The (not-so) Great British Weather?
Exploring corporate weather accounting by the UK food retail industry

Jill Atkins
Sheffield University Management School, University of Sheffield

Elisabetta Barone
Brunel University London

Warren Maroun
School of Accountancy, University of the Witwatersrand

Abstract

This paper explores the extent to which companies in the UK food retail and production industries are disclosing information on weather-related risk, especially in relation to climate change-induced weather risk, in their annual/integrated reports, their sustainability (or equivalent) reports and on their corporate websites. The primary focus is on UK food retailers and producers and the changing British climate. However, we also consider the impact of climate change in other countries which affect the companies under study, due to their inclusion in the supply chain, as well as disclosures relating to non-food areas of their businesses. More specifically, the paper also seeks to assess the quality and consistency of these disclosures, from a critical perspective and draws conclusions as to whether these weather disclosures are discharging adequate accountability to stakeholders in terms of their information content, depth of discussion and detail. For example, we consider whether the information sources used for corporate weather forecasting and subsequent decision-making are being disclosed to stakeholders? Do companies disclose detailed information regarding their weather risk mitigation strategies? Further, do companies provide information concerning any weather derivatives they use in their reports and accounts and if so, how much detail do they provide? We also consider whether companies disclose opportunities arising from climate change-induced weather variability as well as the associated risks.

Key words: weather, climate change, forecasting, risk disclosure

Commented [WM1]: To be updated

1. Introduction

The UK is notorious for its variable and unpredictable weather. The main reason for the "not-so-great" British weather is the country's geographic location. As an island between continental Europe and the Atlantic, the UK is located at the meeting point of five air masses (Winterman, 2012).[1] They collide with each other with the dominant stream decides the weather at that point in time. Consequently, for those who live in the UK, the daily weather is always a topic of discussion and a good way to start a conversation when people meet for the first time.

An acknowledged outcome of climate change is weather variability with more frequent extremes. The UK is forecast to receive heavier rainfall with increased risk of flooding, particularly in winter, while summers may be hotter and drier. Unusual events, such as 'Ex-Hurricane' Ophelia, are expected to become more common, highlighting the risks posed by changes in climate. This is especially true for the agricultural sector.

As populations continue to grow and food security becomes an increasing concern for governments and policy-makers, the ways in which the food production and retail sectors respond to weather-related risks is becoming ever more important. UK agriculture has evolved to cope with the traditionally unpredictable British weather but the magnitude of the changes being experienced, largely due to global warming, is leaving farmers struggling to adjust. This, in turn, has implications for the reliability of food supplies and the cost at which these goods can be made available to consumers.

In this paper, we explore the extent to which companies in the UK food industry are disclosing information on weather-related risk in their annual, integrated and sustainability reports as well as on their websites. While the primary focus is on UK food retailers, we also consider the impact of climate change on non-food areas of their business and in other countries due to supply chain effects. The aim is not to quantify risk disclosures or test potential reporting drivers. The research is grounded in a social constructivist stance which sees language as a tool used to construct and convey meaning. Using interpretive content analysis, we examine the content, tone and consistency of disclosures and draw conclusions on whether or not companies are reporting proactively on the risks posed by climate change and the boundaries of their weather accounts. We are interested in how companies understand and internalise the effects of erratic weather; if information on risk management strategies is being provided and the focus of their stakeholder engagement.

Our study makes an important contribution to the environmental accounting and accountability literature. First, we offer additional evidence on the construction of alternate "charts of account" which have the potential to widen the scope of the conventional accounting system. This is done using an innovative case. While different types of environmental reporting and accounting techniques have been considered, we are not aware of prior research dealing specially with the British weather. Illustrations of how meaning is constructed and conveyed using environmental disclosures and how this contributes to the broader risk society framework are rare (see Giddens, 1990; Gallhofer and Haslam, 1996; Solomon et al., 2011). We also complement the prior research on climate change and carbon reporting. This has dealt with issues such impression management/symbolic reporting (Borghei et al., 2016); how carbon accounting is framed as part of the border sustainability reporting and accounting project

[1] *An air mass is defined as a large body of air that has similar temperature and moisture properties throughout (Winterman, 2012).*

(Ascui and Lovell, 2011) and the assurance of carbon disclosures (Green et al., 2017). How climate change forms part of an emerging risk discourse is not explicitly considered. The relationship between reporting on climate change and potentially emancipatory forms of accounting such as extinction (Atkins and Maroun, 2018) and ecological accounting (Russell et al., 2017) has not been addressed. As a result, an examination of reporting on the risks posed by weather variability, in the context of what Gidden's (1990) and Beck (1993) describe as a risk society, offers an excellent opportunity to examine accounting's reflexive change potential and contribution to the emancipatory environmental accountability agenda.

In Sections 2 and 3, we discuss the discourse of risk, the prior research on climate change and emerging forms of emancipatory accounting. Section 4 outlines the method and explains the selection of companies for review. In section five we discuss the findings of the research and the paper concludes with a critical discussion in section five.

2. The discourse of risk: climate change, farming and the Great British Weather

Modernity and the discourse of risk

Risk and the way in which risk is internalised, acted on and reported has been a topic of interest for social scientists studying periods of late modernity for several years. In one of the primary references on the emergence of a 'risk society', Giddens (1990), deals specifically with environmental disasters as a consequence of modernity and the increased prominence of environmental risk in modern business discourse. There is a growing awareness of the impact humanity is having on the planet and a realisation that we are on an unsustainable trajectory which ends in environmental disaster (Beck 1992, 1997, 1999). Anxiety about environmental degradation is clearly evident in the scientific literature where we are warned about the catastrophic biological implications of climate change, habitat destruction and loss of species (Klein et al., 2007; Ceballos et al., 2017). Civil society, inter-governmental organisations and environmental research groups have also been ringing the alarm bells (see, for example, Intergovernmental Panel on Climate Change, 2013). Closer to home, the environmental and sustainability accounting community have long challenged the myopic focus of conventional business practice (Gray et al., 1995b; Spence, 2009) and call for a proactive approach to accounting which works to avert environmental disasters (Milne et al., 2009; Russell et al., 2017; Atkins and Maroun, 2018).

From a risk society perspective, the proliferation of natural and social science research dealing with the state of the environment points to a shift from classical economics, institutions and political theory to a period of modernity 'characterised by [environmental] dangers…which are unmanageable and uninsurable' (Solomon et al., 2011, p. 1121). According to Beck (1999, p. 33) ecological concerns are no longer seen as the 'side effect' of industrial activity but a serious threat to the legitimacy of existing institutional orders with the potential to destabilise the capital system. In agrarian and industrial society, behaviours and outcomes are capable of being ordered, ranked and controlled (Gordon, 1980; Foucault, 1983). The 'calculable infrastructure' of the accounting system can be mobilised both to quantity and to hold accountable (Mennicken and Miller, 2012). In periods of late modernity - where meaning is coordinated, managed and ordered according to risk discourse - taken-for-granted assumptions about the relationship between the environment and business practice which have safeguarded the status quo are shaken (Lash et al., 1996; Luhmann, 2005).

> "In the phase of risk society, recognition of the incalculability of the hazards produced by technical-industrial development compels self-reflection on the foundations of the social context and a review of prevailing conventions and principles of 'rationality'. In the self-conception of risk society, society becomes *reflexive* (in the narrow sense of the word) – that is, becomes an issue and a problem to itself" (Beck, 1996, p. 32, emphasis in the original).

It is possible for accounting to be intertwined in this process of reflexive awareness and change. Accounting's role in promoting the centrality of finance and economics to the exclusion of social and environmental imperatives is well documented (Gray et al., 1995b; Solomon and Thomson, 2009; Atkins et al., 2015a). How conventional accounting logics have constrained efforts at promoting more transparent reporting and a sustainable approach to doing business has also been discussed in detail (see, for example, Tregidga et al., 2014; Flower, 2015). Accounting is, however, a 'fluent and emerging craft' (Hopwood, 1987, p. 207) capable of reflecting current organisational arrangements and providing us with a glimpse of alternate (and more desirable) realties (Dillard and Reynolds, 2008; Atkins et al., 2015a; Gallhofer and Haslam, 2017).

> "By its routinisation of information flows and the ways in which it imposes a spatialisation on time, [accounting] can change conceptions of the past, the present and the future, contributing different saliences to each which can, in turn, moderate temporal preferences and emphases, and thereby, organisational actions" (Hopwood, 1987, pp. 207-209)

We see evidence of this in the emergence of new forms of what can be referred to broadly as environmental accounting designed to broaden the scope of conventional financial reporting models and "emancipate" organisations from the myopic trappings of financial discourses (see Gallhofer and Haslam, 1996).

On the self-reflective awareness of the need to broaden accounting

A detailed review of the origin and history of environmental accounting is beyond the scope of this paper (for details see Gray et al., 1995a; Parker, 2005; Fifka, 2013). What is relevant are the most recent developments in environmental accountability aimed at constructing new fields of organisational visibility and promoting positive changes to business practice. Perhaps most notable is emergence of integrated reporting which provides:

> "a concise communication about how an organization's strategy, governance, performance and prospects, in the context of its external environment, lead to the creation of value over the short, medium and long term" (International Integrated Reporting Council [IIRC], 2013).

The IIRC has been criticised for placing too much emphasis on providers of financial capital and need to ensure market efficiency (Flower, 2015; Thomson, 2015). Like sustainability reporting, the possibility of integrated reporting forming part of a coordinated impression management exercise which does little to promote genuine environmental responsibility has also been considered (Brown and Dillard, 2014; Stubbs and Higgins, 2014; McNally et al., 2017). It may, however, be premature to dismiss the potential of this new reporting trend.

