK MANAGEMENT BY ISSUERS

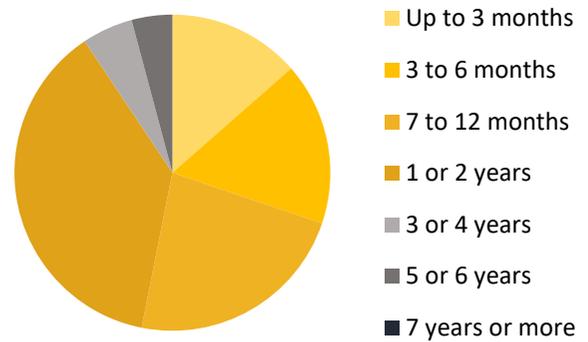
The first major implication of the ‘perfect storm’ described in the previous section is the incentive it creates for companies *not* to explore long-term risks they face, thus exposing shareholders and Society at large to capital misallocation.

Incentive to sacrifice the long-term. The first direct and obvious consequence of the ‘perfect storm’ is to focus the attention and resources of risk departments and CFOs on short and mid-term risks (next 5 years) rather than long term ones (post 5-10 years). A recent survey of executives shows that most of them mostly feel pressure to demonstrate performance on the next months and couple of years (Fig 1). Similarly the analysis of ‘long-term’ incentives for CEOs of the S&P500 shows mostly measured over a three year performance period on indicators related to earnings and share price.⁴⁹ As a result the executives artificially reduce their horizon (fig 2) compared to what would be ideal for the long-term success of the company. The same survey shows that 40% of executives would “undermine long-term value (for example, implementing across-the-board spending cuts, scaling back strategic investments, or taking actions primarily intended to reduce the visibility of losses and volatility)” to meet short term earning targets.⁵⁰

Shortening the horizon of risk analysis. As a result, companies have no reason to measure what they do not want to manage or disclose. Our survey on a limited sample of CFOs suggests that the time frame of financial risk analysis is almost systematically shorter than the horizon of capital planning (See Fig. 3). Combined with limited obligations related to impairment tests (see page 35), this situation creates a fertile ground for the sub-optimal long-term investments.

Don’t measure what you don’t disclose. The previous section establishes that the combination of reporting requirements, average market practices, auditors and legal risks discourage managers from disclosing long-term forward-looking items and discussing long term risks. However the analysis of legal cases and interviews suggest that the consequence is actually more perverse. For company top executives, there is very limited upside to explore *long-term* risks: no demand for disclosure and almost no ties to compensation. But there is a downside: the analysis of cases of litigation shows that executives and boards increase their exposure to litigation costs if they hide evidence of potential risks to their shareholders and authorities.

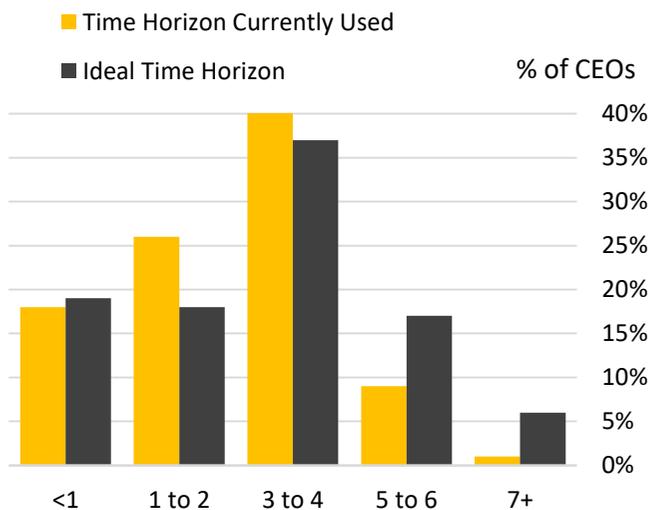
Fig 1. Time periods when Executives feel the most pressure to demonstrate financial performance



Source: *Focusing Capital on the Long-term*, n=384 companies

Fig 2. Time Horizon of Strategic Plans

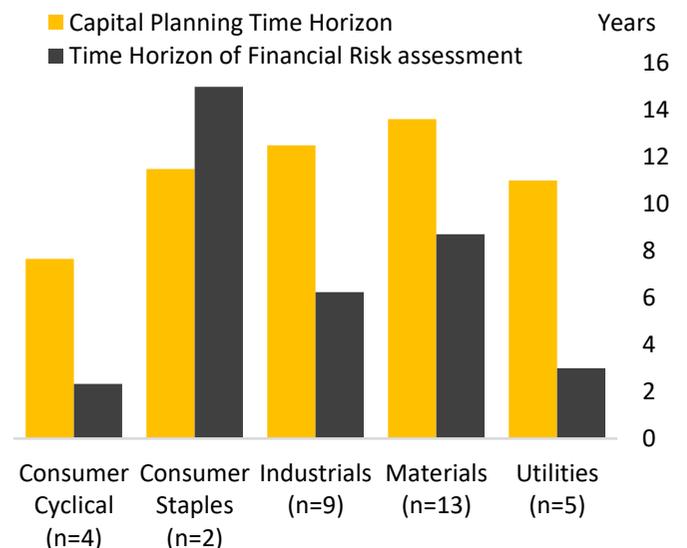
Companies pressured to hit short-term targets make shorter strategic plans than they would like



Source: *Focusing Capital on the Long-term*, n=384 companies

Fig 3. Time Horizon of long-term risk assessment

Risk assessment is often shorter than the plans



Source: *2dii/WBCSD FP&A Department Survey*. N=37

This situation creates an incentive not to explore long-term risks. Further research would be needed to provide robust evidence of this phenomenon, however the analysis of corporate documents and our survey of CFOs provide empirical evidence that most long term risks discussed and identified actually relate to social and environmental issues for which there is an external demand for more disclosure. Issues and trends that are not associated with an advocacy group and do not seem likely to materialize in the near term are largely ignored.

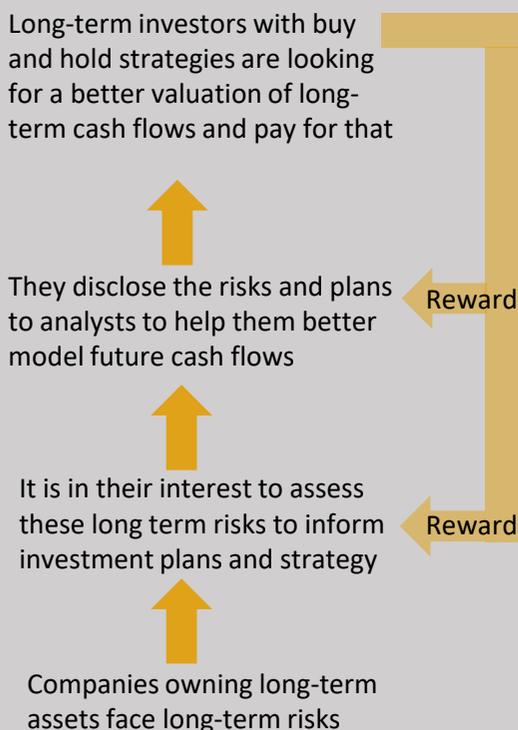
For instance, the disruptive impact of Artificial Intelligence that we identified in our previous paper as one of the major long term risks and opportunities for many industries was only mentioned by 9% of the CFOs we surveyed, after physical risks of climate change (12%) and energy transition risks (54%). In the banking sector, that ranks among the most exposed industries according to literature of AI, there is only one bank in the MSCI World Index that references an internal analysis of the risk, to conclude that it is not material without providing details (see case study on page 34).

Figure 1: Case Studies of Litigation from Unexplored Long-term Risks

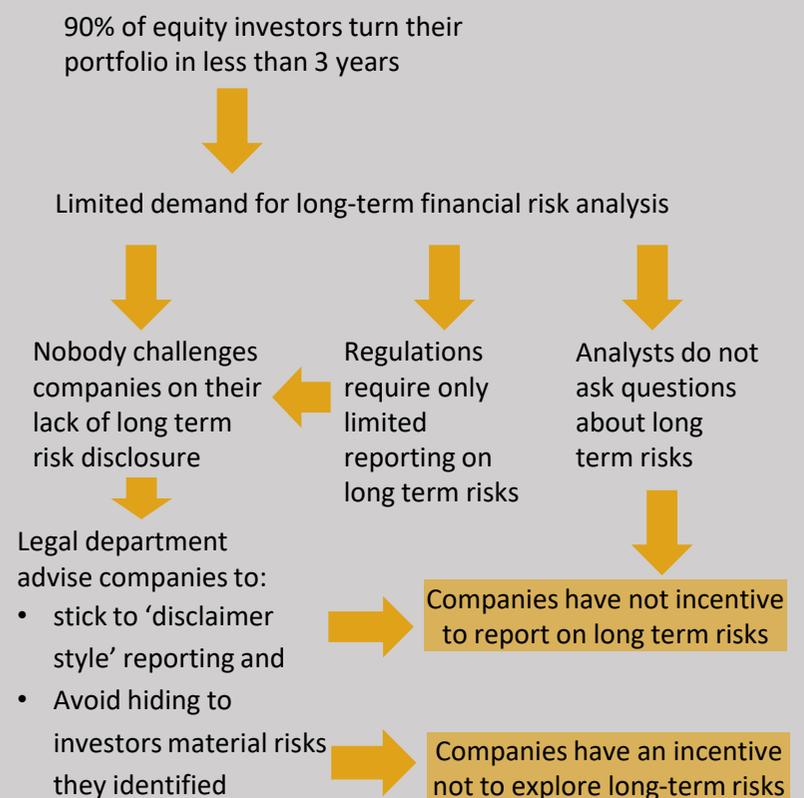
Case (year)	Evidence Hidden
Aetna (2009)	Aetna was accused of underpricing its insurance products based on false projections of cost of health. To respond to this claim they said their projections were just 'corporate puffery' and could give no assurance that their projections were accurate.
Erica P. John Fund et al. v Halliburton Company (2001)	Halliburton lost a \$30 million jury verdict for understating its asbestos litigation risk
Kurzweil v. Philip Morris Companies (1994)	Philip Morris made misleading statements about the addictive qualities of cigarettes and paid \$105 million in settlements to shareholders from 1991 to 1994

Figure 2: How the lack of long-term risk disclosure prevent risks management by investee companies

IN THEORY: long-term risk management attracts long-term investors



IN PRACTICE: the short-term focus of investors discourages long-term risk management



6.2. RISK OF MISALLOCATION OF CAPITAL

Shortage of data for analysts. The report on the time horizons of equity and credit research analysis identified four key obstacles to long-term risk analysis. One area identified among these four was the shortage of long-term disclosure from issuers. According to the analysts, the company disclosure gap was perceived as the number one obstacle to long-term financial analysis (See Figure 1 below). Interviews with equity research analysts and credit rating agencies all stressed the need for better forward-looking corporate disclosure. Our analysis however concluded that other factors such as the lack of demand from investors (see page 42), their limited willingness to pay, and consequently the lack of methodological innovation were also key obstacles, creating a ‘chicken and egg problem.’

Cap on the horizon of analysts. As described in part 1, the forward-looking data disclosed by companies allow analysts to build estimates and ultimately to calculate the future cash flows of a company for the next 5 to 10 years (see Figure 1 on the next page). These forecasts are then extrapolated to several decades in DCF models (see Figure 2 on the next page).

Our analysis suggests that analysts currently focus their risk analysis on a 3 to 5 year time horizon: they value the risks that are likely to impact the cash flows of the issuers within this timeframe, with a strong focus on the first 1-3 years. This approach partly responds to the level of uncertainty that grows with time (see quote from Keynes on the next page), but is also rooted in the lack of long term forward-looking data and risk analysis from corporate disclosure.

