

**Long-term earth system governance:
A role for the social institution of insurance in greenhouse mitigation?**

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Abstract:

This paper explores the potential for the global insurance industry to participate powerfully and constructively in long-term socio-ecological governance, specifically towards significant reductions in greenhouse gas emissions. Climate change presents a formidable public policy challenge and one to which sections of the insurance industry have been responsive. The industry can be expected to play a further constructive role for three reasons: (i) the industry has core capacities in risk management and loss prevention; (ii) the industry is the world's largest with annual income in the order of US\$4 trillion derived from premiums and US\$1 trillion derived from investments; and (iii) anthropogenic climate change is constricting limits to insurability, with implications for the ongoing functioning of the insurance sector and human socio-economic systems more broadly.

Insurance understood as a social institution is a crucial component of contemporary human governance systems. Further, the insurance function – the transfer of risk from party to another – has historically played a major facilitative and regulative role in economic and social development. Governments historically and currently explicitly harness the potential of insurance in support of governance. One enduring example on grand scale is the creation of the modern welfare state. The insurance industry itself also contributes to governance through loss prevention research and lobbying for implementation of safety standards. Yet environmentalists' hopes since the mid-nineties for the insurance sector to participate in governance of climate change response have not been met. We review scholarly, industry and activist literature and find that there is scope for insurance industry engagement towards significantly reducing global greenhouse gas emissions. First, insurance is comprehensively and intimately embedded in the carbon economy, and thus ideally located to effect change. Second, governments use insurance in support of policy objectives in other contexts. Third insurers themselves initiate loss reduction measures. Fourth, the scientific, political and socio-economic contexts in which insurers – and societies more broadly – respond to climate change are shifting.

No insurer can hope to restore the love of a lost one or the aesthetic value of an original work of art. An insurer can only make a partial restoration of the economic loss. This is all that insurance can do today. It is all that insurance could ever do. (Pfeffer & Klock, 1974, p.4)

Insurance is a means of constructing the promise of economic security in a precarious and uncertain world. (Knights & Vurdubakis, 1993, p.734)

Can insurers extend their self-chosen historical role in addressing root causes (as founders of the first fire departments, building codes, and auto safety testing protocols) to one of preventing losses at a much larger scale, namely, the global climate? (Mills, 2005, p.1043)

Anthropogenic climate change presents a formidable public policy challenge (IPCC, 2001, 2007). The nature of the phenomenon and its impacts, combined with the socio-economic role and characteristics of the insurance industry, both historically and currently, invite questions about the capacity and potential for the industry to play a constructive role in mitigation and adaptation. These questions have been addressed to date by various researchers including Leigh et al. (1998), Paterson (2001) Albrecht & Rapport, (2002), Dlugoleki & Keykhah (2002), Mills (2005) and Crichton (2005).

In this paper we explore the proposition that insurance as a social institution is both a crucial component of the stability of contemporary socio-economic systems and a powerful mechanism for socio-economic change. We do so as a prelude to exploring the potential for using insurance, and in particular the insurance function – the transfer of financial risk from one party to another – to effect change in support of ecological ambitions: specifically, to address the challenge climate change presents to the global insurance industry and to human societies more generally. We also anticipate the need for further inquiry into the relationships between potential insurance industry responses and concepts of risk, complexity and environmental justice.

Our engagement is with insurance as a social institution and this limitation is important given that insurance invites a range of approaches. Denenberg (1963) notes that:

Kulp's fourfold classification [of] insurance... as a business, a legal institution, a technique for averaging loss, and an instrument of social planning [refers to an institution which] has taken on many faces and forms, which continue to confound simple classificatory schemes (Denenberg, 1963, p.323).¹

Insurance, whether originating with state or non-state actors constitutes an important component of contemporary governance of human societies. We begin by identifying the ways in which the insurance function, historically and currently, facilitates socio-economic change. Insurance is the world's largest industry with US\$4 trillion in yearly premium revenue and an additional US\$1 trillion in annual investment income (Mills

¹ We're yet to track down Kulp's 'fourfold classification'. We've found a threefold classification where Kulp asserts that 'Insurance may be regarded as a business, a detailed mathematical-statistical science, or a broad social device or technique' (in Kulp & Hall, 1968, p.10). The idea that there are multiple dimensions to insurance is clear.

2007, p.10).² This alone suggests strongly that insurance plays an important socio-economic role globally. Insurance is now an integral element of the globalised economy and many insurers and reinsurers are themselves global firms. Munich Re and Swiss Re for example, the two largest reinsurance firms wrote reinsurance premiums in 2005 valued at US\$25.4 billion and US\$ 23.8 billion respectively (Standard & Poor's, 2007, p.24-25).