The IIRC take a broad approach to risk, requiring organisations to identify economic, environmental and social factors which could undermine value creation over the short-, medium- and long-term. These risks should be clearly identified and explained to stakeholders, including the steps being taken to mitigate their impact (IIRC, 2013). Early indicators suggest that the multi-capital model espoused by the IIRC may heighten awareness of the importance of environmental protection and provide a framework for organisations to internalise environmental risk as part of their strategic development and management processes (consider Atkins and Maroun, 2015; Al-Htaybat and von Alberti-Alhtaybat, 2018; McNally and Maroun, 2018). It is also possible for integrated reporting to be used in conjunction with other emerging forms of accounting as part of a more comprehensive approach to accounting for risk. Biodiversity, ecological and extinction accounting are excellent examples.

Jones and Solomon (2013) situate the accounting for biodiversity as part of a broader cultural, philosophical and accountability framework. The challenges of biodiversity reporting are outlined including for example, the difficulty of defining and accounting for changes in biodiversity mass (for details see Cuckston, 2013; Freeman and Groom, 2013; Tregidga, 2013). The potential for biodiversity accounting and reporting to heighten awareness of environmental issues and lead a reflexive change in how companies protect biodiversity is also present (Jones, 2003). This is because the act of reporting on biodiversity loss can make the anthropocentric and deep ecological case for conserving species more apparent, a key objective of ecological and extinction accounting.

In anthropocentric terms, these two forms of environmental accounting and accountability place "natural capital" at the heart of organisations' business models (Atkins and Atkins, 2016; 2019). Risks posed by climate change and environmental degradation are key business risks which organisations ought to manage in order to preserve the "inventory" of natural capital and, in turn, ensure business continuity (see also Jones, 2003; Siddiqui, 2013). At the deep ecological level, nature has an inherent or intrinsic value which is independent of the direct benefits it provides to people (Khisty, 2006). The risk of extinction or biological degradation must, therefore, be framed from a moral, cultural, religious and ecological perspective (see Russell et al., 2017; Gray and Milne, 2018).

Atkins and Maroun (2018) and Maroun and Atkins (2018) provide an illustration of an extinction account grounded in an integrated thinking and risk management discourse. This blends the anthropocentric and deep ecological arguments for internalising environmental risks and advances an emancipatory framework which sees accounting mobilised as an agent of positive change. Risk is understood in both financial and biological terms. The extinction account includes a clear explanation of how business activities affect different species and ecosystems, the steps taken to mitigate these ecological risks and the different capitals or resources which the organisation must mobilise to reverse or prevent environmental damage (see also Atkins and Atkins, 2016; 2019). The partnerships formed with NGOs, efforts to educate and engage with stakeholders and how well the organisation has performed in redressing adverse environmental consequences form a key part of an emancipatory extinction accounting model (Atkins et al., 2019; 2018).

This type of extinction accounting need not be limited to a single organisation. Gaia and Jones (2017) and Buchling and Maroun (2019), for example, consider the importance of ecological or extinction accounts covering natural capitals under the control of the public sector. For Atkins et al. (2018), the unit of account is a specific environmental issue addressed by multiple organisations in their integrated and sustainability reports. Similarly, Cuckston (2017; 2018)

proposes accounting at the ecological level something which could, conceivably, entail a type of "consolidated biological report" which aggregates the extinction or ecological accounts of multiple organisations, environmental groups and government agencies.

As part of the biodiversity, ecological and extinction accounting project, researchers have considered a range of species and environmental concerns to contextualise environmental risks. While not referring specifically to "risk society" logic, Atkins et al. (2018) and Sibanda and Mulama (2019) deal with the adverse consequences of the possible extinction of the rhinoceros from both an economic and ecological perspective. Nicolov (2019) and Solomon and Clappison (2019) deal with accounting for whales. Butterflies (Lanka, 2019), bees (Atkins et al., 2017) polar bears (Jonäll and Sabelfeld, 2019) and pandas (Zhao and Atkins, 2019) have also received recent attention. What has not been considered are the possible implications of changing weather patterns and how the unpredictability of periods of drought and excessive rain is incorporated as part of the broader risk discourse.

The (not-so) great British Weather

The traditionally changeable British weather is becoming even more unpredictable. The general consensus is that this is primarily the result of global warming. Researchers have found a general shift towards more frequent and heavy rainfall during winter and hotter and drier summers[2] (Maraun et al., 2008; Burt and Ferranti, 2012). In a speech at Lloyds of London about the risks to the insurance and financial sectors of climate change, Mark Carney, Governor of the Bank of England and the Head of the Financial Stability Board, stated:

> "Potential increases in the frequency or severity of extreme weather events driven by climate change could mean longer and stronger heat waves; the intensification of droughts; and a greater number of severe storms. Despite winter 2014 being England's wettest since the time of King George III; forecasts suggest we can expect at least a further 10% increase in rainfall during future winters" (Carney, 2015).

These changes pose significant operating and financial risks for the UK farming industry (Blackmore, 2014). Climate change and unpredictable weather patterns can have direct implications for the areas in which crops can be grown or livestock can be reared. Examples include soil nutrition, the spread of invasive species, incidence of disease and the risk of crops being lost due to adverse weather conditions (see Rial-Lovera et al., 2016).

While climate change is often framed as a long-term consideration, there are already indicators of extreme weather beginning to have an effect on the yields of essential crops such as wheat and soy (Gomann, 2015). In turn, the insurance industry has been hard-hit reporting that:

> "Since the 1980s the number of registered weather-related loss events has tripled; and Inflation-adjusted insurance losses from these events have increased from an annual average of around $10bn in the 1980s to around $50bn over the past decade" (Carney, 2015).

As a result, governments and regulators have called for climate change to be addressed as a systemic risk in the financial system which is more appropriately managed and disclosed

[2] *For example, the UK Meteorological Office (Met Office) reported that December 2015 as the warmest and wettest since records began (Rial-Lovera et al., 2016)*

(Deloitte, 2017). More detailed industry-level efforts to mitigate the risks arising from changing weather patterns and extreme weather events are also under way.

In a risk society context, resilience is a useful strategy for preparing for and mitigating the effects of the unexpected. This can include adopting a systems thinking approach, incorporating resistance as a core element of a system and improving system diversity, connectivity, redundancy and recovery capacity. Forward looking approaches which focus on additivity and transformation are also relevant (de Bruijn et al., 2017). The emphasis is on "learning to change farming and water management practices … to respond appropriately to challenges of sustainability and climate change" (Blackmore, 2014, p.177).

One approach used by companies to manage weather-related risks is to trade in weather derivatives. These are a relatively new form of financial instrument introduced in the mid-1990s[3] (Wang et al., 2010). The derivatives allow companies to hedge "moderate departures" from expected weather conditions as opposed to traditional indemnity insurance which covers "large departures and catastrophes" (Dischel 2002; Brockett et al., 2005; Bates and Goodale, 2017). They provide farmers with a means of hedging the financial effects of weather risks defined as,

> "…the uncertainty in cash flow and earnings caused by non-catastrophic weather events including temperature, humidity, rainfall, snowfall, stream flow and wind" (Wang et al., 2010, p.358).

Indeed, many food production and retail companies express concern over poor sales because of unfavourable weather. For example, temperature and precipitation can have a negative impact on yields. On the retail side, temperature can lead to unexpected changes in consumer behaviour such as substituting soft drinks with teas and coffees in an unusual cold spell. Extreme weather, such as heavy snow and rain can also distribute supply chains and stop customers from shopping.

Weather derivatives offer several advantages. First, they enable farmers to transfer the financial risks of adverse weather conditions to capital market participants with more sophisticated risk management structures and which are better placed to adsorb short-term losses resulting from bad weather (Štulec, 2017). Second, the pay-out on weather derivatives is linked to variations from specified weather indices[4] rather than paying an indemnity based on incurred damages which reduces the farmer's administrative and transaction costs (Vedenov and Barnett, 2004). They can also be tailored to correspond to firms' risk appetites and hedging requirements and provide companies with flexibility in determining which risks to manage. This is especially true when considering that, unlike conventional insurance policies, the instruments can have multiple applications. Examples include compensating the holder for actual losses, off-setting opportunity costs and diversifying portfolios[5]. As a result, weather derivatives can have a

[3] *Weather derivatives were introduced in the US in 1997. Weather derivatives differ from weather insurance, which is used to cover catastrophic events, e.g. hurricanes, floods and windstorms.*

[4] *For example, temperature-related weather derivatives compensate for deviations from the basis of 65°F per the Heating Degree Days (HDD) index and Cooling Degree Days (CDD) index. Precipitation-related products compensate for variations in precipitation.*

[5] *Weather derivatives can be used to speculate on the change of weather, a potentially risky undertaking.*

material effect on overall risk exposure and firm value (Vedenov and Barnett, 2004; PÉRez-GonzÁLez and Yun, 2013).