Figure 1: Obstacles to Long-term Risk Analysis

Analysts face four key obstacles to long-term risk assessment



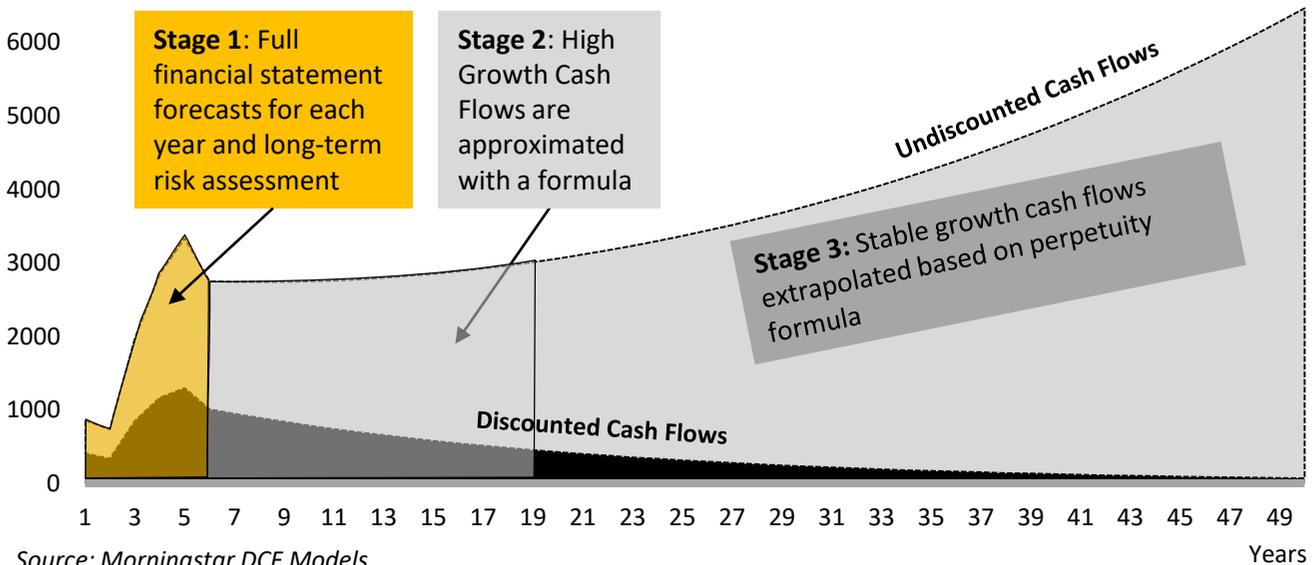
1. Source: *All Swans are Black in the Dark*, 2Dii/Generation 2017

Figure 1: Cash Flows Before and After Discounting in Typical DCF Models

Equity NPV Relies on Perpetual Growth Extrapolation

\$ (Millions, USD)

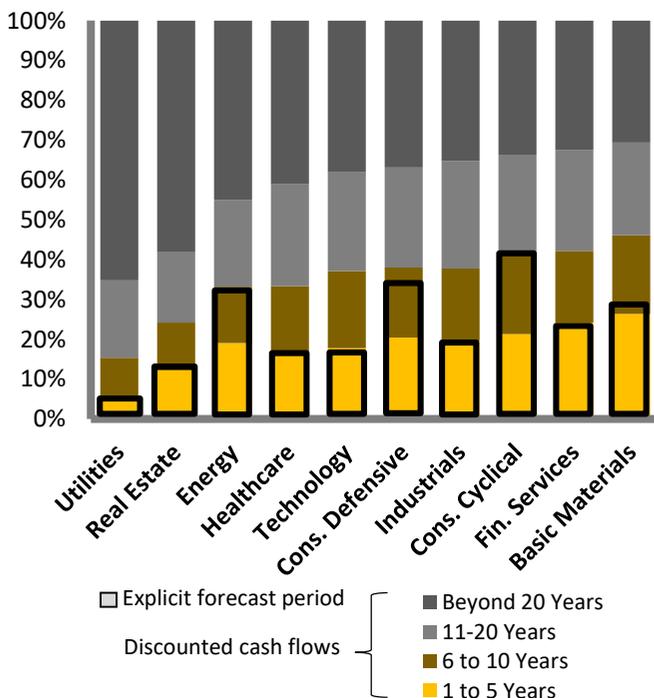
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“It would be foolish, in forming our expectations, to attach great weight to matters which are very uncertain. It is reasonable, therefore, to be guided to a considerable degree by the facts about which we feel somewhat confident, even though they may be less decisively relevant to the issue than other facts about which our knowledge is vague and scanty. For this reason the facts of the existing situation enter, in a sense disproportionately, into the formation of our long-term expectations; our usual practice being to take the existing situation and to project it into the future, modified only to the extent that we have more or less definite reasons for expecting a change.”

John Maynard Keynes, The General Theory of Employment, Interest and Money

Figure 2: Share of NPV covered by the explicit forecast period in the DCF model



- Source: *Hit and Miss*, 2Dii, 2017
- Source: *All Swans are Black in the Dark*, 2Dii, 2017

Mispricing of long term risks by financial markets.

One of the main consequences of this lack of risk analysis is the potential mispricing of long term risks (as defined on page 28) by financial markets. Beyond the decision to integrate or not a potential risk in investment decisions, this paper together with the first two papers of the *Tragedy of the Horizon* series suggests that no one in the investment chain actually performs this analysis: companies, sell side analysts and buy side analysts all ignore those risks due to their horizon. On the other hand asset owners with long term liabilities (pension funds, insurers, retail investors) rely on models only capturing macro trends based on backward looking data for strategic asset allocation and increasingly invest in passive funds - requiring no risk analysis. As far as their active portfolios are concerned, the paper we produced with Mercer suggests that they are also managed with a short term horizons.

Our research suggests that long-term downside risks faced by companies are not monitored by financial markets. Similarly, prudential authorities do not focus on such long-term horizons and largely rely on credit rating agencies and equity research to identify and analyze long term, non cyclical, non linear risks.⁵¹ Notably this conclusion does not apply to long term upside risks that could be priced by venture capitalists, private equity and small cap investors and benefit from this momentum when the related companies become mid and large caps (e.g. Tesla).

Suboptimal returns for long-term investors and misallocation of capital. At the end of the day, many long-term risks are likely to become financially material after both the time horizon of models (e.g. forecast period of the DCF) and the horizon of the portfolio manager (holding period) they are still a financial risk for the issuer, affecting the security, and therefore the future owner of the security. Given the weight of the long term in the net present value of both fixed income (fig 1) and equity portfolios (fig 2), the portfolio of institutional investors is exposed to significant 'long term risk mispricing risk' (fig 3). If these risk materialize rapidly at large scale (e.g. subprime crisis) they can become systemic risks for the finance sector. Several Central Banks and the European Commission High Level Expert Group on Sustainable Finance are currently exploring this issue for climate-related risks. But even if they materialize more gradually, thus giving enough time for financial markets to price weak signals they will still lead to sub-optimal performance for investors. Further research would be needed to quantify the magnitude of this phenomenon. Besides the impact on the returns for investors, the lack of risk analysis translates into suboptimal investment and allocation of capital with the potential to generate stranded assets, job destruction and other negative externalities for Society at large.

Fig 1. Breakdown of a bond portfolio NPV by Time Period

Only 4% of NPV is informed by corporate forecasts

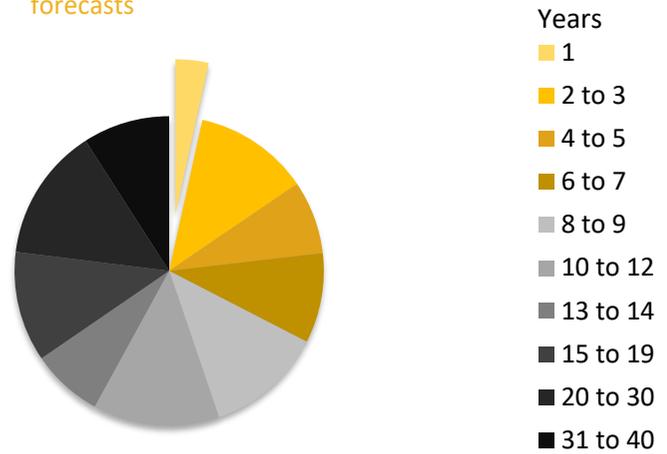
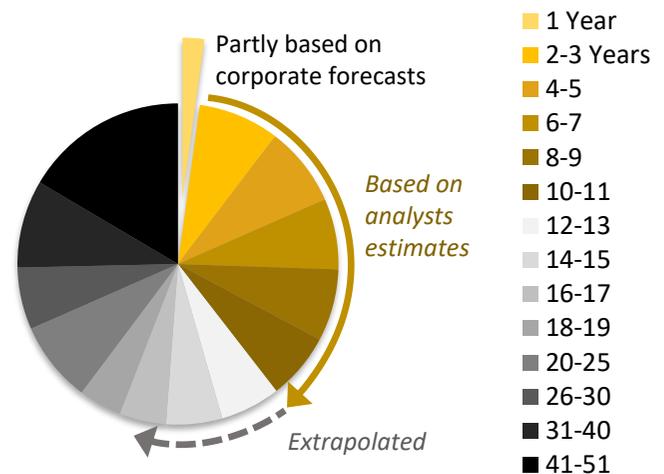


Fig 2. Breakdown of an equity Portfolio NPV by Time Period

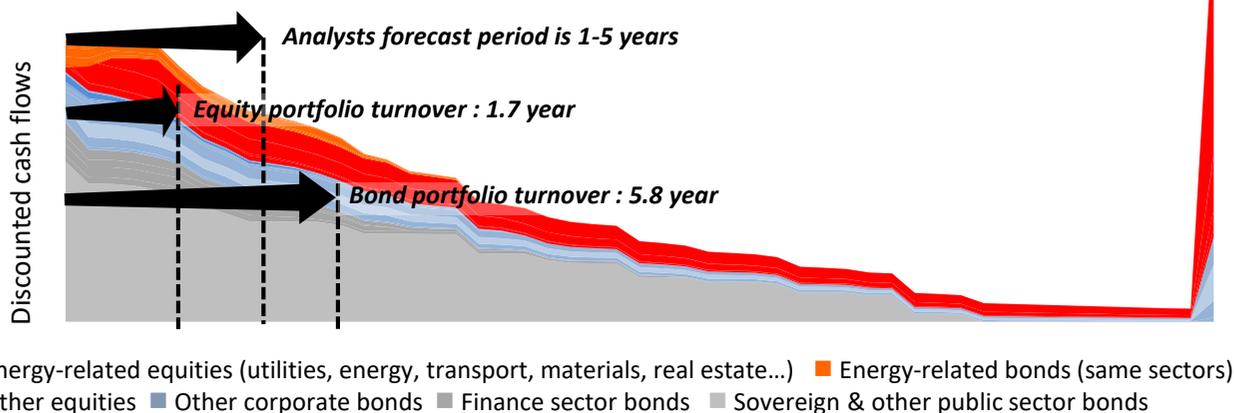
About 3% of NPV is informed by corporate forecasts



Sources: 2°ii, Morningstar DCF for equities. Portfolios: diversified equity and bond portfolios of a European Insurer. Feb 2017. .The Fig 3 shows the same portfolios with 40% equity and 60% fixed income.

Fig 3. Time frames of financial analysis and portfolio management compared with the NPV by period

About 80% of the NPV of the portfolio are based on cash flows expected in periods not explicitly covered by the financial risk analysis



6.4. THE FAVORABLE WINDS OF LONG-TERM RISK MANAGEMENT AND DISCLOSURE

Several trends in regulation and voluntary practices suggest a recent evolution towards more long-term risk disclosure, with primarily a focus on climate risks.

Emergence of user groups for long term risk disclosure. The main evolution that took place of the past decade is the creation of a ‘user group’ composed of a mix of advocacy NGOs, sell-side research firms, and Socially Responsible Investors who started to actually process the information on long term risks disclosed by companies and available on the market. Perhaps the most well know example of that is the campaign initiated by the Carbon Tracker Initiative regarding the exposure of oil companies to energy transition risks. Their initial analysis, based on economic Intelligence data triggered more research on the topic from financial analysts, as well as questions and resolutions for more disclosure from investors (e.g. campaigns coordinated by CERES in the US). Some oil companies responded with more disclosure on the viability of their business in a 2° C scenario (Total), other strongly opposed the request (Exxon), but it clearly triggered a momentum. The key question now is whether the coalition created will have the ability to sustain their capacity of ‘user group’ - including asking questions, challenging disclosure, and using results to inform actions. The second key question is the potential for creating similar ‘user groups’ on other major cross-sector long term risks we identify as ‘White swans in the Dark’. Interesting in this respect is the recent creation by Elon Musk of a new NGO called Open AI dedicated to address the risks related to Artificial Intelligence.

The TCFD recommends scenario analysis. The rational for identifying and managing ‘extra-financial’ or ‘Environmental Social’ issues is based on the assumption that their financial materiality can and will increase overtime, due to more stringent public policies, new technologies and new expectations from customers and society. Managing them today is therefore supposed to give companies a competitive advantage over the long term, even if their good ESG performance is currently not explicitly priced by financial analysts. Interestingly, the most long-term financially material risks identified in the sample of annual reports and regulatory filings we analyzed relate to environmental policies in 2025-30 (see page 30). However, despite this forward-looking logic, ESG disclosure standards and practices are almost exclusively focused on backward-looking data to date (see page 43).

The creation of the TCFD (Task Force on Climate-related Financial Disclosures) by the FSB (Financial Stability Board) might initiate an evolution in this respect. In its draft report the TCFD still recommends almost exclusively backward-looking metrics (e.g. GHG emissions) but also put the emphasis on the description of risk and the use scenario analysis. It however falls short in specifying how to quantitatively report on the results and with which time frame.

