

Climate investment risk: floods and droughts

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Biography

Quintin has worked for actuarial and investment consultancy firms and a multi-national European bank, including wide experience in quantitative fund and risk analysis. He is a Fellow of the Institute of Physics, a Chartered Fellow of the CISI and a Chartered Wealth Manager. Quintin has applied skills gained from his Oxford University Physics Doctorate and while working in engineering to finance. He is the second UK graduate from the Sustainable Investment Professional Certification (SIPC) programme and joined P1 in January 2017, founding their ethical and sustainable investing proposition.



Introduction

Investors may feel that extreme flood and drought events linked to global warming present risks that may not be reflected in some companies' share prices [1], [2]. Such events can be incredibly destructive. Should high CO₂-emitting companies or sectors be held at least partially accountable for their activities?

Damages amounting to 1-2% of market capitalisations (or share prices) for seven top carbon-emitting, publicly listed companies, were previously estimated from North Atlantic hurricane seasons [3]. This article outlines a project by the author and others (Dr Karsten Haustein and Dr Pete Walton, both University of Oxford) extending the climate liability concept to estimate the impact of global flood- and drought-related damages on fossil-fuel firm share prices.

We estimate that climate change-related global flood and drought damages for 2012-2016 amount to approximately 2-3% of the top nine carbon-emitting companies' market capitalisations. Financially quantifying emissions illustrates how science can inform decisions, for both investors and companies, arising from a changing climate.

The Economic Impact of Floods and Droughts 2012-2016

Global warming increases the risks of extreme daily temperatures and extended warm spells. It enhances evaporation, with further drying in already-arid areas. Thus, although average rainfall might remain unchanged, there could be a simultaneous increase in floods and more frequent droughts.

Between 1900 and 2016, floods and droughts caused an estimated 19 million deaths and over US\$900 billion in damages globally. Over 2012-2016, flood and drought damages totalled \$265 billion in inflation-adjusted 2016 US dollars [4].

Who are the carbon emitters?

Atmospheric CO₂ rose from 290 ppm (parts per million) in 1880 to 410 ppm in 2018 [5]. Cumulative CO₂ emissions are the primary cause of global climate system changes [6], making the allocation of historical responsibility relatively straightforward.

Nine top-emitting publicly owned companies collectively accounted for 14.5% of Scope 1 and 3 emissions between 1751 and 2017 [7]. The 'scopes' classify emissions' origin from an organisation. Scope 1

emissions are from sources directly owned and controlled, for example, fuel used by company vehicles. Scopes 2 and 3 cover indirect emissions. Scope 2 emissions from energy use, with Scope 3 covering all other indirect emissions, including customers. Emissions over the 1751-2017 period include those from companies that are no longer extant but have become part of another through mergers and acquisitions. For example, Royal Dutch Shell acquired BG in 2016. The historical production data and emissions are attributed to the extant company [7].

Producer	Cumulative 1751-2017 emissions from Scopes 1+3, %
1 Chevron Corp	3.13%
2 ExxonMobil Corp	2.98%
3 BP PLC	2.29%
4 Royal Dutch Shell PLC	2.18%
5 ConocoPhillips	1.08%
6 Peabody Energy Corp	0.92%
7 Total SA	0.83%
8 BHP Billiton Ltd	0.57%
9 CNX Resources (CONSOL)	0.56%
Total	14.5%
Cumulative 1751-2017 industrial greenhouse gas emissions from Scopes 1+3, % [7]	

Financial implications

The nine companies' combined market capitalisation was \$1358 billion in August 2018, although their market values fell during the COVID19 pandemic [8]. Conservatively, consider the 2018 values. If hypothetically, these firms contributed 14.5% of the \$265 billion estimated damages from floods and droughts between 2012-2016, this would be \$38.4 billion. This figure corresponds to 2.8% of their market capitalisations (or share price). The sum is significant, considering that similar contributions might arise regarding other past and future extreme weather events. During the COVID19 pandemic, lower share prices made the damages more significant as a proportion of market capitalisation.

As global warming causes more intense flood and drought events, more significant financial losses will result. Hypothetically, suppose a climate liability regime develops. In that case, these high-emitting companies' damage contributions might be anticipated more frequently with each annual wet or dry season.

Didn't Floods and Droughts Occur Before?

Floods and droughts occurred before human-made global warming, so only costs linked to additional extreme weather frequency or intensity are relevant. Estimating pre-global warming baselines is not easy. Increases in frequency or intensity do not straightforwardly follow atmospheric CO₂ concentrations or temperature rise.

We considered case studies, including floods, droughts and heatwaves (often associated with droughts) from South Africa (2015-2017), Thailand (2011), Russia (2010) and Siberia (2020). Between 57.5% and 99.8% of these events' increases in frequency or intensity arose from human-made global warming. The mid-estimate of 79% reduced the \$38.4 billion damages above to \$30.3 billion (2.2% in share price terms).

Don't the Fossil Fuel users Share Responsibility?

Beyond the fossil fuel extractors' responsibility, what about fuel users, such as motorists in cars, or home heating? It seems counterproductive to argue that the onus lies with motorists—in practice, their choice is not whether to emit, but whether they require a car. Fossil fuel-free cars are still relatively expensive and historically not readily available. Much responsibility lies with companies to provide efficiency gains and alternative technologies to enable fossil-free transport.

One allocation is the current split between industrial and non-industrial emissions. In 2015, around 77% of all human emissions were industrial [9]. In the 1960s, it became clear that CO₂ emissions were damaging the climate. The leading carbon producers could see their products were harmful from then on. A moral responsibility to “do no harm” required leading carbon producers to reduce that harm by capturing CO₂ emissions or developing safe substitutes, such as carbon-free energy [10]. Instead, fossil fuel firms compounded their responsibility by active climate denial [11]. Based on the above, we suggest 88.5% as the appropriate responsibility share for fossil extraction firms.

Both the pre-industrial baseline and producer-user share are relevant. Jointly, the initial damage estimate of \$38.4 billion should potentially drop to \$26.9 billion (2.0% in share price terms). These figures and other analyses not reported here help us arrive at our 2-3% estimated share-price detriment first mentioned.

We have only considered floods and droughts. Including other global warming impacts, such as hurricanes and sea-level rise, could easily contribute much larger sums. The analysis also neglects the likelihood of increasingly powerful climate responses as global warming intensifies [3].

How this helps investors

How should investors respond to the possibility of companies having or deciding to make contributions to climate damages associated with their past emissions? Some investors have reacted already. The City of New York is seeking to divest fossil companies from its \$189 billion pension schemes in a way consistent with fiduciary responsibilities.

Investors might be concerned, especially if they are uncertain whether the relevant companies' share prices reflect these risks. A movement towards an active liability regime could risk fossil fuel company shares becoming stranded assets, with other investors reluctant to buy them, except at a significant discount. Given the mounting evidence and potential risks, some cautious investors may feel they wish to steer clear.

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A sideways look...

Here's a quote from Terry Smith's annual letter: "What are the similarities between a forecaster and a one-eyed javelin thrower? Answer: Neither is likely to be very accurate, but they are typically good at keeping the attention of the audience."

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