For example, Leggio (2007) finds that weather derivatives are useful tools to alleviate the negative consequences of low demand due to bad weather. Consequently, weather derivatives help to reduce revenue volatility by up to 80 percent. Using a natural experiment, PÉRez-GonzÁLez and Yun (2013) find that the use of weather derivatives leads to an increase in firm value because the instruments enable the effective hedging of negative weather-related realisations. Similarly, based on an empirical study in the food retail sector, Štulec (2017) finds that weather derivatives can offset sales uncertainty. Consequently, holding weather derivatives tends to be viewed positively by stakeholders as a means of improving firms' risk profiles. Associated risk management disclosures (see IASB, 2014) can also provide stakeholders with an overview of how organisations hedge their financial risks leading to reduced information asymmetries and higher firm value. For example, Pierce (2015) shows that the use of hedge accounting significantly reduces earnings volatility. Steffen (2016) finds that derivative and hedging disclosures tend to improve investors' understanding of firm risk exposure. High quality risk disclosures can also signal that firms are discharging accountability to their stakeholders leading to improved reputations and competitiveness and lower agency costs.

In addition to weather derivatives, Rial-Lovera et al. (2016) outline a range of techniques and strategies being used by the agricultural sector to address the increasing risks posed by climate change and weather variability. These are summarised in Table 1.

Insert Table 1 about here

Although not exhaustive, Table 1 provides clear evidence of a consciousness of risk. The development of an array of risk management techniques shows that, on average[6], food producers and retailers have accepted weather variability as an integral part of their experienced realities and are taking active steps to mitigate their risk exposure. This, we feel, is indicative of the operation of the risk society which frames business in terms of risk and the steps taken to mitigate risk. As the market for information on risk (such as weather forecasts, derivative indices and insurance data) expands and risk management practices become more established (Bates and Goodale, 2017) a type of risk discourse emerges in terms of which agricultural activity is framed, not only as an economic or biological activity, but one which is characterised by a type of "risk ecology".

Risk disclosure, climate change disclosures and greenhouse gas accounting

Risk management and internal control are a core feature of efficient corporate governance (Solomon, 2013). In the context of a risk society, it also becoming increasingly important for organisations to report on their key risks and mitigation strategies for functional purposes and as a means of articulate their business in a discourse which resonates with a culture of risk awareness and control.

For example, there is a growing demand for risk disclosure by members of the investment community who feel that current reporting trends are inadequate for contextualising risk

[6] *We use this caveat because there are still climate change sceptics among members of the farming community. In a study by Islam et al. (2013), 16% of the farmers surveyed were unconvinced about the reality of climate change. While small, this figure is still concerning given the direct impacts of climate change-related weather risks affecting farming in the UK.*

exposure and explaining how organisations are identifying and managing their risks (Solomon et al, 2000; ICAEW, 2011). These criticisms apply to both traditional financial issues (Moxey and Berendt, 2010) as well as social and environmental metrics which are, increasingly, being understood as an integral part of an organisation's overall risk exposure (see, for example, Edgley et al., 2010; ICAEW, 2011; Atkins and Maroun, 2015).

Per conventional finance theory, appropriate risk reporting can assist in reducing a company's cost of capital and creating a more stable business environment (Abraham and Cox, 2007; Rajab and Handley-Schacler, 2009). There is also a sense that risk management and reporting are becoming an integral part of the business ethos and defining feature of legitimate management control systems and reporting protocols. In support of this assertion is the codification of minimum levels of risk disclosures in terms of already institutionalised financial accounting standards. In US-GAAP, the use of and reporting on financial instruments as part of a firm's risk management strategy is outlined by SFAS 119, SAFS, 133 and FRR 48[7] In the UK, where International Financial Reporting Standards (IFRS) are applied, IFRS 7 and IFRS 9 are applicable.

In addition to accounting standards, the *UK Corporate Governance Code* requires a board of directors to take responsibility for an organisation's risk governance and to ensure that key risks and steps taken to mitigate those risks are reported to stakeholders (FRC, 2018). These guidelines are complemented by recommended "best practice" outlined by the IIRC (2013) and the GRI (2016). The academic community has also gone to considerable lengths to explain how management control systems (including those which deal with risks) form an integral part of the overall business management environment. They are essential for engaging with stakeholders, managing threats to legitimacy and ensuring business continuity (Melnyk et al., 2003; Alrazi et al., 2015; De Villiers et al., 2017). The net effect is considerable normative pressure on organisations to provide an account of their risk and to demonstrate how their business models are being aligned with a culture of risk identification and curtailment. One area which has received considerable attention is accounting for climate change.

The last decade has seen a rapid increase in climate change reporting (KPMG, 2015; 2017). An estimated 400 initiatives encourage or, in some cases, mandate companies to provide information on the costs, opportunities and risks associated with climate change. Most notable are the efforts of the Carbon Disclosure Project (CDP) which seeks to promote awareness about climate change and encourage the measurement of and reporting on interventions designed to reduce greenhouse gas emissions (CDP, 2017). The CDP compiles information from the world's largest companies to provide insights into the scope and quality of interventions taken by companies to lower their carbon footprint. In addition, the Financial Stability Board Task Force developed and published a series of voluntary recommendations in December 2016 which aim to,

> "…. ensure that investors, lenders and other financial market participants receive consistent climate-related financial disclosures that are useful in understanding material climate-related risks and opportunities" (Deloitte, 2017, p.4).

Some firms disclose information on greenhouse gas (GHG) emissions information voluntarily in order to gain competitive advantage (Rankin et al., 2011) or as part of a symbolic display

[7] *SFAS 119, Disclosures about Derivative Financial Instruments and Fair Value of Financial Instruments (1994), SFAS 133, Accounting for Derivative Instruments and Hedging Activities (1998), and the Financial Reporting Release (FRR) 48, Disclosure of Accounting Policies for Derivative Financial Instruments etc (1997).*

designed to manage impressions (Borghei et al., 2016). In other cases, GHG disclosures can enhance environmental transparency. They are positively influenced by the presence of corporate sustainability officers and environmental committees (Peters and Romi, 2014) suggesting that some companies are starting to make a concerted effort to lower their carbon footprint. Carney (2015) takes a similar stance suggesting that climate change disclosure could have an emancipatory potential by making companies, investors and other stakeholders sensitive to environmental issues and aware of the total cost of their behaviour. More specifically:

> "….. a framework for firms to publish information about their climate change footprint, and how they manage their risks and prepare (or not) for a 2 degree world, could encourage a virtuous circle of analyst demand and greater use by investors in their decision making. It would also improve policymaker understanding of the sources of CO2 and corporate preparedness" (Carney, 2015).

This is especially true if climate change moves away from oversimplification of relationships in order to calculate the monetary cost of carbon and becomes more inter-disciplinary, context-specific and outcomes-focused (Isenhour, 2016).

In support of the emancipatory potential of the carbon accounting project is its ability to facilitate engagement with institutional investors and NGOs on climate change risks and opportunities. A dialogical type of accounting, in terms of which companies can seek advice from environmental groups or researchers and investors and other stakeholders can participate in discussions on the risks posed by climate change promotes information sharing and the development of innovative strategies for combating climate change (Solomon et al., 2011; Atkins et al., 2015).

This is not to say that companies' risk reporting is free from limitations. Enslin et al. (2015) and Raemaekers et al. (2016), for example, find that current risk management and reporting practices:

> "run the risk of appearing superficial due to the lack of meaningful forward-looking disclosure and the failure to link the possible impact of risks to the strategic objectives that could be affected" (Enslin et al., 2015, p.277).

Similarly, a recent report by Deloitte (2017) argued that, while there is a growing awareness of key environmental issues, like climate change, many organisations struggle to understand and act on the associated risk. Atkins and Atkins (2017; 2019) make a comparable point in connection with biodiversity and extinction of species. At the technical level, the difficulties of accounting for climate change, loss of species or ecological degradation should not be overlooked. Estimation methods necessary for reporting on GHG emissions, species under threat or changes in biomes are inherently complex and difficult to apply in practice (Milne and Grubnic, 2011; Jones and Solomon, 2013). The accounting infrastructure, necessary for collecting and analysing environmental data, is often under-developed and a single method or approach for accounting for environmental metrics is yet to be developed. Consequently,

> "The existing surfeit of existing schemes and fragmented disclosures means a risk of getting 'lost in the right direction'"(Carney, 2015).

4. Research Method

The research subscribes to a social constructionist world view in terms of which language is seen as playing a key role in constructing organisational identify and revealing the operationalisation of a risk society mind-set (see Laine, 2010; Tregidga et al., 2014). As a result, data collection and analysis is carried out in an interpretive fashion.

The study employed a meaning-oriented content analysis of the weather-related disclosures produced by 15 FTSE100 companies involved in food retail and. in some cases, food production. The companies analysed re listed in Table 2.

Insert Table 2 about here

We analysed all of the publicly available disclosures made by these companies in their annual/integrated and sustainability reports as well as on their websites. We focused on the periods from XXX to XXX which coincide with some of the most recently reported extreme weather events.

Data collection

Data were collected from each corporate report and website and analysed systematically to ensure that all sections or parts of the reports and webpages were taken into account. In the first reading, the researchers considered the overall content and structure of the data sources, their scope and the context in which the reporting entities were operating. Next, each source was carefully reviewed to identify disclosures dealing directly or indirectly with the British weather.

The researchers focused on three specific types of content: information on the weather; disclosures outlining key risks and mitigation strategies and logistical arrangements or explanations of supply chains. For this purpose, no distinction was made between qualitative or quantitative disclosures. Narrative information, pictorial and graphical information were treated as having equal relevance. As well as food products, which are the main focus of this paper because of the impact of climate change on farming, we also collected data on weather-related impacts on other items, such a clothing.