Pressure from economic intelligence providers. As exemplified on page 19 for power, energy and automotive, economic intelligence data providers commercialize forward-looking data on physical assets, investment and production plans. This data is collected from a variety of sources including:

- Press Releases and Automated Web Searches using customized web crawlers and automated searches of print sources,
- Government Databases including permitting and public statistics,
- Direct Surveys and Communication including a variety of engagements with companies.

For some items and in certain sectors, these databases are more forward-looking than the data disclosed by companies at group level (see page 17). The information is also far more granular (information by plant, by product). Until recently, these databases were mostly used by companies themselves for economic intelligence. But increasingly, financial analysts, investors and central banks use them to better assess the exposure of securities to energy transition risks and climate risks. In 2017, Oxford, Stanford, CDP and 2°ii have launched the *Asset-level Data Initiative* with the objective to improve the availability to investors and other stakeholders. The immediate next steps of the project involves the publication of data related each listed company in target sectors. All the companies will be invited to correct or validate the data related to their plans and assets. This initiative will likely incentivize companies to disclose directly more forward-looking data and increase the discussion of the assumptions and risks behind these plans and forecasts.

“...shared economic security can only be achieved through a long-term approach by investors, companies and policymakers. As you build your strategy, it is essential that you consider the underlying dynamics that drive change around the world. The success of your company and global growth depend on it.”

Larry Fink, CEO, Blackrock

6.5. CONCLUSIONS AND FIRST RECOMMENDATIONS

Based on our findings we recommend four actions to the private sector and policy makers.

1. Best practice framework for ‘long term risk disclosure’. Together with existing guidance documents (e.g. TCFD, IIRC), the analysis of corporate disclosure on forward-looking data and long-term risks reveals a great range of practices, and the emergence of ‘best practices’. They help establishing practical recommendations to reporting companies on ‘long-term risk disclosure’. The table below provides a first summary of the recommendations that will be fine-tuned during the consultation phase. These recommendations applies to reporting companies directly but can also be considered by reporting standard setters like the TCFD, SASB, GRI and the IIRC and policy-makers in charge of drafting the implementation guidance for extra-financial disclosures.

2. Drive demand for long-term risk disclosure. One clear challenge to which this report and the *Tragedy of the Horizons* research project returns to continuously is the lack of demand for long-term risk assessment throughout the investment chain, despite the presence of long-term risks on the one side and long-term liabilities by pension funds and insurance companies on the other. Given this lack of demand for long-term risk assessment, it is understandable that company reporting appears somewhat limited. Pressure from users is lacking to avoid ‘reporting in a vacuum.’ On the issue of climate in the energy sector, a first response to this problem as been provided by the ‘hybrid user group’ initiated by the Carbon Tracker Initiative that effectively created pressure for better long term risk disclosure from energy companies. The challenge now for these groups and their potential funders (e.g. governments, foundations, universal LT investors) is to help sustain and structure these user groups, and initiate similar pushes on other major cross-sector disruptive factors such as AI.

Table 1. Long term risk disclosure best practice framework
Draft set of recommendations for consultation

Topic	Current best practices	Recommendations to go further
Identification and discussion of long term risks	Following the example of the best viability statements, companies can discuss the key factors of potential disruption for the next 5 years, build a set of 3-5 scenarios and report both qualitatively and quantitatively on the impact of their key financial indicators	In certain industries with long-term assets and visibility (e.g. energy, power, aviation) the time frame can be extended to 10 or 15 years. Reporting companies can also support the standardization of sector-specific scenarios to allow comparability.
Description of impairment tests assumptions	Best reporters discuss the impact of different scenarios on the results of the impairment tests, as well as the assumptions behind each scenario and the reason for prioritizing one	The selection of scenarios can be linked to the discussion of long-term risks. In sectors exposed to policy-risks (e.g. climate goals, phase out from nuclear), the companies can link the scenarios with achievement of policy objectives (e.g. 2° scenario).
Forward-looking disclosure of investment plans*	A few best reporters publish consolidated capital expenditure plans for the next 3-5 years and discuss the impacts on production capacity.	Companies can align their level of disclosure on what is already available in economic intelligence databases, by extending the time horizon when there is enough visibility and providing asset-level results. They can discuss the misalignment of their plans with public policy goals (e.g. climate)
Financial forecasts and targets	A very limited number of reporters provide forecasts for the next 5 years for their central scenario. Some of them set targets on operational indicators (e.g. sales) and environmental impacts (e.g. CO2 emissions)	Companies can increase the horizon of their forecasts to 5 years at least and/or align them on the forecast period of analysts in the industry. They can provide the results of sensitivity analysis for each of the scenarios discussed as part the viability statement and discuss the misalignment with policy goals and corporate targets.

*It is important to note that R&D expenditures have not been covered by our analysis, even though they are clearly relevant in the context of ‘long-term risk disclosures’. A specific paper will be published on the topic by 2^oii in 2017.

Policy-makers can also play a role in strengthening the use of long-term risk corporate disclosure by investors. An example for this approach is regulation in France around climate risks, which requires institutional investors to report on long-term climate-related risks and their alignment with climate goals (Art. 173 of the French Energy Transition Law, 2015). Similar types of disclosure requirements are currently discussed in other jurisdictions (e.g. California for public pension plans).

3. Leverage the power of big data. As highlighted in Part 1, there is growing momentum around the use of alternatives to consolidated corporate reporting, notably economic intelligence databases that include forward-looking investment and production data. To date, access to these data aggregation platforms is prohibitively expensive for all but a few investors, in particular given that much of this data is not properly matched to financial securities. A number of initiatives are seeking to overcome this gap (e.g. Asset Data Initiative). Easing the access to this type of reporting can both improve access to long-term data more generally for analysts, and create pressure for companies to provide more long-term risk analysis and forward-looking data in traditional group-level reporting channels (filings, annual reports, guidance, etc.).

As far as forward-looking data are concerned, the future probably involves the development of a dialogue between the operators of these data platforms, reporting standard setters, and reporting companies, rather than the traditional push for ‘more disclosure in annual reports’ approach. 2^oii and its partners of the Asset Data Initiative are currently working on the development of the new approach to disclosure.

4. Fix the bugs in mandatory reporting rules and guidance. Besides the evolution of mandatory reporting to align with the best practice framework we identified, there are a number of low hanging fruits to fix bugs in existing regulation of corporate disclosure. In many cases and countries, bug fixing could be achieved with greater oversight and enforcement by financial regulators, together with interpretive guidance on disclosure requirements and legal duties. Informal notes by industry associations, stock exchanges, and audit firms can support the effort. How best to achieve these recommendations will be jurisdiction specific and further research is needed to analyse how best to achieve these recommendations in key jurisdictions. The main bugs in disclosure guidance identified in this report are summarized in the following table:

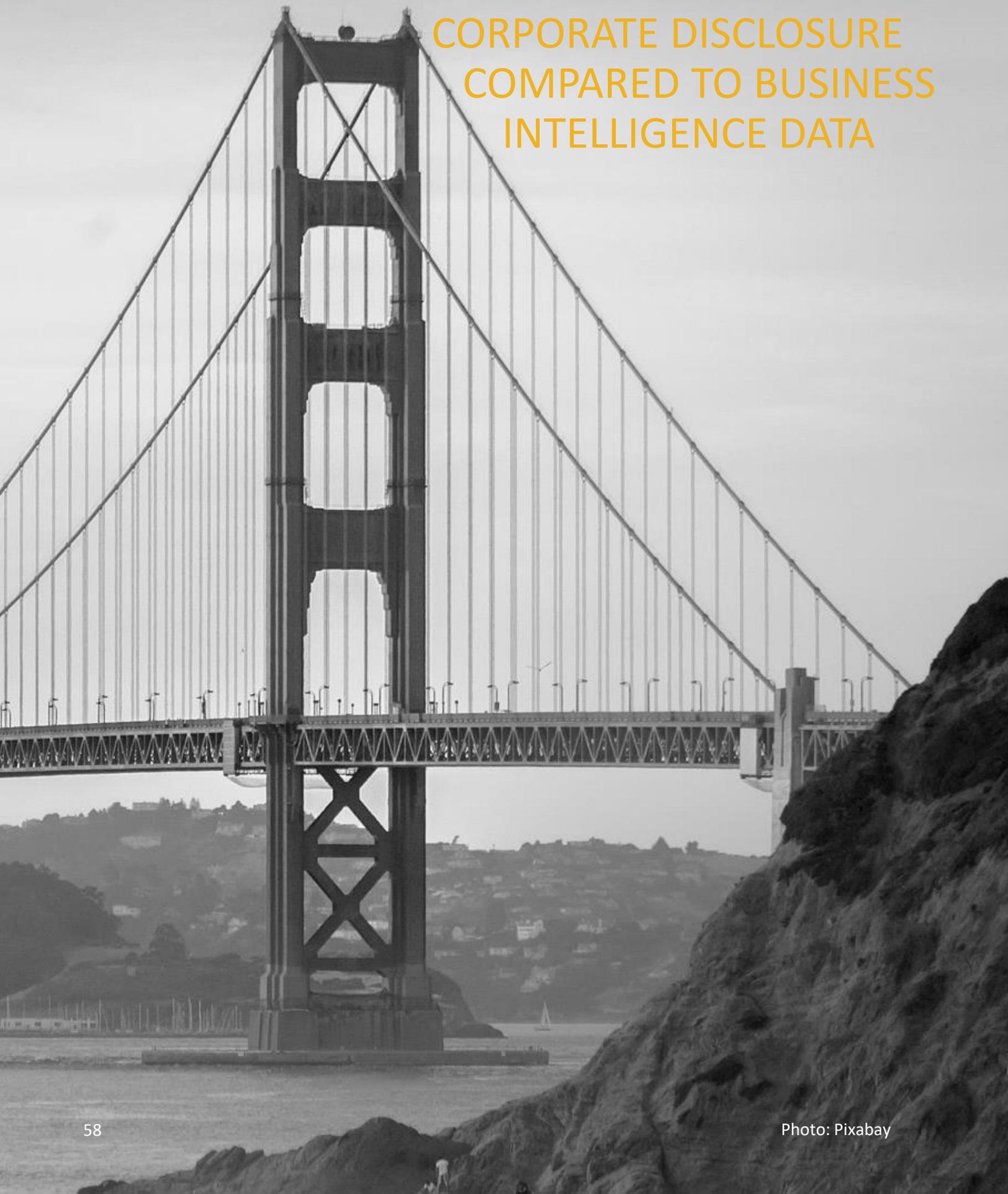
Table 2. Evolution of the Long term risk disclosure regulatory framework

Draft set of recommendations for consultation

Topic	Current best practices	Questions to be addressed by policy-makers
Clarifying the investment horizon	At best, existing regulations clarify that the user of the disclosure is a ‘long term reasonable shareholder’	Clarify the investment strategy and the related time horizon: is the disclosure supposed to inform an investor with a ‘buy and hold’ strategy or the average fund manager with a <2 year horizon?
Clarifying the target audience	ESG-related requirements have started to introduce the idea that companies also report to other stakeholders	Beyond the investors, is the company supposed to discuss the viability of its business in general and understand the implications for other stakeholders?
Set a minimum level of precision on the description of risks	Many market authorities have published notes calling for more precision on financial risk identification and description	Why is this dimension of requirements not enforced? The market authorities can set up an internal team or partner with the private sector to monitor compliance, fine-tune guidance, and help level-up the playing field to counter balance the ‘perfect storm’.
Apply the principle of equal access to information to asset level data	The information available in asset level data bases is not directly disclosed by companies to investors	Regulators could review the state of information available (e.g. read this report) and consider recommending companies to at least disclose to investors what is publicly available, but difficult to access.

CASE STUDIES

CORPORATE DISCLOSURE COMPARED TO BUSINESS INTELLIGENCE DATA



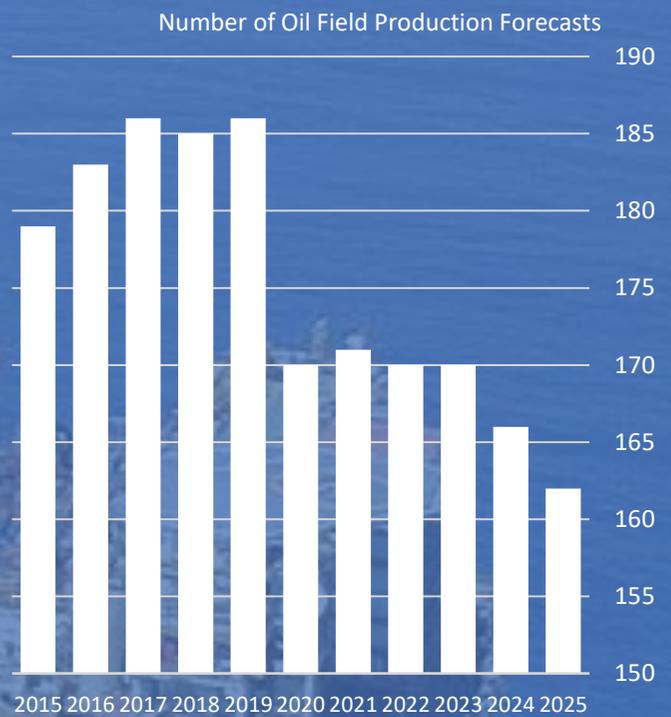
IS EXXONMOBIL ABLE TO DISCLOSE BETTER FORWARD-LOOKING DATA?