However, it is the ways insurance has been used strategically to achieve specific public policy and practice outcomes which are of particular interest to us, for example social security and workers' compensation insurance (e.g. Denenberg, 1964a). The creation of the welfare state comprising features such as universal health care and pensions (Lengwiler, 2003) is a public policy objective on a grand scale dependent on the application of insurance. The resilience of welfare states has received attention (e.g. Blomqvist, 2004; Pierson, 1996; Vettenranta, 1986) as the trend to privatisation of public institutions, including insurance provision, has accelerated since the 1970s (Clifton et al. 2006, Walker & Walker, 2000). Nevertheless even where states have ceded greater control through discontinuing direct provision of insurance, the comparatively heavy regulation of the sector allows continued state intervention.

The insurance industry itself has also initiated socio-economic change in three ways. First, through direct action, for example by establishing and supporting the first fire brigades (Mills & Lecomte, 2006, p.33; Kline, 1964a, p.90). Second, through loss prevention research, for example by conducting and financing research into fire, building, lift and vehicle safety (Mills & Lecomte, 2006, p.33; Kline, 1964b). Third, insurers have pushed for implementation of standards and practices geared towards loss prevention by lobbying public officials and business as well as through conducting public relations campaigns (Kline, 1964b). Whilst each of these cases is not an example of direct application of the insurance function, they are examples of the insurance industry using their special social role as 'custodians of the insurance function' in support of social change.

Our engagement with the potential of insurance explicitly encompasses both the use of insurance by governments as a tool and the potential of the industry as a driver of change. Further, our interest extends to specifically include prospects for applying the insurance function.

The way we use the term 'social institution of insurance' encompasses two distinct understandings of insurance. First, a narrow and exclusive definition of insurance as a contractual financial arrangement, implying contracts between market-based insurance providers and insureds. Second, we refer to an understanding of insurance in a broader and more inclusive sense, for example as exemplified by the welfare state, where individuals' risks are socialised by virtue of citizenship. There is a degree of messiness in this area. Our view is that this is reflective of the complexity of insurance as a social

² Mills (2007, p.10) makes comparison with the dollar value of other industries, for example the world oil market, valued at US\$1.9 trillion/year at current production levels and price and world military expenditures at US\$770 billion. His source is the 2004-2005 Statistical Abstract of the United States.

institution, comprising a long history and myriad contexts, forms, participants and purposes, but with the transfer or risk a discernable feature throughout.

This paper explores the new challenge that global warming presents to the insurance industry. In view of the historical context this new challenge raises questions about the potential of the industry to respond. It addresses a gap in the literature by applying new breadth of focus to a previously considered question. There is a timeliness to this inquiry also. The Intergovernmental Panel on Climate Change's (2007) Fourth Assessment Report communicates scientific certainty about climate change impacts using language unprecedented in strength. Sir Nicholas Stern's (2006) review of the economics of climate change brought sharp focus on the economic dimensions of climate change. This was preceded by the release of Al Gore's film An Inconvenient Truth (Guggenheim, 2006) which communicated and popularised the science and policy implications of climate change. The associated Live Earth concerts in July 2007 and the awarding of the 2007 Nobel Peace Prize jointly to the Intergovernmental Panel on Climate Change and Al Gore also reflects the recent increased interest in climate change and potential mitigation and adaptation measures.

A BRIEF HISTORICAL PERSPECTIVE

The historical role of insurance in society and its current function indicates the potential for using insurance as a mechanism to foster significant reductions in greenhouse gas emissions. The transfer of risk from one party to another historically and currently has facilitated socio-economic change and development at the broadest scales of human socio-economic systems: “[s]hips do not sail and capital is not deployed abroad without adequate insurance protection” (Pfeffer & Klock, 1974, p.272). The contemporary industry has a long history: insurance has played a critical function in the development and flourishing of trade and commerce systems. Pfeffer and Klock³ (1974, p.7) trace the beginnings of insurance as far back as antiquity, to Babylon and the Code of Hammurabi,⁴ and from there on to “the Phoenicians, Rhodians, Greeks and Romans as each, in turn, became the dominant trading or commercial nation”. Pfeffer and Klock assert that insurance was necessary for increasing trade between centres across the Babylonian empire, noting that “uncertainties were a major deterrent to commercial expansion” and that “under the pressures of high risk”, insurance dimensions in the Code of Hammurabi “improved trade conditions” (Pfeffer & Klock, 1974, p.7).

³ Pfeffer & Klock's (1974) *Perspectives on Insurance* is an extremely useful source, accurately described in the Preface as ‘a multidisciplinary approach to the subject of risk and insurance. The insurance business is treated as a major social institution, with private and governmental sectors, that employs a set of techniques for risk management and makes important contributions to personal and business relationships by reducing uncertainty and anxiety.’ Through good fortune I found this book on the library shelves whilst looking for something similar and it has proved a fortuitous entry point to the literature.

⁴ Pfeffer & Klock (1974, p.5) report the *Code of Hammurabi* as ‘engraved in a block of black diorite about 2.25 metres height’, discovered at the site of the ancient city of Persepolis in 1901, ‘in fragments that were rejoined’, and generally thought to date from circa 2250 BC. Trennery (1926) provides an early and thorough investigation of the existence and development of marine insurance in the ancient world.