As each source was read, applicable content was highlighted and aggregated. This occurred until each section or subsection of the annual, integrated or sustainability reports had been reviewed. The same approach was followed for web content. The result was a log of the different weather-related disclosures categorised by company and source/location of the disclosure.

Data analysis

It was not our intention to determine the frequency of disclosures or to test for changes in the volume of quality of information being reported in a positivist sense. As a result, paragraphs, images, tables or sub-sections served as the unit of analysis rather than individual words or sentences. This avoided having to disaggregate data at a level which was not necessarily intended by the authors of the report content and mitigated the risk of a loss of meaning and context due to analysis taking place at a the granular, rather than conceptual, level (Krippendorff, 1989).

Data were analysed by considering how content, choice of language and tone construct meaning (adapted from Laine, 2010; Merkl-Davies et al., 2011; Atkins et al., 2018). This required each section of reports or webpages dealing with the weather to be considered in the context of how the respective organisation identified and understood risk and the actions being taken, if any, to manage those risks. The possibility of the disclosures forming part of a broader emancipatory agenda or compliance-orientated approach to reporting was also considered.

As is the case with all interpretive text analysis, data collection and analysis is inherently subjective. The researchers decided against using traditional inter-coder checks for validity and reliability as this runs the risk of reducing the analysis to a disclosure checklist. A more interpretive approach was used. The first round of data collection and analysis being performed by two of the researchers to ensure consistency. A type of collective peer reviewed followed. This entailed a detailed discussion of each disclosure and how it was being interpreted as part of the broader risk society framework before including the information in the preliminary results. In the final stage, findings were presented to colleagues at two separate workshops to test inferences and ensure that results resonated with a broad audience.

The final results were grouped under broad theme headings (as per Section 5) which were derived interpretively by the researchers. Results are not organised by scientific method or objective data reduction. Their structure and sequence reflects the application of a subjective analytical model which "progressed in hermeneutical manner" as the paper was being developed (adapted from Laine, 2010; Merkl-Davies et al., 2011; Atkins et al., 2018).

5. Findings on weather risk disclosures

The data analysis revealed a series of themes covered by British food producers and retailers: (1) 'the Great British Weather' as a traditional business challenge; (2) acknowledgment that climate change is increasing weather risk; (3) the impact of the weather on production; (5) investor-company dialogue on weather risk; (6) acknowledgement of financial materiality of weather risk including supply chain effects; (7) philanthropic outcomes from climate change; (8) weather risk mitigation strategies and innovations and (9) opportunities arising from changing weather patterns. These themes coalesce and provide the boundaries of a risk awareness and identification discourse which resonates with a "society of risk" mind-set. There is an awareness of a need for urgent action and, in some cases, glimpses of what may be the start of material changes to the way in which companies are internalising and acting on the implications of changing weather patterns. We discuss each theme and provide illustrations below.

'The Great British Weather': a traditional challenge for British food retailers

As discussed in Section 2, unpredictable weather is a historical feature of the British Isles. British farmers have battled with the weather for centuries developing products which are tailored to deal with the 'great British weather'. Weather-related risk is, therefore, part of the local culture. For example:

> "Designed with the **great British weather in mind**, a rain cover, foot muff and hood will keep your little one dry and warm. Whether you're in the city or out in

> the countryside, the multi-terrain pushchair is **ready for every eventuality**" (Sainsbury's website, emphasis added).[8]

Similarly, the business model is adapted to traditionally unpredictable weather:

> "That's why strawberries are grown under polytunnels … which protect the delicate fruit from **whatever the British weather throws at them**" (Sainsbury's website, emphasis added).[9]

The erratic weather which food producers and retailers have factored into their strategies and day-to-day operations is, however, becoming increasingly unpredictable and triggering alarm among industry leaders with Jonathan Church, a Tesco spokesman, commenting: "Rapidly changing weather can be a real challenge" (Werdigier, 2009). How this abnormal variability is being incorporated in organisation's understanding of risk and, in turn, their strategies, management systems and reporting to stakeholders, is the key consideration of this research.

Acknowledgment that climate change is increasing weather risk

There is some mention in corporate disclosures of links between food/weather-related risks and climate change but this is sporadic. For example, in a section of their website dealing with "How Sainsbury's is responding to global challenges" the retailer explains:

> "The world is changing. Global warming, extreme weather and volatile prices are making it harder for farmers to produce the foods we love. So Sainsbury's is changing too" (Fairly Traded: accessed 22/7/2017).

The disclosure is very broad. Exactly how global warming is affecting the business is not outlined and the change being referred to is undefined. The company does provide some information about a new pilot programme aimed at supporting tea farmers in Africa but detailed are limited and the link between the initiative and climate change action is unclear.
Morrisons gives a more detailed account of the negative impact of climate change:

> "Climate change is a direct result of human activity, from population growth, demand and consumption patterns increasing emissions into the atmosphere. It is already affecting the way we live today, we see this through severe weather patterns, rising temperatures and sea levels causing food and resource scarcity and devastation to communities (Morrisons website).

The business impact is explicated, albeit briefly:

> "security of food supply; loss of food quality through changing climate patterns; food price inflation; loss of livelihoods for Morrisons suppliers; new markets; changing buying habits" (Morrisons website).[10]

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[8] *GIVING ALL PARENTS A SUPPORTING CUGGL NEW NURSERY BRAND, CUGGL, LAUNCHES EXCLUSIVELY AT ARGOS (ACCESSED ON 23/7/2017) 19 July 2017 https://www.about.sainsburys.co.uk/news/latest-news/2017/19-07-2017*

[9] *BEHIND THE SCENES OF HOW WE GROW THE PERFECT STRAWBERRY (ACCESSED ON 23/7/2017) 11 July 2017 https://www.about.sainsburys.co.uk/news/latest-news/2017/10-07-17-strawberries*

[10] *CORPORATE RESPONSIBILITY REPORT 2016/17 (ACCESSED ON 8/7/2017) https://www.morrisons-corporate.com/Global/corporate/Morrisons_CR_Report2017_Interactive_FINAL.pdf*

Under operational risks in the annual report and statements, ABF Ltd state that,

> "Our businesses rely on a stable supply of natural resources some of which are vulnerable to external factors such as natural disasters and climate change" (ABF website).[11]

The company outlines the types of risk which it deals with, albeit in broad terms:

> "We operate across a vast range of environments, which requires our businesses to adapt to local or national issues such as changes to regulation, increasing pressure on agricultural land, weather patterns and local social pressures ….. Our businesses are constantly responding to a range of physical, regulatory and financial risks associated with major environmental matters, including adapting to challenging weather patterns and temperatures, operating in water-stressed areas and responding to changing water and carbon-related regulations" (ABF Ltd website).[12]

These high-level disclosures are supported by more detailed case-specific information which provides context and gives a better sense of the impact which weather conditions can have business operations. For example in "The Impact of Changes in Weather" on the ABF website, the company explains:

> "Our sugar operations account for over 82% of our total energy use. The impact of weather on the size and quality of the sugar beet and cane crops therefore directly affects the amount of energy needed to process those crops, and the efficiency with which we can do this. Our sugar factories are based in parts of the world with different climates and significant variability in local weather patterns. This year alone, our operations have managed the impacts of excess rainfall and flooding, droughts and hard frosts which have generally led to reduced crop yields. Through appropriate risk management and adaptability, our businesses are prepared to respond to these extremes in weather patterns" (ABF Ltd website). [13]

Exactly how the company has responded is not dealt with. For example, how risk management plans are designed, the details of each, implementation costs and measures of performance against targets are not provided. Similarly, the Chairman's statement includes the following generic comment on climate-related risk:

> "Whether responding to challenging financial markets; integrating acquired businesses; disposing of businesses; dealing with the effects of unusual weather on our supply chains or retail demand …. Our people have responded with enthusiasm" (ABF website).[14]

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[11] *Annual reports and accounts 2016 (for the year ended 17 September 2016) (accessed on 19/5/2017) http://www.abf.co.uk/documents/pdfs/ar_cr_2016/2016_annual_report.pdf*

[12] *Corporate Responsibility Report 2016 (accessed on 23/5/2017) http://www.abf.co.uk/documents/pdfs/ar_cr_2016/2016_corporate_responsibility_report.pdf*

[13] *Corporate Responsibility Report 2016 (accessed on 23/5/2017) http://www.abf.co.uk/documents/pdfs/ar_cr_2016/2016_corporate_responsibility_report.pdf*

[14] *Annual Results Announcement Year ended 17 September 2016 (accessed on 28/5/2017) http://www.abf.co.uk/documents/pdfs/ar_cr_2016/annual_results_announcement_2016.pdf*

From a critical perspective, the company is dealing with environmental issues which are of increasing concern to stakeholders but without committing to the specific details necessary for holding the organisation accountable for its environmental performance. More optimistically, there is a sense of climate change being accepted as part of the corporate reality. There is no effort to deny to the fact that climate change is taking place and linked with increasingly erratic weather. Similarly, the risks arising from changing weather patterns are being acknowledged. These are a type of sunk cost which leave business with no realistic alternative but to engage "enthusiastically".