The economic intelligence database GlobalData hosts forecasts for oilfield projections over the next 10 years. While this does not factor in new exploration & production, it gives investors a sense of how much a company's current assets are worthy. When combined with an assumption on the long-term price of oil, as uncertain as it is, an analyst can forecast revenues based on production.

Analysts can use asset data to forecast the impact of policy scenarios on oil reserves. Carbon Tracker Initiative's research has shown that Oil & Gas revenues can vary in different climate scenarios. Asset-level data can allow for reserve forecasts to be adjusted based on geographically specific scenarios. Exxon Mobil's reserves are split out into 150 geographically specific fields over the next 10 years down to the state/territory and type of drilling procedure used. Thus, if a US state is likely to ban fracking in the next 10 years, an analyst could discount the reserves in this location by an additional amount.

This data allows for advanced valuation methods including stochastic analysis. The most common valuation methods for Oil & Gas companies are multiples and sing value DCF models.³ Based on country-level policy scenarios, an analyst could run a Monte Carlo simulation using multiple parameters and thousands of potential outcomes to determine the likely earnings forecast over the long-term. While IEA scenarios are globally-based, they can be disaggregated into country level climate targets. These targets can substantially influence climate policy and ultimately automobile manufacturing.

ExxonMobil Production Forecasts



Source: GlobalData 2015

ExxonMobil Production Forecasts by location, North America



EXXONMOBIL

Overview of Forward-looking Data in Annual Report

ExxonMobil uses its Summary Annual Report to disclose forecasts from its Long-term Energy Outlook but does not offer specific metrics on the operating and capital expenditures of its oilfields or likely price of oil over longer time horizons. Exxon offers many volume-based forward-looking metrics in its annual report. Exxon forecasts energy demand and fuel mix out to 2040 and references its Long-term Energy Outlook document for assumptions behind them.¹ These forecasts extends to 2040 but are not specifically tied to business strategy including capital expenditures or revenues. As such, investors must connect the dots to make sense of the demand forecasts or understand how they benefit Exxon relative to its competitors.

Exxon does not offer forecasts of revenues. If investors want information on likely costs and revenues, they are limited to 6 year disclosures of lease payments and 8 year *barrel per day* projections for individual projects. **Exxon indicates that it evaluates the likely price of oil but does not disclose the scenarios or the result.** When discussing its Upstream business, the report indicates that ExxonMobil “evaluates annual plans and all investments across a wide range of price scenarios.”² Because of this, investors are left in the dark as to the price of oil assumed by the company in its capital expenditures. This makes it more difficult to value the company’s projects.

Location of Forward-looking Operational Indicators in Annual Report

CEO Letter

- Individual project production forecasts

Summary Report

- Demand Forecasts out to 2040

Business Profile

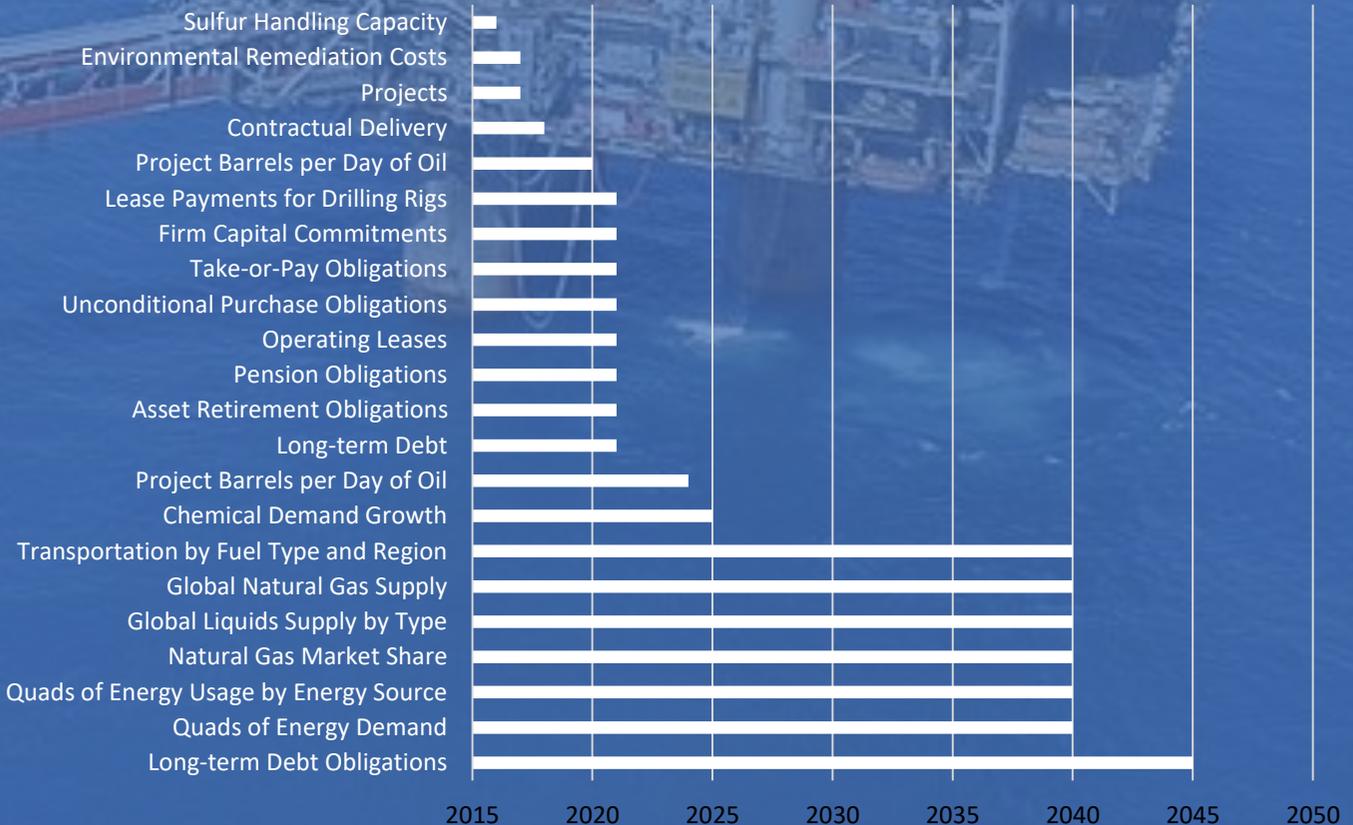
- Long-term Debt
- Asset Retirement Obligations
- Pension Obligations
- Operating Leases

Financial Summary

Consolidated Financial Statements

- Unconditional Purchase Obligations
- Take-or-Pay Obligations
- Firm Capital Commitments
- Lease Payments for Drilling Rigs

Time Horizon of Operational Indicators, ExxonMobil Summary Annual Report and Form 10-K, 2015



CASE STUDY: ENGIE ANNUAL REPORT 2015

Overview of Forward-looking Data in Annual Report

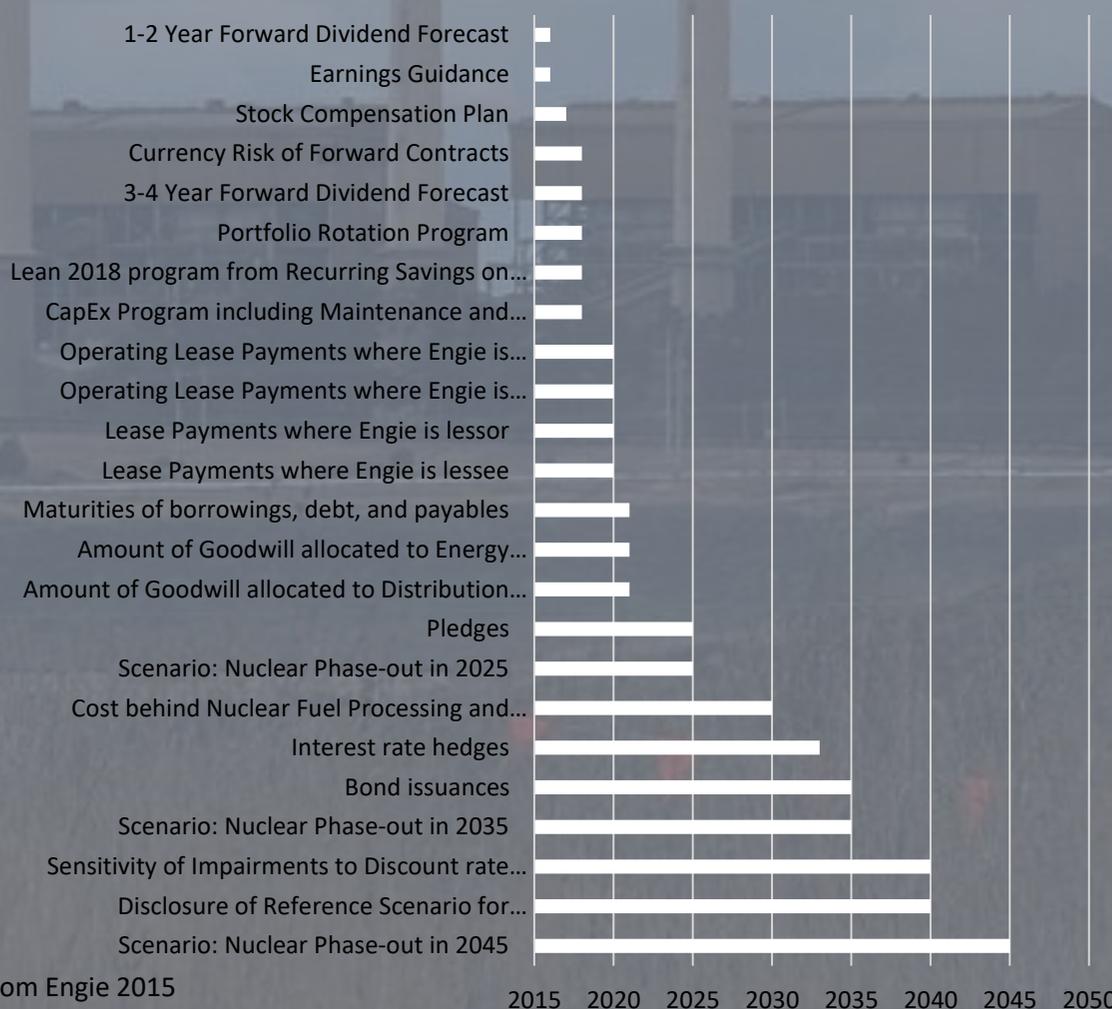
Engie discloses cash flow metrics that extend out 6 years as well as scenario-based assumptions behind its impairment tests. For revenue and cost-based indicators, Engie discloses up to 6 years of metrics based on its Management Forecast out to 2021. In its

The outlook section that most of the forward-looking cash flow indicators are located is required by regulation but the specific indicators are not specifically listed. Engie discloses a 3 year capital plan in the Outlook section of its Management Report. It includes a 3 year capex plan, a debt portfolio rotation program, and an operating cost savings program. This is not a regulatory requirement. Article 212-13 of the Autorité des marchés financiers requires companies to file a Management Report but does not specify the metrics that Engie discloses. With relation to forward-looking time period, it only asks for “an objective and exhaustive analysis of the company's business development, results and financial position.”¹ This plan was a key item in the rating of Engie’s credit.²

Beyond this, Engie discloses the assumptions behind its impairment tests, including the scenarios it used to define them, and the results. Its key forward-looking assumptions relate to the extension of permits for nuclear reactor operation given the political pressure on nuclear operators. It runs impairment tests under 10, 20, and 30 year extensions of operating permits, with phase out possible at either of those increments. Their indication is that the 30 year scenario is most likely but an analyst can see the extent of asset stranding that would occur under each scenario.