Weather risk, food production and crop accounting

There is some discussion on the companies' websites about the relationship between harvests, inflation and the weather. For example, Sainsbury states:

> "….we've seen a reduction in commodity prices, particularly in areas like fresh produce, as a result of a better winter, a less inclement winter, leading to better crops" (Sainsbury's website).[15]

Morrisons also discussed the impact of unpredictable weather on harvest and the related price effects:

> "Poor weather, which affected harvests both in the UK and abroad, had a particularly negative impact on the price of some food commodities including potatoes and carrots, which increased by 23% and 18% respectively" (Morrisons website).[16]

In most cases the weather is operationalised as a business risk with material financial and operating consequences. Consider the following two examples dealing with apples, milk and lamb:

> "If I could change anything about my job it would be the British weather, especially the hail. The damage it can do to top fruit is sad to see. I've seen fantastic crops destroyed in just five minutes of hail" (Tesco website).[17]

> "Without milk we would not have a business. Restricted milk supply could be caused by economic factors, weather, fuel availability or an epidemic which affects dairy cows. This could lead to lower sales and profits" (Dairy Crest website).[18]

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[15] *First Quarter Trading Statement 2014 (transcript) (accessed on 6/8/2017) Wednesday 11th June 2014, 8:30 https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/reports-and-presentations/2014/j-sainsbury-plc-q1-trading-statementtranscript.pdf*

[16] *PRELIMINARY RESULTS FOR THE YEAR ENDED 3 FEBRUARY 2013 (accessed on 8/7/2017) https://otp.tools.investis.com/clients/uk/morrison/rns/regulatory-story.aspx?cid=623&newsid=329302*

[17] *British supplier support from Tesco's Master of Apples (accessed on 13/8/2017) https://www.tescoplc.com/news/blogs/topics/british-fruit-supplier-support-from-tesco-master-of-apples/ 14 Sep 2016.*

[18] *Dairy Crest Group plc Strategic report 2017 (for the year ended 31 March 2017) (accessed on 19/6/2017) http://www.dairycrest.co.uk/~/media/Files/D/Dairy-Crest-Group/documents/annual-report-2017-strategic-report.pdf*

> "… lambs stay together as a group but their diet is based entirely on grass and forage. If grass is in short supply because of bad weather, they are fed other natural supplementary feeds to ensure the nutritional needs of the animal are met" (Sainsbury's website).[19]

Other parts of the value chain also bear the brunt of a changing climate:

> "Wet autumn conditions lowered wheat plantings to 70% of normal levels, reducing the demand for fertiliser and crop protection products although volumes are expected to pick up as spring planting resumes" (ABF website).[20]

Weather changes also have demand-side implications. UK summers are expected to be warmer and leading to changing consumer patterns.

> "As the warmer weather begins to emerge, Sainsbury's has seen a 58% increase in French rosé sales in the past four weeks, and is expecting bumper sales this weekend with temperatures expected to hit 23 degrees. When temperatures soar, we turn to rosé over white. A warm spell sees rosé sales up 30% in comparison to 20% for white wine" (Sainsbury's website).[21]

> "Supermarkets that stock meat and other barbecue items in anticipation of sunshine are often left with unsold food if the weather turns out rainy and cold instead. A temperature increase of 18 degrees generally triples sales of barbecue meat and increases demand for lettuce by 50 percent, Tesco said" (Werdigier, 2009).

Variations in consumer purchases due to the weather can, however, result in volatile sales which companies need to manage.

> "In 2007, the company bought an option to offset the risk that December would be warmer than expected. After seeing sales of jackets in December 2006 tumble by 30% because of unexpected warm weather in the Northeast, the company decided to buy a contract for the following winter to cover up to $10 million in potential losses if temperatures in December 2007 were warmer than normal" (Morrison, 2009).

Logistical challenges are also documented:

> "…. We rely on the ability of our employees to be able to get to their place of work …. This leaves us exposed to traffic congestion, road works, congestion chares and

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[19] *Extract from: ANIMAL HEALTH & WELFARE REPORT (ACCESSED ON 06/8/2017) https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/pdf-downloads/animal-health-and-welfare.pdf published in July 2017*

[20] *INTERIM REPORT 2013 (UNTIL 02 MARCH 2013) (ACCESSED ON 26/5/2017) http://www.abf.co.uk/documents/pdfs/news/abf_interim_2013.pdf*

[21] *2017 IS LOOKING ROSÉ AS BRITS' TASTES CHANGE (ACCESSED ON 23/7/2017) 07 April 2017 https://www.about.sainsburys.co.uk/news/latest-news/2017/07-04-2017*

> inclement weather, particularly snow, all of which could at times render deliveries difficult or even impossible" (Ocado Group plc website).[22]

Dealing with its "principal risks and uncertainties" ABF Ltd list physical damage to operations and assets, availability and cost of agricultural raw materials, higher operating charges and the "negative impact on the environment and the communities which depend on land used by our operations" as key risks arising from climate change. Ocado has a similar message:

> "We are vulnerable to fluctuations in the availability and price of food items. General economic conditions, unanticipated demand, problems in production or distribution, natural disasters, adverse weather conditions during the growing and harvesting seasons" (Ocado Group plc website).[23]

Weather risk and non-food products

In addition to selling food, many of the retailers under review also sell non-food products. We found substantial disclosures relating to weather risks and their impacts on the latter. For example, Sainsbury and ABF warn:

> "The Sainsbury's Group's and the Home Retail Group's businesses are subject to seasonal peaks, with higher sales and operating profits generated during certain peak trading periods. Weak sales during such peak trading periods, or as a result of extreme or unseasonal weather conditions, could adversely impact the Sainsbury's Group and the Home Retail Group, as applicable, and, following completion of the Acquisition, the Combined Group" (Sainsbury's website).[24]

> "Unseasonable weather and cautious consumer sentiment led to value declines in the clothing retail sector in some of our important markets, particularly the UK and Germany" (ABF website).[25]

Similarly, Primark's trading update stated,

> "Following a strong performance at the start of the financial year, trading was weaker in the weeks leading up to and over Christmas, as a result of unseasonably

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[22] *OFFERING MEMORANDUM (ACCESSED ON 9/7/2017) http://www.ocadogroup.com/~/media/files/o/ocado-group/financing-2017-disclaimer/offering-memorandum-382265.pdf*

[23] *OFFERING MEMORANDUM (ACCESSED ON 9/7/2017) http://www.ocadogroup.com/~/media/files/o/ocado-group/financing-2017-disclaimer/offering-memorandum-382265.pdf*

[24] *Extract from: HRG ACQUISITION- PROSPECTUS DATED 5 JULY 2016 (ACCESSED ON 23/7/2017) https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/investors/prospectus-5-july-2016.pdf*

1. [25] *ANNUAL REPORTS AND ACCOUNTS 2016 (FOR THE YEAR ENDED 17 SEPTEMBER 2016) (ACCESSED ON 19/5/2017)http://www.abf.co.uk/documents/pdfs/ar_cr_2016/2016_annual_report.pdf*

> warm weather across northern Europe, resulting in like-for-like sales for the first half that were less than 1% below last year" (ABF website).[26]

Climate change effects are not limited to the production and supply and food. The implications are broader. Erratic weather is influences consumer confidence and behaviour in addition to the availability of food and non-food items. This means that diversified retailers, which appear would otherwise enjoy a type of natural hedger, remain exposed to the underlying financial and economic risks associated with climate change.

Acknowledgement of financial materiality of weather risk

Given the pervasive impact of climate change on retailers' business models, we found several instances where weather risks were disclosed, not just in terms of products, customers or operations, but also as direct and material financial concerns. For example:

> "We are disappointed that our Grocery business reported materially lower sales in the quarter due to warmer weather; particularly in September" (Premier Foods website).[27]

> "The Sainsbury's Group's and Home Retail Group's sales are also sensitive to periods of extreme weather conditions. The Sainsbury's Group and the Home Retail Group may see a reduction of sales during periods of inclement weather due to reduced customer footfall. The number of customers visiting the Sainsbury's Group's or the home Retails Group's stores may also decline during periods of extreme weather conditions affecting the relevant local catchment area. Extreme weather conditions may also result in orders placed online being unable to be delivered. Prolonged unseasonal weather conditions, and/or temporary severe weather during the Sainsbury's Group's and the home Retail Group's peak trading periods could have a material adverse effect on the Sainsbury's Group's, the Home Retail Group's and, following completion of the Acquisition, the Combined Group's businesses, results of operations, financial condition or prospects" (Sainsbury's website).[28]

For some of the companies under review, climate change may be so material that it is being grouped with other high consequence risks:

> "the occurrence of one or more natural disasters, such as floods, pandemic outbreaks, weather conditions, such as major or extended winter storms, terrorist acts or disruptive global political events, in the UK or in countries in which the Sainsbury's Group's or the Home Retail Group's suppliers are located, or other disruptions, could materially and adversely affect the Sainsbury's Group's the Home Retail Group's and, following completion of the Acquisition, the Combined

2. [26] *INTERIM RESULTS ANNOUNCEMENT 24 WEEKS ENDED 27 FEBRUARY 2016 (ACCESSED ON 28/5/2017) http://www.abf.co.uk/documents/pdfs/2016/abf-interim-results-announcement-2016.pdf*

[27] *TRADING UPDATE FOR THE 13 WEEKS ENDED 1 OCTOBER 2016 (ACCESSED ON 9/7/2017) http://www.premierfoods.co.uk/media/news-releases/Items/%E2%80%8BTrading-update-for-the-13-weeks-ended-1-October-2*

[28] *Extract from: HRG ACQUISITION- PROSPECTUS DATED 5 JULY 2016 (ACCESSED ON 23/7/2017) https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/investors/prospectus-5-july-2016.pdf*

> Group's businesses, results of operations, financial condition or prospects" (Sainsbury's website).[29]