These assumptions are not discussed in other parts of the document. The company only discloses what the impairments would be under this scenario analysis, offering only short-term dividend and operating costs forecasts. Thus, it may be difficult to construct cash flow models

Time Horizon of Operational Indicators, ExxonMobil Summary Annual Report and Form 10-K, 2015



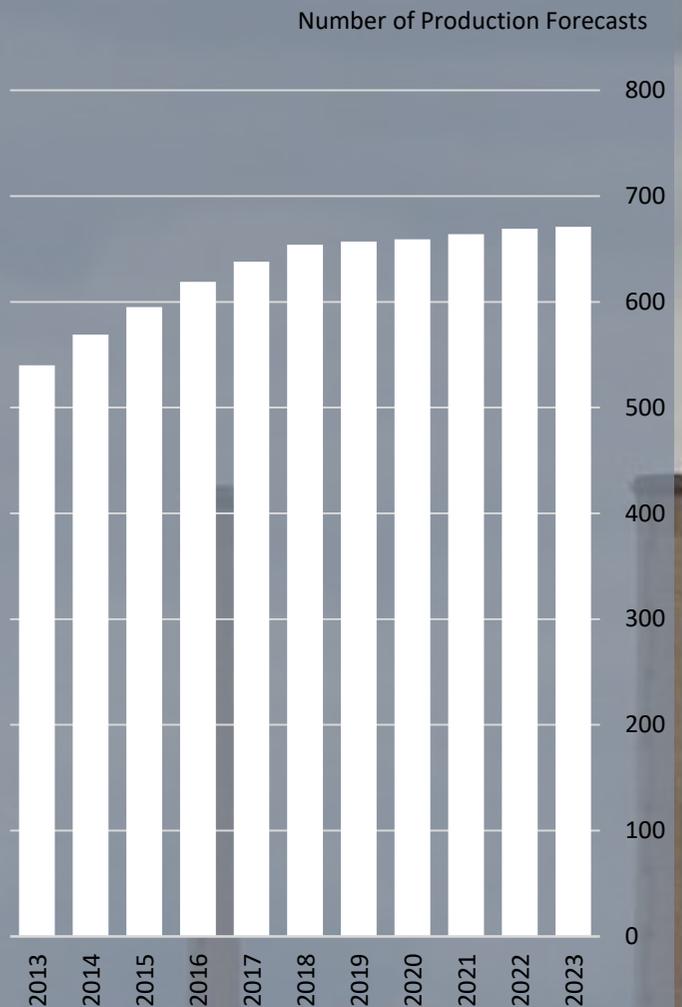
Source: Authors from Engie 2015

IS ENGIE ABLE TO DISCLOSE BETTER FORWARD-LOOKING DATA?

Engie could be disclosing the forecasted production from its power plants for the next 10 years. For each of its over 800 power stations, production can be forecasted over the lifespan of the asset. GlobalData contains power production projections for each of Engie's current power plants and planned power plants. Each of these plants has megawatt capacity associated with it over its lifespan. The number of years of projections can vary and new plants are expected to come online in future years as others are retired. For this reason, GlobalData's number of forecasts increases over the 10 years beginning in 2013 (see right). This suggests that it is possible to disclose how the power generation portfolio will change over time, enabling analysts to forecast cash flows from future energy projects.

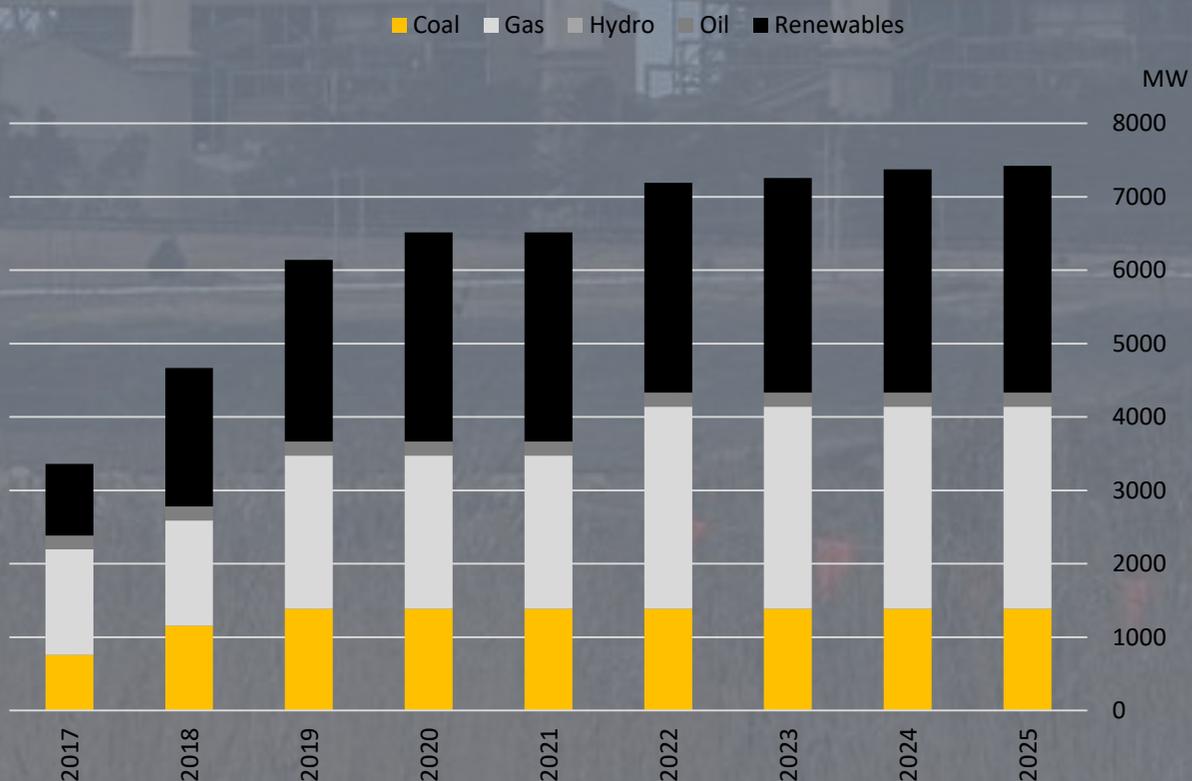
Further, Engie could give data on the specific energy mix it expects to deploy in the future. In order to track the alignment of Engie's generation portfolio with 2° carbon reduction scenarios, for example, investors can see the planned technology mix of Engie's generation portfolio out to 2025. The balance of its technologies could change under different IEA scenarios. The scenario employed by GlobalData is likely a business as usual scenario, but an analyst could tweak

Engie Production Forecasts



Source: Authors from GlobalData 2015

Engie Production Plans by Technology



Source: GlobalData 2016

CASE STUDY: DAIMLER ANNUAL REPORT 2015

Overview of Forward-looking Data in Annual Report

Daimler discloses largely one year forecasts for sales and growth. Daimler focuses on one year forward in its report, disclosing projections for GDP including Japan, EU, World, China, and Emerging Economies.

Its longer-term disclosures show the ability to disclose on long-term plans. Daimler emphasizes its long-term innovation plans and the time horizons by which it intends to achieve them, including Connectivity and Electrification programs. Connectivity refers to the use of Internet to coordinate truck and van logistics, reducing inefficiency in shipping. These innovation programs demonstrate Daimler's plans to adapt to long-term risks over the next 5-10 years.

The forward-looking nature of Daimler's report is based on the outlook section of German disclosure regulations. GAS 20 of the German Accounting Standards requires an Outlook section that covers "the most important financial and non-financial key performance indicators that are also used for the internal management of the group."¹ Daimler uses its Outlook section to forecast sales, earnings, and economic forecasts over a one year time horizon. While not explicitly required to disclose these indicators, they fall under the 'most important' KPIs, especially given investors interest in forecasting revenue and earnings. Investors can use this information to construct cash flow models although they would necessarily be used to extrapolate the results.

Time Horizon of Operational Indicators, ExxonMobil Summary Annual Report and Form 10-K, 2015



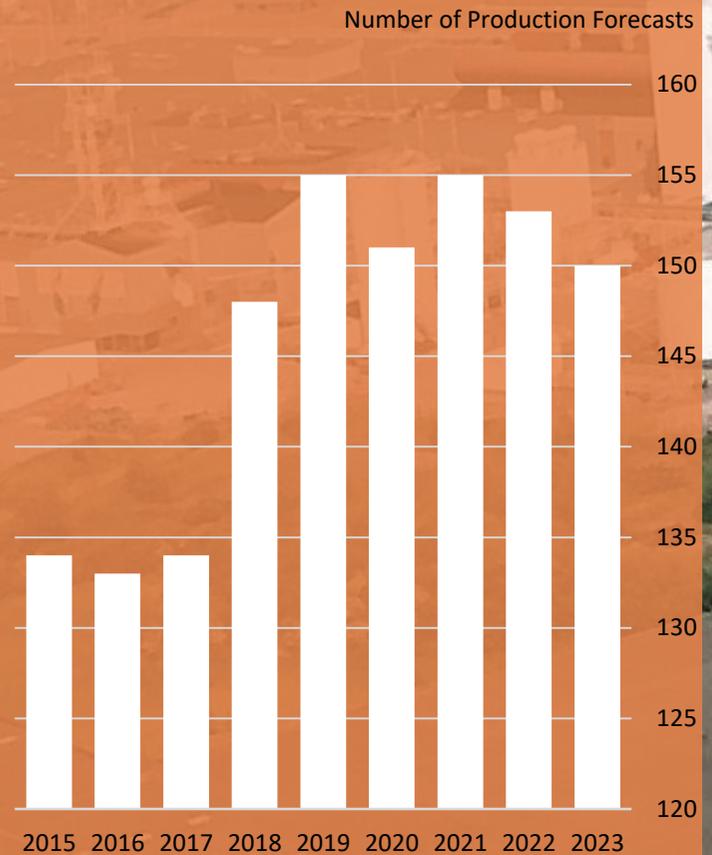
Source: Authors from ExxonMobil 2015

IS DAIMLER ABLE TO DISCLOSE BETTER FORWARD-LOOKING DATA?

Daimler could be disclosing the forecasted production from its factories for the next 10 years. Analysts want to know Daimler's expected revenues from its automobile brands in the long-term but must extrapolate forecasts over the next year only. WardsAuto data contains production forecasts over the next 8 years. It includes planned factories, especially in emerging markets like India and Indonesia as well as plant closures, especially in more mature markets like Finland and Hungary. For this reason, production estimates dramatically increase after 3 years (see right). Thus, annual reports may not be accurately depicting the level of growth over the medium- to long-term.

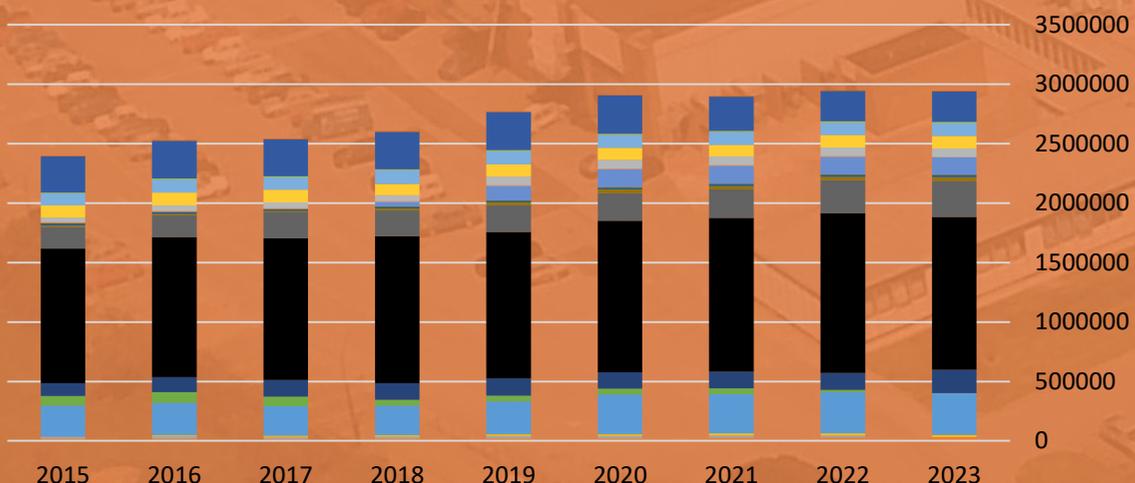
WardsAuto contains estimates of auto production out to 2023 including the location, model, fuel type, and brand of auto production. Daimler has production operations in 20 countries and WardsAuto allows for granular addition of production forecasts in each region (see right). For example, the production in Finland is expected to diminish by 2023, reducing Daimler's balance sheet's exposure to regulatory risk. This location-based analysis allows analysts to add country-specific risk premiums and growth forecasts, allowing for more accurate valuations. Additionally, the effects of the energy transition can be calculated based on the current fuel type mix of the projected fleet.

Number of Daimler Production Forecasts



Source: WardsAuto Global Vehicle Counts 2016

Forecasts of Daimler Production by Country



Source: WardsAuto Global Vehicle Counts 2016

CASE STUDY: CLP Group Risk Management Framework Disclosure

CLP Group discloses its risk management framework. CLP Group has a structure risk management process that it discloses to investors in its Annual Report. Going above and beyond the disclosure requirements, CLP outlines who in their organization identifies risks and passes them onto management for risk management.

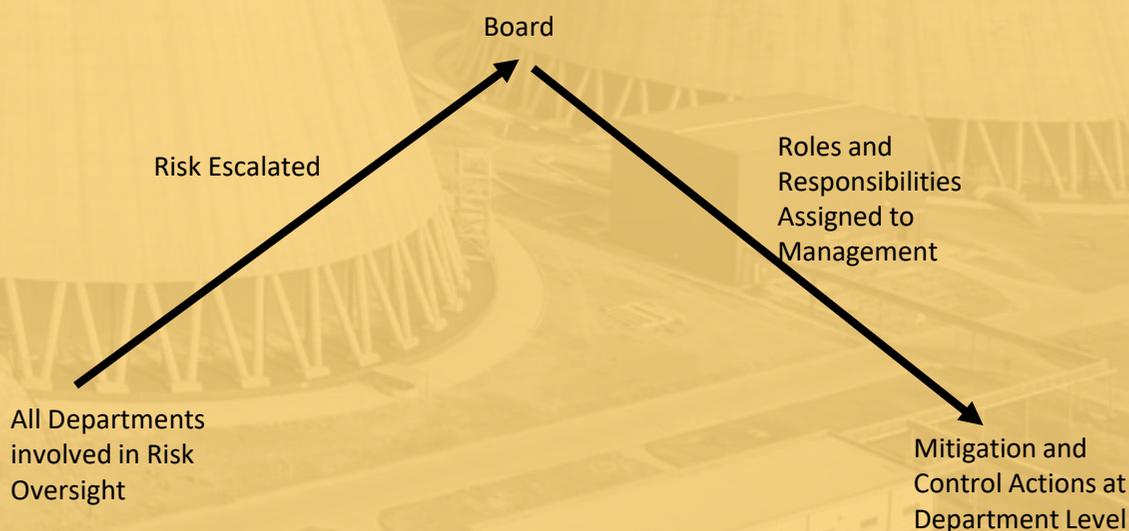
The Framework demonstrates how risks are escalated in the organization. Every department is involved in Risk and Control Oversight Functions, including Sustainability and Finance. The inclusion of these departments shows that the company has a process for integrating financially material sustainability risks. Our interview with the Financial Planning department revealed that departments commonly review literature on long-term risks to escalate to senior management. The Board is directly involved in risk management, a rare feature of corporate governance. All risks identified as material by the Board's audit committee are disclosed through the CFO and Group Executive Committee. Mitigation and control actions are then taken and reported on. From this framework, an analyst could ask which risks are being escalated and which did not pass through the Audit Committee.

This approach was inspired by the onset of disruption to their business model. The so-called "utility death spiral" of customer defection to onsite renewable energy sources has inspired different responses from utility companies. CLP elected to refine its risk management framework, diversify its power generation mix, and disclose additional risks to investors. Other companies facing similar risks can use the opportunities of mandatory reporting to disclose what they are doing about the risks.

A key consequence of disclosing this framework is disclosing the practical results of it. CLP Groups' report includes the result of a scenario analysis on emerging risks, identifying a cyber-attack as an event potentially major consequences on cash flows.¹ The report lists potential impacts and key mitigation activities to prevent the risk from materializing. While an analysts would have to calculate the financial impact of the risk themselves, they would have a concrete sense of the probability given the mitigating actions taken by management.

Litigation was not a concern in this case. Due in part to the jurisdiction in which it operates, CLP Group was not concerned about litigation on its risk disclosures or risk management framework. Additionally, the company has enough of a competitive moat between it and its competitors that the disclosure was not a competitive disadvantage.

Figure 1: CLP Group Risk Management Flow Chart



Source: CLP Group Annual Report 2015

APPENDIX 1 : BLOOMBERG FIELDS

Note: field definitions are as given in Bloomberg “FLDS” screen.

Indicator Group	Analyst Estimate Field	Analyst Estimate Field Definition	Company Guidance Field	Company Guidance Field Definition
Sales	BEST_SALES	Sales estimate reflects a company's Net Revenues or Sales from Continuing Operations.	CEST_SALES	This represents the company's estimate of Sales.
Gross Margin	BEST_GROSS_MARGIN	Specifies the Bloomberg Estimates figure for net sales minus the cost of goods sold divided by net sales.	CEST_GROS_MRGN	This represents the company's estimate of projected gross margin, the ratio between net sales and cost of goods sold.
EBITDA	BEST_EBITDA	Earnings Before Interest, Tax, Depreciation & Amortization. It is calculated as: EBIT + Depreciation + Amortization.	CEST_EBITDA	This represents the estimate of the Company Estimates EBITDA adjusted.
Operating Income	BEST_OPP	Earnings Before Interest & Tax. It is calculated as: Pre-Tax Profit (PTP) + Interest Expense +/- Non Operating gains/charges.	CEST_OPER_INCME	This represents the company's estimate of income through its earning assets and services.
EBIT	BEST_EBIT	Earnings Before Interest & Tax. Calculated as: Pre-Tax Profit (PTP) + Interest Expense +/- Non Operating gains/charges.	CEST_EBIT	This represents the company's estimate of EBIT adjusted.
Pre-Tax Profit	BEST_PTP	Pre-Tax Profit (PTP) estimate is calculated using a bottom-up approach as: Income before extraordinary items + Income Tax Expense.	CEST_PTAX_PROFT	This represents the company's estimate of Profit before income tax adjusted for one-time non-recurring items.
Net Income	BEST_NET_INCOME	Net Income estimate is defined as the profit after all expenses have been deducted. It might include or exclude the effects of all one-time, non-recurring, and extraordinary gains, losses, or charges.	CEST_NET_INCOME	This represents the estimate of the Company for Net Income Adjusted.
EPS	BEST_EPS		CEST_EPS	This represents the estimate of the Company for EPS Adjusted.
EPS_GAAP	BEST_EPS_GAAP		CEST_EPS_GAAP	This represents the company's estimate of EPS according to GAAP.
Free Cash Flow	BEST_ESTIMATE_FCF	Cash from operations minus capital expenditures. This is the consensus of estimated FCF (free cash flow) as provided by the broker.	CEST_CFC	This represents the estimate of the Company Estimates FCF.
CapEx	BEST_CAPEX	Amount of money a company spends to buy capital assets or upgrade its existing capital assets.	CEST_CAPEXPEND	Measure issued by a company that estimates the funds that will be spent for acquisition of long term assets.
-			CEST_CHARGES	Measure issued by the company that details a one-time item that they may take against their Net Income

APPENDIX 2 : MORNINGSTAR DCF SAMPLE

Notes on Morningstar DCF Models

1) Each model in the sample (n=673) was downloaded as it became available from the Morningstar application. The sample was not constructed in accordance with any methodology or sampling strategy and as such does not attempt to represent the universe of models as a whole. Additionally, Morningstar as a single source of research may not be representative of the practices of the industry as a whole.

2) There are no duplicate firms in the sample.

3) Sample sizes vary by GICS sector and initial forecast year (see tables below). The initial forecast year of models in the sample ranges from 2013-2018. Since macroeconomic conditions change over time and models are to a certain extent are updated to reflect that, it is possible that some of the variation in Morningstar inputs (growth rate, discount rate) and therefore outputs is due to this. Further work will examine variations in DCF inputs and outputs over time.

4) Financial sector results. Due to differences in the format of Morningstar’s valuation models for commercial and investment banks versus other firms, banks have been systematically excluded from our sample (for example, JP Morgan Chase, Goldman Sachs, etc). The types of Financial sector firms that are in the sample include insurers (e.g., Aon), brokerages (e.g., Charles Schwab), data providers (e.g., FactSet), asset managers (e.g., BlackRock), and exchanges (e.g., Nasdaq). However, to some extent Financial sector results are biased by omission of the banks.

5) Real Estate and Materials sector results. Morningstar allows its analysts to calculate extrapolated cash flows using other methods besides the terminal value calculation described in this report. An alternative method will be selected when an analyst feels it will result in a better valuation. In the models that were downloaded, Real Estate and Materials companies used alternative methods relatively often, and so could not be used for the DCF section of this report (since there is no terminal value calculation). This resulted in a smaller sample size than for the other sectors. Due to both the excluded models and the lower sample size, the Real Estate and Materials sector results may not be representative of the sectors as a whole.

GICS Sector	Number of Models
Real Estate	12
Financials	31
Utilities	44
Energy	43
Industrials	96
Materials	16
Health Care	92
Telecomms	27
Information Technology	125
Consumer Staples	58
Consumer Discretionary	129

First Year of Projected Data	Number of Models
2013	74
2014	182
2015	5
2016	69
2017	315
2018	28

APPENDIX 3: SENSITIVITY OF DFC MODELS TO ASSUMPTIONS

DCF valuations: one part explicit, two parts extrapolated. The valuation produced by a DCF model is the sum of explicitly forecasted cash flows for an initial period plus a calculation of the terminal value of the firm to perpetuity. Explicitly forecasted cash flows are built-up from projections of individual financial statement line items within an integrated financial model (including balance sheet, income statement, and cash flow statement). Extrapolated cash flows rely on an assumption of trends continuing into the future, such as from a terminal value calculation. Assuming that the firm is able to reinvest and maintain a stable growth rate forever, the stable growth rate formula is commonly used to calculate a terminal value (see below).

Simple math: valuation depends on inputs to the terminal value equation. As is clear from the formula, the terminal value is based on analysts' choice of the stable growth rate (g), the discount rate (r) and the last explicitly forecasted cash flow (CF^{LAST}). Terminal value plays an important role in total valuation. Previous 2dii research shows that in practice, across all sectors, extrapolated cash flows generally account for at least 2/3 of Enterprise Value.

A cloudy view of the future makes selecting inputs tougher. Even in the presence of perfect forward-looking information on firm plans and investments over a long time horizon, unexpected changes in the firm's industry, consumer preferences, or any number of factors make it essentially impossible to correctly predict terminal value inputs. Lack of adequate forward-looking information from companies makes understanding and quantifying a firm's longer-term prospects even more difficult, likely increasing the variance in valuations that result.

How much does changing terminal value inputs impact Enterprise Value? To better understand the sensitivity of DCF valuations to changes to terminal value inputs, 2Dii collected a sample of 673 unique Morningstar DCF models covering the years 2013-2018. This sample was constructed as models were available, see Appendix 2 for full description of sample and notes on Financial, Real Estate, and Energy sectors. Morningstar uses a 3-stage DCF model to calculate Enterprise Value. The first stage consists of either 5 or 10 years of explicit forecasts of Free Cash Flow to the Firm (FCFF). In the second stage the analyst chooses a growth rate that it is extrapolated for the length of stage 2, allowing for a high-growth period for companies that have not yet reached a long-term stable growth rate. The third stage assumes that returns to newly invested capital will exactly equal the discount rate—i.e. the mature company may as well just pay out all earnings as dividends. For the third stage the analyst selects a growth rate to perpetuity calculates the terminal value. In our sample, the median length of Stage 1 is 5 years and Stage 2 is 10 years. For the analysis that follows, "explicit value" is

Figure 1: Stable Growth Formula for Terminal Value

$$\frac{CF^{LAST} * (1 + g)}{r - g} = \text{Terminal Value}$$

KEY QUESTIONS

2DII Morningstar DCF Model Sample

- **DCF Inputs:** In practice, what are the levels of terminal value inputs (r , g , CF^{LAST}) commonly used? How much do these inputs vary within sectors and between sectors?
- **DCF Outputs:** How much of Enterprise Value is based on extrapolated cash flows (stage 2 + 3)? How much is driven specifically by the terminal value (stage 3)? How do these percentages vary within and between sectors?
- **DCF Sensitivity:** For the most basic 2-stage DCF model, how much does a change in an input value (r , g , CF^{LAST}) change the calculated Enterprise Value? How does this vary based on the level of the input?

the sum of Stage 1 cash flows and "extrapolated value" is defined as the sum of stages 2 and 3 (all values are discounted). Unless otherwise mentioned median values are used to describe the center of the data. Where summary statistics are provided for the entire sample, the individual observations are up or down weighted to produce a statistic that is equally-weighted by sector (i.e., as if the sample sizes for each sector were equal).

Valuation Inputs: few outliers. Figure 2 bottom left shows the median values by sector of three key inputs to Morningstar DCF valuations: the discount rate (r), the Stage 2 growth rate, and the growth rate to perpetuity. The discount rate for most industries is between 7.5% and 9%. The median perpetuity growth rate is essentially constant across industries and for the sample as a whole at roughly 3%; only 4 models in our sample had a rate higher than 3%. This is in line with standard valuation practice that no company can grow faster than the economy as a whole forever; 3% is considered the reasonable upper bound. For all industries except Telecommunications, the stage 2 growth rate is higher than the perpetuity growth rate, somewhere between 4 and 5%. Across all inputs, the discount rate for Utilities is the notable outlier at 6.3%.