Weather risk in food retailers' international food supply chain

The main focus of this paper is on the 'not so great' British weather and the extent to which its increasing variability arising from climate change is being reported by UK food retailers. However, we also found substantial disclosures by the same companies dealing with climate change-induced weather risks for their supply chain. For example, Tesco deals with extreme weather and the impact on Spanish suppliers:

> "This winter, the rains in Spain were quite a pain, as they caused floods that destroyed many of the crops. It was the worst weather to hit production in over 30 years. This unprecedented weather led to price rises and shortages with some products such as courgettes, peppers and leafy salads. In some cases over 40% of the crop was lost" (Tesco plc website).[30]

ABF discussed the consequences of unpredictable weather on sugar supplied from Illovo, Africa's largest sugar producer with agricultural and production facilities spanning six countries:

> "Illovo made good progress following last year's weather-related crop shortfalls and, with further recovery expected in the new season, sugar production in this financial year is expected to improve to 1.7 million tonnes compared with 1.4 million tonnes produced in the comparable months last year" (ABF plc website).[31]

> "In 2016, we abstracted 800 million m^3 of water, a decrease of 14% compared with 2015. In the main, this is due to Illovo's reduction in water abstracted for agricultural use because of the extreme dry weather in many parts of southern Africa. There was inadequate water in the rivers and other water sources to fulfil irrigation requirements" (ABF plc website).[32]

Similar problems were experienced among Chinese amd European suppliers,

> "Our two beet factories in north China at Zhangbei and Qianqi, are operating well and will process a record beet crop. Adverse weather conditions experienced during beet harvesting and storage have adversely impacted sugar levels in the beet but, with the higher volumes and improved prices, this business is expected to deliver a much improved profit this year" (ABF plc website).[33]

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[29] *Extract from: HRG ACQUISITION- PROSPECTUS DATED 5 JULY 2016 (ACCESSED ON 23/7/2017) https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/investors/prospectus-5-july-2016.pdf*

[30] *LETTUCE TELL YOU THE NEWS: BEST OF BRITISH BACK IN BASKETS (ACCESSED ON 23/7/2017) https://www.tescoplc.com/news/blogs/topics/british-lettuce-tesco/*

[31] *INTERIM RESULTS ANNOUNCEMENT (24 WEEKS ENDED 4 MARCH 2017) (ACCESSED ON 26/5/2016) http://www.abf.co.uk/documents/pdfs/2017/interim_results_2017_announcment.pdf*

[32] *ANNUAL REPORTS AND ACCOUNTS 2016 (FOR THE YEAR ENDED 17 SEPTEMBER 2016) (ACCESSED ON 19/5/2017) http://www.abf.co.uk/documents/pdfs/ar_cr_2016/2016_annual_report.pdf*

[33] *PRE CLOSE PERIOD TRADING UPDATE (27 FEBRUARY 2017) (ACCESSED ON 19/5/2017) http://otp.investis.com/clients/uk/associated_british_foods/rns/regulatory-story.aspx?cid=1464&newsid=847977*

> "In Spain, the northern campaign was delayed to maximise beet development from the reduced area under cultivation in the 2013 crop year. Although the campaign commenced well, adverse weather towards the end of the period resulted in challenging harvest conditions and an interrupted campaign at our La Beneza factory" (ABF website).[34]

Climate change is a global problem and not specific to a single organisation Unfortunately, environmental accounting takes place as part of act of providing an economic account of a firm's performance and is included as part of a sustainability or integrated report which is constrained by the boundaries of financial reporting conventions on the "reporting entity". (see Cuckston, 2017; 2018). The above disclosures go some way to address this by showing how an organisation's business risk has geographic context. This is, however, a far cry from a consolidated ecological account of the risks posed by climate change in both anthropocentric and deep ecological terms.

Investor-company dialogue on weather risk

There were numerous mentions of weather-related risk in investor-company dialogue at quarter trading statement meetings. The content of these discussions resemble findings from earlier private climate change disclosure reach and illustrate how investors are engaging directly with companies as part of a process of gaining a shared understanding of the dangers posed by changing weather conditions (Solomon et al., 2011). Consider, for example, the following two explanation where the weather is used to explain sales trends in different parts of the business to investors:

> "It was an awkward summer in terms of some aspects of the seasonal business because it was a little bit wetter and colder in the first part and a bit warmer and drier in the second part. That has probably been helpful to the Convenience business. So where there is a delta to the supermarket business, it is probably driven as much by the weather in August and the early part of September as anything else…The convenience business in particular is quite affected by weather, particularly in the big towns and, as I have already observed, it was probably not the most helpful summer for the grocery industry, but that would be particularly the case for the convenience stores. So I did see a slowdown in our convenience business, but still a great engine for growth" (Sainsbury's website).[35]

> "General merchandise has been slower than we have been used to and that is largely a reflection of a couple of things. Firstly, the weather was particularly unseasonal, or unseasonable over the summer. So the seasonal categories were not particularly buoyant in the year or in the first half" (Sainsbury's website).[36]

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[34] *Associated British Foods plc announces its interim results for the 24 weeks ended 1 March 2014 (accessed on 26/5/2017) http://www.abf.co.uk/documents/pdfs/2014/interim_results_announcement_final.pdf*

[35] *First Quarter Trading Statement Tuesday 4 th July 2017 (transcript) (accessed on 6/8/2017) https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/reports-and-presentations/2017/transcript-j-sainsbury-first-quarter-trading-statement-4-july-2017.pdf*

[36] *Interim Results 2015 Analysts Wednesday 11 November 2015 (transcript) (accessed on 6/8/2017) https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/reports-and-presentations/2015/transcript-j-sainsbury-interimresults-analysts-11-november-2015-v1.pdf*

There is a type of systematic dialogue taking place where the company is providing a detailed and neutral account of information to investors in order to explain sales trends and firm performance. The language is informal and the tone is neutral. Particularly interesting is the seamless incorporation of the weather as part of a standard business discourse used to inform investors. Consider also the following exchange between an institutional investor and Sainsbury:

> Question: "And we had adverse weather this year in the UK during Q1, so to what extent did that impact your non-food sales this quarter?" (Edouard Aubin, Morgan Stanley)
>
> Response: "It sounds a bit like you're making excuses when you start talking about the weather, but we had already had the warmest week of the year this time last year. So there were certainly some seasonal weather effects in the quarter ….. so there's a few underlying factors in the numbers at which are probably on balance unhelpful but, as I say, blaming the weather **is the last refuge of scoundrel** so we won't do that this time!" (Mike Coupe, Sainsbury's website).[37]

The exchange points to the retailer's desire to please and reassure its investors, as found by the earlier research on private reporting and engagement between companies, shareholders and analysts (Atkins et al., 2015b). At the same time, we see that the weather is not being used as a convenient excuse for poor performance. This view is reaffirmed when, in a different engagement, the same company representative downplays the impact of the weather on financial returns:

> "on weather, you wouldn't be surprised to know that year-on-year there aren't that many different sunshine days and warm weather days. It just happened that they came a little bit later this year and caused a bit of a furore because of the timing. Actually it happened last year in May. So I would not call a lot of significance to the weather year-on-year, it is not that significant especially when you stretch it over a 16 week quarter that began at the back end of March. So don't get too carried away about that" (Sainsbury's website).[38]

Weather risk mitigation strategies and innovations

Given the material risks posed by climate change and increased attention accorded to it by the investor community, it comes as no surprise that companies are disclosing information on their strategies for mitigating weather-related risks. For example:

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[37] *First Quarter Trading Statement Wednesday 10th June 2015, 08:30 BST (transcript) (accessed on 6/8/2017)https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/reports-and-presentations/2015/q1-transcript-final.pdf*

[38] *First Quarter Trading Statement Tuesday 4 th July 2017 (transcript) (accessed on 6/8/2017) https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/reports-and-presentations/2017/transcript-j-sainsbury-first-quarter-trading-statement-4-july-2017.pdf*

> "Sainsbury's will boost support for hundreds of thousands of farmers and workers – helping them to become more resilient in the face of escalating challenges from climate change to global competition, health and geo-political tensions. The plan includes the roll-out of new Sainsbury's Sustainability Standards across key crops and ingredients, the pilot of a new sustainable sourcing approach for tea farmers and the set-up of an expert advisory board" (Sainsbury's website).[39]

Sainsbury could be criticised for departing from generally accepted Fair Trade conventions by introducing its own standards which may be biased or difficult for smaller farmers to implement. One could also argue that the plan is an under-developed and reactionary response to climate change. Nevertheless, the disclosures are detailed are suggest that this is more than just symbolic reporting aimed at reassuring stakeholders while avoiding substantive action (cf Borghei et al., 2016):

> "The Sainsbury's Sustainability Standards, which build on and recognise existing certifications… have been piloted on prawns in Thailand and Belize and will now be piloted on other key crops such as tea, wheat, potatoes, sugar and bananas. One of their imminent applications is with tea farmers in Africa as part of a pilot on key lines of Sainsbury's tea, called Sainsbury's Fairly Traded – a new way of working that will enable tea farmers in Africa to strengthen their businesses and communities as they tackle ever growing challenges, such as the impact of climate change and associated droughts, soil erosion and crop diseases" (Sainsbury's website)[40].

There are references to company partnering with different suppliers and running workshops to educate farmers on the plan's features and the suggested methods for becoming more resilient to adverse weather (see Atkins et al., 2018). In response to the possible criticism of departing from already established codes of best practice, stakeholders are reassured that Sainsbury's plan has been calibrated and references to pilot studies suggest that a carefully planned implementation strategy has been developed rather than an ad hock environmental initiative. Key performance indicators, timelines and actions taken to date are not discussed in as much detail. Nevertheless, the disclosures point to a type of emancipatory accounting where weather-related risks are being internalised and the company is, at a minimum, taking the first steps to mitigate those risks (considerGallhofer and Haslam, 2017; Maroun and Atkins, 2018; Atkins et al., 2019).