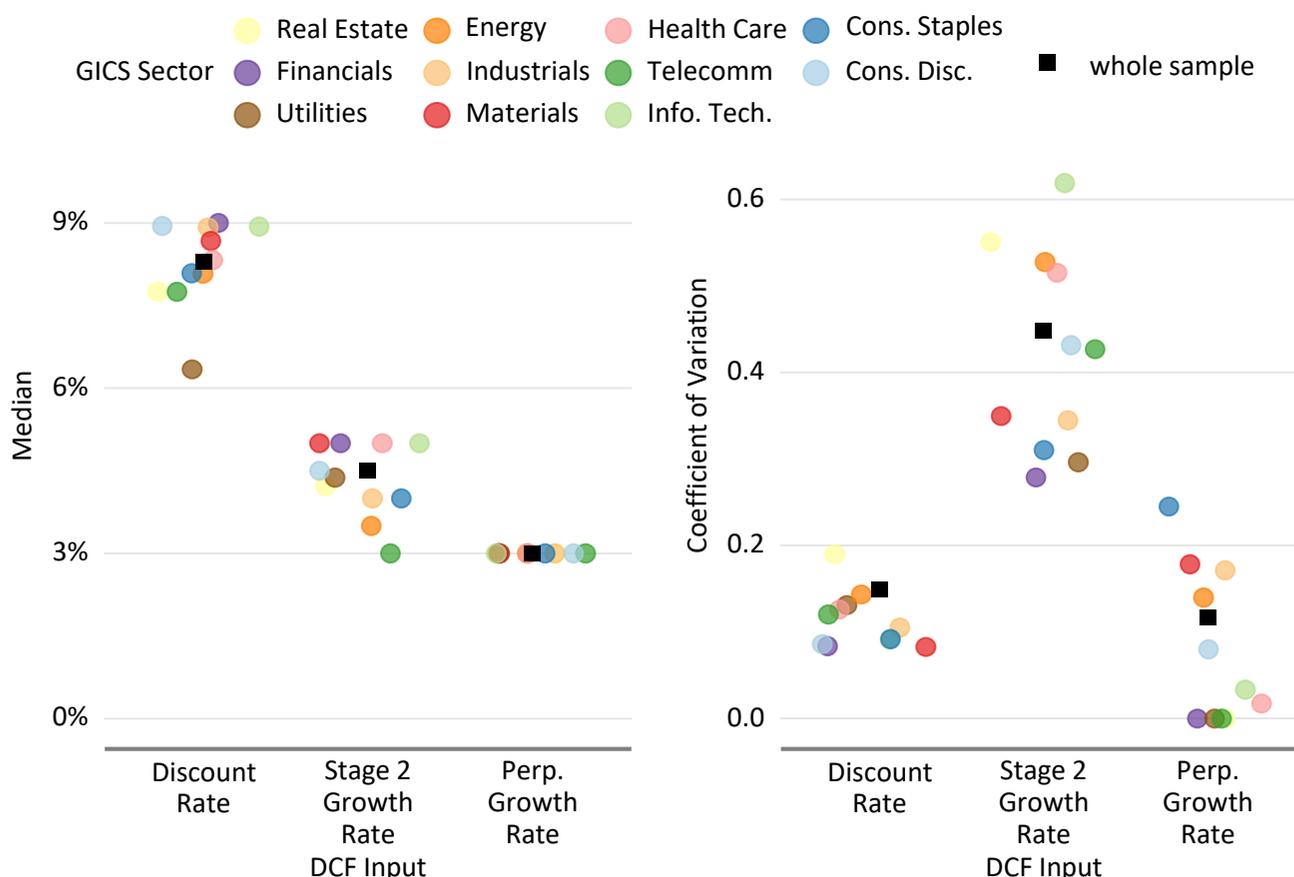
Dispersion of inputs is low. Figure 2 bottom right shows the Coefficient of Variation (COV) of these inputs. The Coefficient of Variation is a measure of dispersion of the data equal to the standard deviation divided by the mean; it is “unitless” and thus allows for comparisons of variation across different groups. For the discount rate, the within-sector COV for all sectors except Real Estate is less than the COV of the sample as a whole. This means that discount rates within a sector are more similar than

discount rates across the whole sample. This makes sense: within a sector, characteristics such as its relative maturity or required level of physical asset turnover play a large role in determining discount rates. Overall, the dispersion of the perpetuity growth rate and discount rate is very low (.11 and .15, respectively), and less than the dispersion of the Stage 2 growth rate. For some sectors in our sample—Utilities, Telecoms, Financials— there is literally no within-sector variation in the growth rate to perpetuity.

DCF INPUTS: Key Points

- whole sample: Stage 2 and perpetuity growth rates are 4.5% and 3%.
- whole sample: dispersion of the discount rate and perpetuity growth rate is quite low—less than .15.
- Utilities: median discount Rate is much lower (6.3%) than overall sample (8.3%).
- Discount rates within sectors generally have less variation than discount rates across the sample as a whole.

Figure 2: Median (left) and Dispersion (right) of Morningstar DCF Inputs, by GICS Sector



Source: Morningstar DCF Models (n=673), sample sizes vary by sector see Appendix 2 for details.

DCF Outputs: how much is explicit, how much is extrapolated? Figure 3 shows key output multiples for the DCF models in our sample. The first two multiples-- extrapolated value to the last explicit cash flow (CF^{LAST}) and extrapolated value to total explicit value, measure the contribution of extrapolated value to the overall Enterprise Value. The last two multiples apply specifically to Morningstar's 3-stage model, and calculate the relative contribution of Stages 2 and Stage 3.

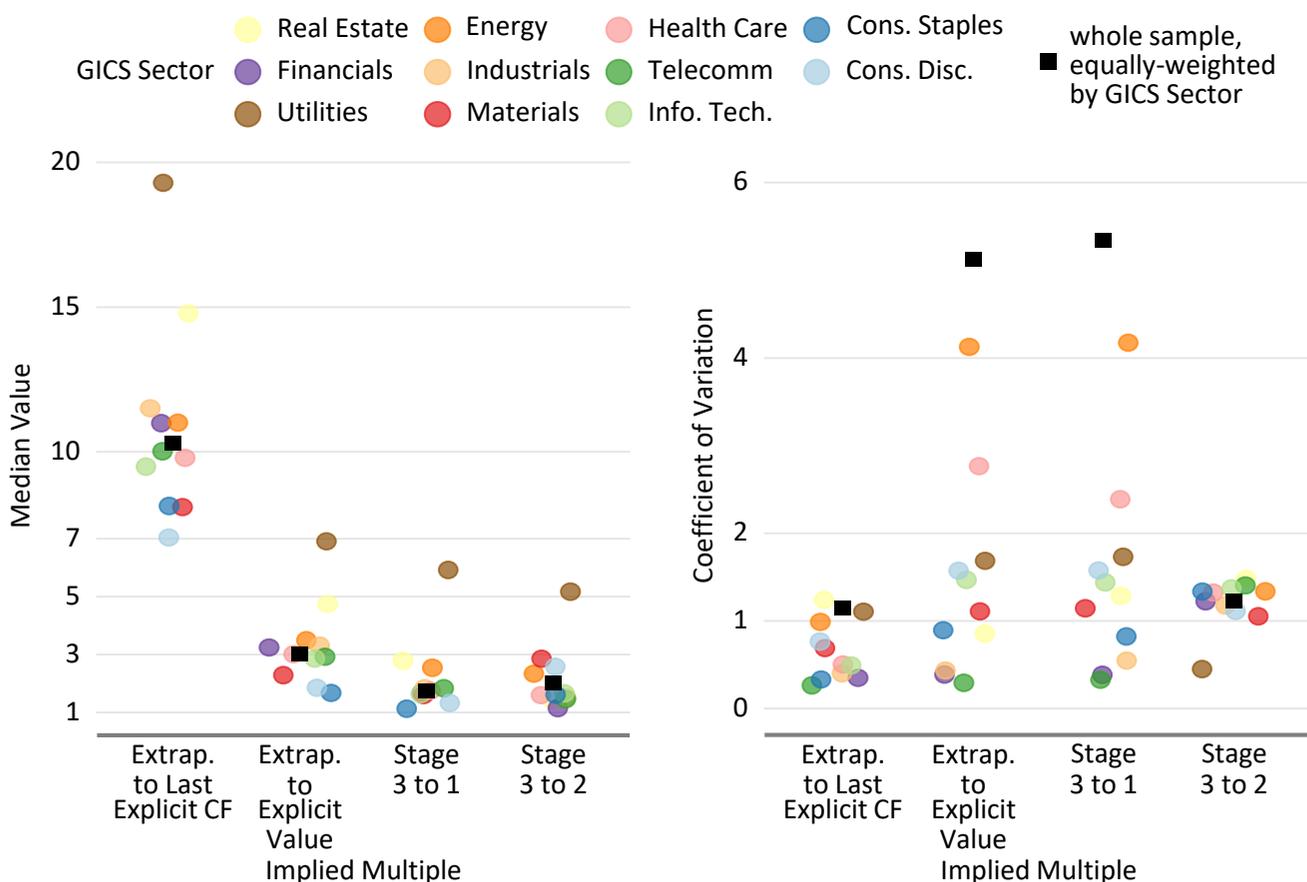
DCF Outputs: Utilities again stand out. Across the whole sample, the median multiple of extrapolated to explicit value is 3.02, implying that 67% of enterprise value comes from extrapolated cash flows. This is much higher for Utilities (86%) and much lower for Consumer Staples (40%). Within total extrapolated value, the Stage 3 to Stage 2 multiple calculates the relative contribution of each. For the whole sample, the median multiple of 2.04 implies that Stage 3 (the terminal value) contributes 51% of extrapolated value. For all the output multiples, Utilities are a high outlier. The relative importance of both extrapolated value (86% of Enterprise Value)

and Stage 3 (81% of extrapolated value) to the overall valuation is much larger for Utilities than for other sectors. Given the terminal value formula, these high percentages are directly connected to the much lower discount rate used for the Utilities sector (6.3%) than for other sectors (7.7% or higher).

DCF Outputs: Key Points

- Whole sample: 67% of Enterprise Value from extrapolated cash flows.
- Utilities: 86% of Enterprise Value from extrapolated cash flows
- With a few exceptions, dispersion of selected output multiples is on the order of 10x larger than dispersion of input variables.
- There is less variation in the proportion of Enterprise Value from extrapolated cash flows within a sector than across the whole sample.
- Industrials, Telecomms, and Financials have minimal within-sector variation of proportion of Enterprise Value from extrapolated cash flows.

Figure 3: Median (left) and Dispersion (right) of Morningstar DCF Outputs



Source: Morningstar DCF Models (n=673), sample sizes vary by sector see Appendix 2 for details. Given the lack of clear interpretation of negative multiples (most often resulting from a negative last explicit cash flow), models with negative multiples were removed when examining outputs. Resulting sample sizes of multiples are from left to right 665, 648, 648, and 671, respectively (and are the same for Median and Coefficient of Variation).

Much more variation in DCF outputs than inputs.

Looking at Figure 3 bottom right previous page, the dispersion of output multiples within sectors is much higher than the dispersion of input variables – for a number of sectors roughly 10x higher than the input values, and this finding is robust to the inclusion of negative multiples. The Energy sector has the most dispersion of the Extrapolated to Explicit multiple, indicating significant differences in the long-term prospects and assumptions made when valuing firms in that sector. However for some sectors--Healthcare, Information Technology, and Financials—there is relatively low dispersion, very similar to that of input values. This may indicate a strong sector basis for the relationship between extrapolated and explicit value, as well as relatively higher discount rates that decrease the impact of terminal value. For Financial and Information Technology (9% and 8.9% respectively, this is a likely scenario.

DCF: Connecting Inputs and Outputs. A key takeaway from examining Morningstar DCF Inputs and Outputs is that extrapolated cash flows generally contribute 2/3 of Enterprise Value, with sectors ranging from a low of 40% for Consumer Discretionary to 86% for Utilities. Secondly, within this sample the inputs that were examined showed considerably less variation than the DCF outputs (both within sector and across the sample). Further, we found that the discount rate and the perpetuity growth rate had relatively low within-sector dispersion. Overall, it seems that small changes in DCF inputs can yield larger changes in the valuation output, as has been pointed out in valuation literature.

Sensitivity Analysis. Using a basic 2-Stage DCF model, we tested how sensitive Enterprise Value is to changes in terminal value inputs—specifically, the perpetuity growth rate, the discount rate, and the last explicit cash flow. For this analysis we assumed 5 years of explicit cash flow forecasts, after which a terminal value is calculated as described previously. Changing the number of years of explicit cash flow forecasts would also have an impact on Enterprise Value, but that is not explored here.

Inputs based on Morningstar sample.. Based on our sample of Morningstar DCF models, we chose realistic low, medium, and high levels for each input variable (see Table 1 right), and then assessed the impact on Enterprise Value of a +/- 1%, +/- 5%, and +/- 10% change on that level of input, using the medium values for the other two inputs as a default. For example, when testing the impact of a +/- 1%, +/- 5%, and +/- 10% change in the growth rate from 3%, a discount rate of 8% and last year of explicit cash flow of \$1.1 Billion is used. For simplicity's sake, value of the last

year of explicit cash flow is used for all years of explicit forecasts. Using these inputs, the terminal value is calculated according to the formula presented in Figure 1, and the results are graphed on the following page.

Results. Figures 4, 5, and 6 next page show the impact of the changes to the growth rate, discount rate, and last explicit cash flow, respectively. Each graph contains a panel for the low, medium, and high levels of the input variable (left, center, and right panels respectively). From left to right, columns within a panel show the impact of a +/- 1%, 5%, and 10% change. Bars that are a result of an increase in the input value are in yellow; bars that are a result if a decrease in the input value are in gray.

Table 1: Sensitivity Analysis Inputs

DCF Input	Low	Med.	High
Perpetuity Growth Rate (g)	3%	3.5%	4%
Discount Rate (r)	6.5%	8%	8.5%
Last Explicit Cash Flow	\$500 Million	\$1.1 Billion	\$11 Billion

DCF Sensitivity: Key Points

- The impact of changing the growth rate and the discount rate increases with the starting level of the input.
- The impact of a given percentage change to the last explicit cash flow is constant across starting levels. Over the range of input levels we specified, it can have as much if not more impact on Enterprise Value than changing the growth rate.
- For growth rate and discount rate, the impact of a given percent *increase* in an input is greater than the impact of the same percentage *decrease* in the input.
- Increases in growth rates and the last explicit cash flow are positively correlated with Enterprise Value, while increases in discount rates are negatively correlated.
- Over the range of input levels we specified, changes in the discount rate had the largest potential impact on Enterprise Value.

■ Increase In Input
 ■ Decrease in Input

Figure 4: Sensitivity to Growth Rate Assumptions

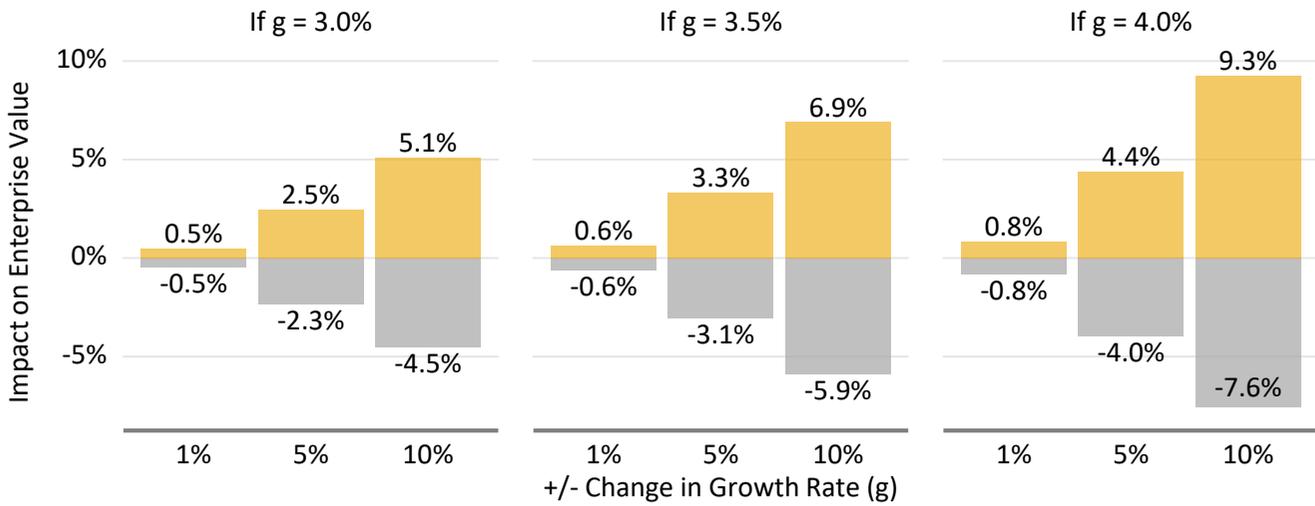


Figure 5: Sensitivity of Discount Rate Assumptions

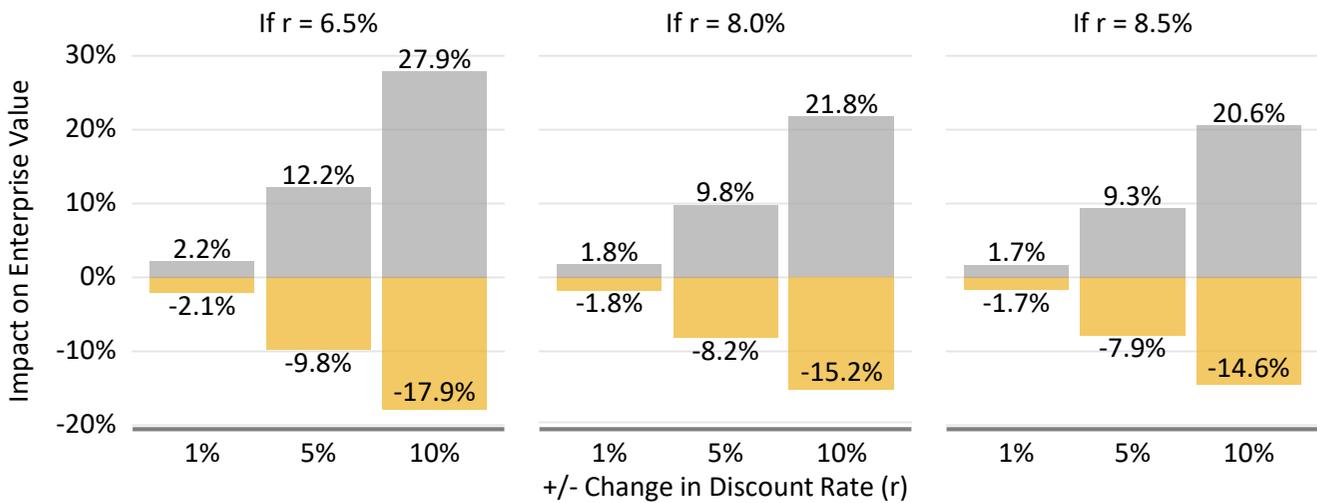
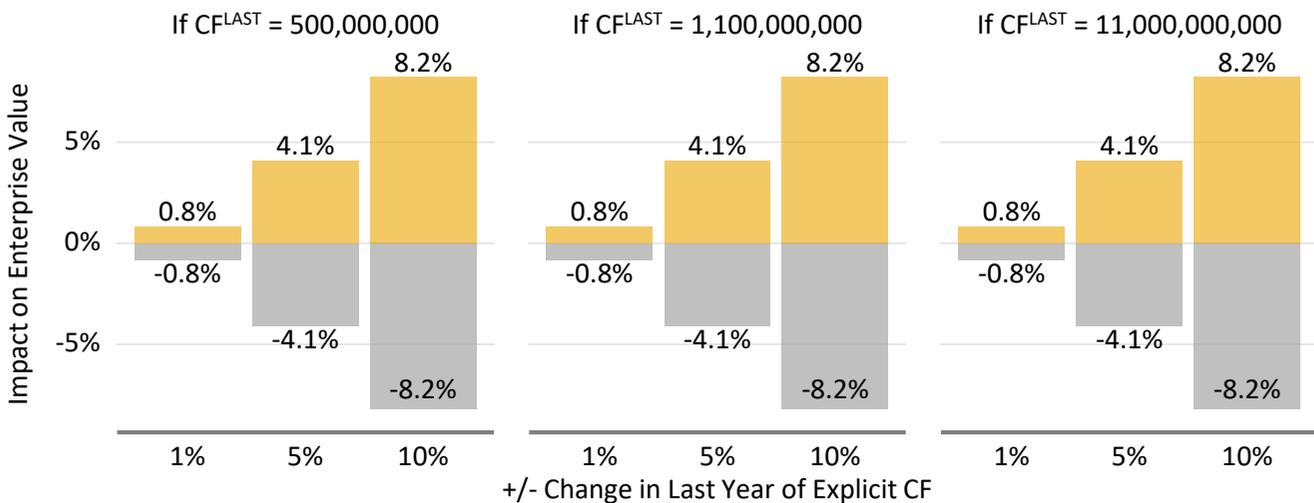


Figure 6: Sensitivity to Last Year of Explicit Cash Flows



Source: 2dii using representative levels for each input variables based on Morningstar DCF model sample (n=673) and standard stable growth rate formula.

ENDNOTES

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ENDNOTES

give a balanced view of the company through the eyes of the company's management team. See also SEC Financial Release No. 72, Commission Guidance Regarding Management's Discussion and Analysis of Financial Condition and Results of Operations (FR-72), reminds registrants that MD&A rules require disclosure of a critical accounting estimate in either of the following cases: • The nature of the estimates or assumptions is material because of the levels of subjectivity and judgment needed to account for matters that are highly uncertain and susceptible to change • The effect of the estimates and assumptions is material to the financial statements The SEC staff has noted that registrants' disclosures about critical accounting estimates often are too general and should provide a more robust analysis than what is in the notes to the financial statements. The SEC staff has commented that there are examples of portions of the significant accounting policies note being repeated verbatim in MD&A. While accounting policies in the notes to the financial statements generally describe the method used to apply an accounting principle, the discussion in MD&A should provide more insight into the uncertainties involved in applying the principle at a given time and the variability that is reasonably likely to result from its application.

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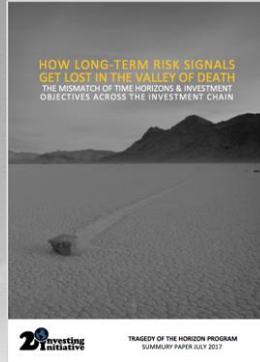
2° Investing Initiative (2°ii) is a not-for-profit think tank working to align the financial sector with the 2°C climate goal and long-term investing needs. With offices in Paris, London, Berlin and New York, the Initiative engages a global network of over 40 partners and members, including financial institutions, investment researchers, asset managers, policymakers, research institutions, academics and NGOs. Our work primarily focuses on three pillars of finance - metrics and tools, investment processes, and financial regulation.

Tragedy of the horizon program. In the course of its work on climate-related risks for the finance sector, 2° Investing Initiative faces the question related to what Mark Carney, the governor of the Bank of England called “the tragedy of the horizon”: risks that are material for a physical asset (e.g. power plant) or a company (e.g. electric utility) are not necessarily material for their investors and not necessarily priced by financial analysts. As a response, we have initiated the ‘Tragedy of the Horizon’ research program.

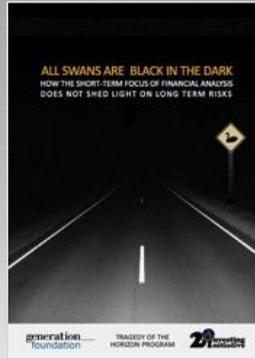
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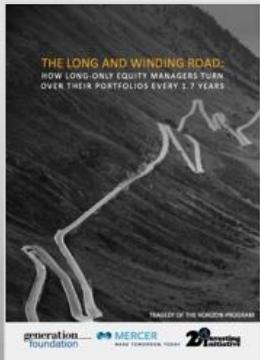
OTHER PUBLICATIONS OF THE TIME HORIZON PROGRAM



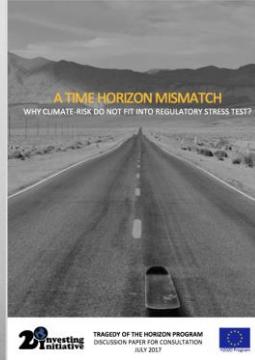
Overview of the time horizon mismatch across the investment chain



The horizon of equity research and credit risk analysts



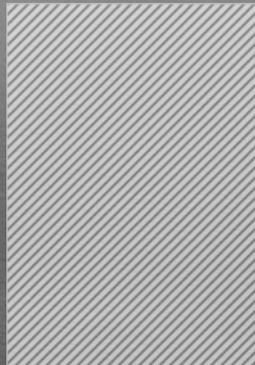
The horizon of long-only equity managers



Why long-term risks like climate change cannot be approached with regulatory stress tests?



Adaptive capacity of companies that face long-term risks like the energy transition



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