Other organisations are also working to develop and implement operating policies, codes of best practice and alternate product lines as a way of making their business models more resilient. The Farming Minister, David Heath, discusses how the introduction of a voluntary code and new milk price formula could help dairy farmers:

> "The bad weather has been a real blow to dairy farmers, but the Code is a sign of what can genuinely be achieved through collaboration and overcoming differences" (Dairy Crest website).[41]

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[39] *Sainsbury's unveils ambitious new sourcing approach to give greater support to farmers (accessed on 23/7/2017) 23 May 2017 https://www.about.sainsburys.co.uk/news/latest-news/2017/23-05-2017*

[40] *Fact Sheet: Sainsbury's Sustainability Standards. Fact Sheet: Fairly Traded Pilot, from Sainsbury's unveils ambitious new sourcing approach to give greater support to farmers (accessed on 23/7/2017) 23 May 2017 https://www.about.sainsburys.co.uk/news/latest-news/2017/23-05-2017*

[41] *Farming Minister joins Dairy Crest to launch milk price formula in Parliament (accessed on 19/6/2017) 25 Apr 2013 http://www.dairycrest.co.uk/media/latest-news/news/2013/25-04-13.aspx*

Premier Foods have introduced a product range which reduces weather-related impacts on the business,

> "… the new ready-to-use range … can be used across a wide variety of dishes, from soups to casseroles, to curries and risottos – making it less weather dependent than traditional stock" (Premier Foods website).[42]

Similarly, Morrisons have introduced a new line of misshapen vegetables. What is especially interesting is that the environmentally responsible consumer is co-opted in this risk mitigation strategy, albeit indirectly, thereby creating a market for food items which may otherwise have been left to waste.

> "To support producers we adjust our specifications when weather conditions lead to poor harvests and following customer feedback we have introduced a range of 'wonky' vegetables, such as parsnips, carrots and onions, which are cheaper in price and give customers the choice on which they want to buy" (Morrisons website).[43]

Another weather risk mitigation strategy described by ABF includes an EU-funded three-year Maragra Smallholder Sugar Cane Development Project (MSSDP) granted to Illovo in Mozambique. This project,

> "… enables smallholder farmers to increase their household food security by providing technologies that reduce vulnerability to climate shocks such as drought. The project introduced a new human-powered water pump that means smallholder farmers are less reliant on rainfall" (ABF Ltd website).[44]

ABF's *Annual Reports Announcement* (2017) outlined other mitigation strategies implemented to address the climate-induced weather-related risks such as protecting infrastructure from floods.

Despite evidence on the increasing popularity of weather derivatives, we found very few disclosures in the UK food retail and production industries where these instruments were being used to hedge risks[45]. To confirm this finding, we reviewed the news coverage on Factiva, which is a global news database of just under 33 000 premium sources[46]. We also collected 1 271 publications including "weather derivatives" (or related terms) in their key words, titles or summaries/abstracts. Approximately 35 of articles mention "weather derivatives" in the energy sector, followed by in the electricity/gas utility (30%), financial investment (14%) and insurance sector (13%). Only 2% and 0.6% of articles mention "weather derivatives" in the agriculture and the retail/wholesale sectors respectively. There are three possible reasons for this finding

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[42] *Tasty new additions to iconic Oxo range with first Ready-to-Use option and new Beef Stock Pot (accessed on 9/7/2017) http://www.premierfoods.co.uk/media/news-releases/Items/Tasty-new-additions-to-iconic-Oxo-range-with-first*

[43] *CR programme- Food waste (site no date) (accessed on 8/7/2017) https://www.morrisons-corporate.com/cr/policy/food-waste/*

[44] *Corporate Responsibility Report 2016 (accessed on 23/5/2017) http://www.abf.co.uk/documents/pdfs/ar_cr_2016/2016_corporate_responsibility_report.pdf*

[45] *We found only example where a company referred to a commodity price hedge in the financial statements.*

[46] *We review the press articles from Factiva until 07 March 2018.*

First, the lack of interest in whether derivatives may be due to the complexity of financial products (Huault and Rainelli-Weiss, 2011). The use, valuation and accounting for weather derivatives requires considerable expertise. The weather derivatives market is relatively new. Food retail and production sectors in the UK may be too conservative to roll out an extensive hedging strategy using weather derivatives. Second, weather derivatives may be too costly[47](Musshoff et al., 2011). Finally, weather derivatives can offset short-term losses but are not a substitute for structural changes required to ensure resilient business models capable of adapting to an unpredictable environment in the medium- to long-run.

Changing weather brings opportunities: Accounting for strawberries, asparagus and apricots

Bad weather is not always bad news:

> "A wet autumn in 2012 lowered wheat plantings thereby reducing demand for fertiliser and crop protection products. However, the cool spring and warm summer of 2013 provided good growing conditions for autumn planted crops and spring cereals creating a better harvest potential than was previously expected" (ABF website).[48]

Warmer winters and changes in rainfall are have a positive impact on some type of food production in the UK. Sainsbury's provides illustrations of weather-related potato, radish and apple accounting:

> "It's great news that we're able to kick start the Jersey Royal season and due to the warmer weather over the winter it's a whole week earlier than last year" (Sainsbury's website).[49]

> "The milder winter has meant that the radish have grown much faster than usual. It's a real bonus for us to be able to increase the length of the British radish season and get them to Sainsbury's customers earlier than ever before" (Sainsbury's website).[50]

> "The recent hot weather is having a positive effect on the English apple crop, leading UK supermarket Sainsbury's has revealed, with the first apples of the season coming in 5% bigger than usual" (Sainsbury's website).[51]

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[47] *Basis risk is an important concern in the hedging effectiveness of weather derivatives, in which the value of derivatives might not move in line with that of the underlying exposure. For example, a farm may face the geographical basis risk if there is the difference between the site of production and the reference weather station.*

[48] *ANNUAL RESULTS ANNOUNCEMENT YEAR ENDED 14 SEPTEMBER 2013 (ACCESSED ON 30/5/2017) http://www.abf.co.uk/documents/pdfs/2013/annual-results-announcement.pdf*

[49] *SAINSBURY'S IS THE FIRST MAJOR RETAILER TO STOCK JERSEY ROYALS IN 2017 (ACCESSED ON 23/7/2017) 08 March 2017 https://www.about.sainsburys.co.uk/news/latest-news/2017/08-03-2017*

[50] *SAINSBURY'S CUSTOMERS GET FIRST BITE OF UK RADISH HARVEST (ACCESSED ON 23/7/2017) 12 April 2017 https://www.about.sainsburys.co.uk/news/latest-news/2017/12-04-2017*

[51] *SUNSHINE IS THE CORE INGREDIENT IN OUR FIRST APPLES OF THE SEASON (ACCESSED ON 25/7/2017) 06 September 2016 https://www.about.sainsburys.co.uk/news/latest-news/2016/06-09-2016-a*

The agricultural sector has been developing plant hybrids which are more weather-resistant as a strategy for mitigating climate risks. Their research and development is starting to bear fruit as highlighted by Tesco which has invested heavily in cultivating new species of Apricots:

> "Apricots flourish in continental climates with cold winters, but without spring frosts. So traditionally they have grown in countries like Spain, France, Morocco, Turkey and Iran. Tesco were the first UK retailer to start selling English grown apricots and started working on a production partnership with one of the UK's largest stone fruit producers from Kent back in 2010…. In the last year UK demand for apricots has rocketed by an unprecedented 75 per cent, making it one of Britain's most in demand fruits. Apricot trees still need a lot of sunshine and as a result all the production at the moment is in the southern counties, with growers based either in Kent of the Isle of Wight. Until the late nineties English apricot production was not thought possible because of our cooler temperatures" (Tesco website).[52]

There are examples of "asparagus" and "strawberry accounting' which explain how UK farmers are benefitting from warmer and sunnier weather,

> "The recent sunshine has brought the harvest forward this year, meaning that remarkably, customers will be able to enjoy British asparagus in March … Tesco Produce Buying Manager David Daniels said: 'This is a brilliant opportunity for customers who love English asparagus, to enjoy it unusually early in the year. Thanks to the mild weather of late, our grower in Suffolk has been able to produce enough asparagus to supply stores across the UK, which is really quite a feat." (Tesco website).[53]

> "The sunshine experienced across the UK has meant that our British strawberry crop has come on in bigger volumes than forecast. Growers from Herefordshire, Kent, Lancashire and Scotland have told us about a small crop flush brought on by the bonus British sunshine" (Tesco website).[54]

Other crops, such as lettuce and cauliflower are also thriving due to the change in the UK's weather. Similarly, while climate change is adversely affecting some crop yields or livestock rearing, it simultaneously benefits farmers due to a price effect:

> "The wet winter in the UK, particularly in the west country, adversely impacted livestock farming but excellent forage growing conditions during a dry spring and

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[52] *Great news for apricot fans as first British fruit of the year hits Tesco stores (ACCESSED ON 23/7/2017) https://www.tescoplc.com/news/news-releases/2017/british-apricots/*

[53] *Highly prized English asparagus to go on sale at Tesco - almost a month early (ACCESSED ON 23/7/2017) https://www.tescoplc.com/news/news-releases/2017/english-asparagus-goes-on-sale/*

[54] *Bumper British strawberries crop taken to help our farmers (accessed on 10/8/2017) https://www.tescoplc.com/news/blogs/topics/food-waste-bumper-british-strawberry-crop/ 15 Jun 2017*

summer, as well as a softening commodity market, led to a period of more stable prices and increased confidence among farmers" (ABF website).[55]

Similarly, a heat wave which can devastate crops can have an unexpected benefit for a diversified retailer:

> "Our top five selling lines across the whole of Argos last week comprised of two fans, two paddling pools and play sand, with over 165,000 units of paddling pools and fans sold. Fans: This has been one of our busiest weeks ever for fans – yesterday we sold 92,000 units alone" (Sainsbury's website).[56]

The changing weather can also be good news for NGOs or charities working with the homeless:

> "There are times when unfortunately food surplus is unavoidable for a host of reasons such as unpredictable weather. In these instances, donating this surplus food to charity is our absolute priority, and we have been working hard to ensure we are continually increasing the number of local food charities we work with" (Sainsbury's website). [57]

The disclosure can be seen as a type of philanthropic accounting in the sense that Sainsbury is explaining how the losses resulting from adverse weather conditions are being partially "recouped" as part of their commitment to corporate social responsibility. This can be dismissed as a type of impression management rather than genuine altruism (see, for example, Brown et al., 2006; Zadek et al, 2015). The monetary values are, however, relatively low and the disclosure suggests that the organisation is more concerned with explaining how it is managing efficiency and cost implications associated with adverse weather than trying to win stakeholder support with a superficial marketing campaign.

6. Concluding discussion

Our analysis provides interesting insights into how UK food retailers understand, internalise and react to the not-so-great British weather. Disclosures in their annual, integrated and sustainability reports and on company webpages points a discourse of risk awareness which recognises the need to manage risk and, at the same time, expresses anxiety about the magnitude of the threat posed by climate change.

There is a sense that companies appreciate the operational and financial implications of the every erratic weather and that this environmental issue is not being seen as just a side effect of doing business. The weather is being incorporated as part of a broader business discourse on strategy development, operating resilience and risk mitigation. As part of this process, specific

3. [55] *Annual Results Announcement for the Year ended 13 September 2014 (accessed on 28/5/2017)*
http://www.abf.co.uk/documents/pdfs/2014/annual_results_announcement.pdf

[56] *Argos customers are cooling down and making the most of the heatwave in the garden (accessed on 23/7/2017)*
https://www.about.sainsburys.co.uk/news/latest-news/2017/20-06-17-argos-weather
20 June 2017

[57] *Sainsbury's food surplus and food waste: How we are delivering a positive impact (accessed on 23/7/2017) Released: 19 September 2016*
https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/documents/reports-and-presentations/2016/sainsburys-food-surplus-and-food-waste-figures-15-16-report.pdf

initiatives being taken to reduce the impact which climate change is having on each organisation are discussed, albeit to different extents. Examples include building weather-resistant infrastructure, launching new products and, where applicable, identifying and capitalising on opportunities presented by the ever changing weather.

Contrary to international research findings, UK retailers are not using weather derivatives as part of a strategy for hedging environmental risks. The complexity and cost of this risk management model is a possible reason for this. An alternate explanation is that UK firms are taking a longer-term and more structural approach to managing weather-related risks. Hedging is effective for offsetting short-term losses. Re-engineering business models and changing operating practices are more appropriate for ensuring resilience in the long-term.

In our opinion, the approach to risk management points to more than just symbolic reporting or impression management. Important details – such as cost estimates, implementation challenges and actions taken to date – are limited but efforts to formulate and act on specific plans points to a more emancipatory form of accounting based on action and proactive risk reduction. In support of this view are examples of companies forming partnerships with suppliers to tackle the effects of changing weather; active dialogue on the business impact of climate with investors and an awareness of the broad geographical context of weather-related risks. Perhaps most important is the realisation that the weather cannot be seen as just a part of the "non-financial reporting" model. It is being internalised as a material business risk with operating, financial and reputational implications.

The risk discourse is strongly grounded in anthropocentric terms. This is to be expected given the capitalist context in which the UK retailers operate and the fact that annual, integrated and sustainability reports, while dealing with the information needs of stakeholders, are often targeted primarily at shareholders. This is not, in itself, a limitation. As explained by Gallhofer and Haslam (2017), accounting does not need to be radical to be emancipatory and it is possible to construct a comprehensive and shared understanding of environmental risk without having to dispense entirely with Capitalist constructs. A deep ecological perspective cannot, however, be overlooked.

In articulating the meaning and relevance of the weather, some retailers made subtle references to the "not-so-great British weather" as a defining feature of national and cultural identity. This type of reporting can play an important role in enabling accounting's reflexive potential and ability to promote change. As illustrated by the prior research on aesthetic accounting, narratives, poems and pictures concerning nature can help to construct an "archive" or "diary" which both preserves and reminds readers about what needs to be protected. The works by the 17th and 18th century writers such as White (XXX) Josselin (1649) and Evelyn (1685) are excellent examples (see Taylor, 2009). We are not proposing that companies become nature diarists but some narrative or pictorial information in the deep ecological tradition can provide context, allow stakeholders to understand risks more clearly and make vivid what we stand to loose if climate change is not halted.

Our findings make an important contribution to the environmental accounting research. They offer additional empirical evidence on a widening of accounting; how this can be used to construct new perspectives on environmental risk and how these can be managed. This is done in an original setting. There are no prior examples of weather accounting and how this meshes with a risk society logic. We execute the research in an interpretive (and normative) tradition where the aim is to explore and to inform rather than to test empirically. To this end, we offer the following recommendations:

First, weather accounting by UK companies is aligned with an emancipatory accounting framework but has a long way to go. As found by the earlier research on sustainability and integrated reporting, disclosures can be too generic and stop short of explaining exactly how companies are changing their strategies and business processes (see McNally et al., 2017; Van Zijl et al., 2017). An emancipatory weather account gives a clear explanation of the risks faced (in anthropocentric and deep ecological terms), how the company plans to mitigate each risk and the resources required. Action plans should be laid out; implementation challenges must be discussed and reviews of progress against set targets are essential for proactive and transparent management and reporting (see Atkins et al., 2018; Maroun and Atkins, 2018).

Second, the boundaries of weather accounting need to be expanded. The prior research is usually content to deal with environmental management and reporting at the level of the firm. Climate change is a global problem which impacts every part of society. While reporting by individual firms is an important start, what is needed is an ecological-level account which contextualises the problem at the macro-level, outlines the steps taken by different stakeholders and explains which risks are not being addressed (see Cuckston, 2017; 2018).

Finally, academics and standard-setters need to focus on developing practical guidance for how companies can identify, assess and report on risks associated with social and environmental issues. Mainstream accounting research is preoccupied with examining capital market effects and much of the prior interpretive research focuses on theoretical development. There is little in the academic (and professional) literature which explains *how* to construct an emancipatory account. Possible areas for future research include experimenting with alternate formats for presenting information about the weather (see Sullivan and Hannis, 2017); outlining a conceptual model which can be used to organise an anthropocentric and deep ecological perspective on weather-related risks (see Atkins and Atkins, 2019) and developing a framework for how to identify these risks, partner with stakeholders and implement actions plans for effectively (see Atkins et al. 2018).

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Table 1
Agricultural mitigation strategies and techniques for dealing with climate change-induced weather risk

To deal with drought:	Greater use of water conservation techniques	Irrigation management	Greater drought resistant crop use	Changing planting/harvest dates	Reduced tillage adoption
To deal with flooding:	Greater use of flood tolerant crops	Increase range of equipment	Adoption of soil conservation techniques (increased use of 'cover' crops)	Adoption of crop rotation	Changes in timing and quantities of fertiliser usage
To deal with high temperatures:	Crop varieties with longer duration	Sequential planting	Earlier sowing and later harvesting	Integrated pest management	Greater use of heat tolerant crops
To deal with low temperatures:	Shifts to crop varieties with different flowering and maturity dates				
To deal with changes in the length of growing seasons:	Adjusting planting and harvesting dates	Extend geographical range of suitable production areas	Integrated weed management		

Adapted from Rial-Lovera et al. (2016)

Table 2
Companies included in the analysis

ABF ASSOCIATED BRITISH FOODS PLC	Food producers	FTSE 100
CARR CARR'S GROUP PLC	Food producers	FTSE All-Share
CWK CRANSWICK PLC	Food producers	FTSE 250
DCG DAIRY CREST GROUP PLC	Food producers	FTSE 250
DVO DEVRO PLC	Food producers	FTSE All-Share
GNC GREENCORE GROUP PLC	Food producers	FTSE 250
PFD PREMIER FOODS PLC	Food producers	FTSE All-Share
TATE TATE & LYLE PLC	Food producers	FTSE 250
BOK BOOKER GROUP PLC	Food and drug retailers	FTSE 250
GRG GREGGS PLC	Food and drug retailers	FTSE 250
CLS MCCOLL'S RETAIL GROUP PLC	Food and drug retailers	FTSE All-Share
MRW MORRISON (WM) SUPERMARKETS PLC	Food and drug retailers	FTSE 100
OCDO OCADO GROUP PLC	Food and drug retailers	FTSE 250
SBRY SAINSBURY (J) PLC	Food and drug retailers	FTSE 100
TSCO TESCO PLC	Food and drug retailers	FTSE 100