Pfeffer & Klock's (1974) analysis identifies the transfer of risk from one party to another as the central idea of insurance and this is common to many studies and definitions of insurance (e.g. Clark, 1999; Melone, 1964). Other historical accounts and analyses point to pooling of risk (e.g. Kulp & Hall, 1968, p.10). Yet others focus on the increasing sophistication of the use of insurance through the ages, for example through change, formalisation and standardisation of insurance contracts in the Middle Ages (e.g. Edler de Roover, 1945, p.173).

Intellectual developments that connect with the increasing sophistication of insurance are also subjects of study, for example the beginnings and development of actuarial science (e.g. Haberman, 1996). Yet Kulp (1968, p.10) argues that reliance on science is not a requirement for a definition of insurance. Lengwiler (2003) in discussing the development of actuarial science in Switzerland and Germany at the close of the 19th century goes further arguing that private insurers have traditionally been "hostile" to science and "marked by a culture in which practice and experience was everything and theoretical knowledge nothing" (Lengwiler, 2003, p137). This is an interesting proposition in the context of climate change, a phenomenon for which both expert and lay understandings are heavily mediated by science.

The establishment and rise of insurance firms also tells us something of the significance of insurance. Indeed the fact that histories of insurance have been researched and documented in substantial detail is also indicative of the influential role of insurance houses. Histories of individual firms, by virtue of their influential socio-economic roles, are also common.⁵

Other studies chart the beginnings of differing lines of insurance, for example life insurance, through key periods of their development and expansion (e.g. Clark, 1999). This perspective provides a sense of the way the adoption of insurance has moved beyond limited coverage against a limited number of risks in limited geographic areas to a phenomenon with much broader application, substantially further reach into more complex socio-economic systems, and finally the crucial socio-economic role it now has globally.

INSURANCE AND SOCIO-ECONOMIC CHANGE

Throughout the literature focussing on insurance's socio-economic role, a key theme stands out: the conduct and expansion of trade and commerce at anything other than the local scale requires availability of insurance (Pfeffer & Klock 1974; Edler de Roover, 1945; Denenberg et al., 1964, Clark, G., 1999; Westall, 1984). Supple (1984) for example argues that insurance, understood as an economic and financial mechanism, is "directly associated with the modernisation of economic and social arrangements, and, therefore,

⁵ Lloyd's for example has many, e.g. Brown, (1973). Histories of individual firms often also aspire to tell some of the more general history of insurance, even as their attention is centred on particular businesses. For example Dickson's (1960) *The Sun Insurance Office, 1710-1960: The history of two and a half centuries of British insurance*, and Supple's (1970) *The Royal Exchange Assurance: A history of British Insurance 1720-1970*, as the titles indicate, have this ambition.

with the growth of the British economy from the late eighteenth century” (Supple, 1984, p.3).

Thus the facilitative role insurance has played and continues to play in economic development is clear. Insurance provides a socialised risk management foundation within and for capitalist socio-economic organisation. Insurance does this by providing a degree of socialised limitation to financial risk, and thus a degree of financial certainty. This allows profit-seeking endeavours by individuals and organisations involving levels of financial risk that would or could not otherwise be tolerated.

Insurance is a powerful agent of socio-economic change and use of insurance can impact in a myriad of ways, not all of which are positive. Insurance can constitute a perverse financial subsidy, leading to increased financial and other losses. For example, Bagstad and others (2006) identify how insurance together with taxes and other financial incentives have encouraged building in areas that are prone to adverse weather-related events on the east coast of the US. This is reminiscent of Odum’s (1982) work in the same region of the US which drew attention to the way that coastal ecologies can be destroyed by a multitude of small decisions.

Anthropogenic climate change is a direct consequence of historical patterns of growth and development of industrialising human societies and economies since the Industrial Revolution. Insurance, by virtue of its more general role in facilitating socio-economic development throughout that period is therefore implicated in anthropogenic climate change and associated financial losses.

Beck’s (1992) central “risk society” thesis on late modernity is usefully employed towards understanding this. He argues that modern societies are now at a stage where the more significant risks populations face are reflexive: self-generated through human activities. This is distinct, Beck argues, from earlier stages and forms of modernity where the major risks faced by populations were generated by nature. Anthropogenic climate change is an interesting example: human intervention is changing global climatic systems from ‘the weather’, which is understood to be a natural phenomena and beyond human influence, into a something significantly altered by human activity at global scale.

Further, the new reflexive risks operate at previously inconceivable spatial and temporal scales. The nuclear power plant is an example used by Beck (1992): the impacts of a major accident at a nuclear power station can be anticipated to spread well beyond the plant’s fence line, and beyond the plant’s anticipated operational life. The majority of the victims may well not even be born at the time of a catastrophe’s occurrence. As a result of their high levels of risk and near limitless financial liability, individual nuclear power plants are “beyond the insurance limit” (Beck, 1992, p.88): insurers will not provide liability cover. Even as scientific and public policy debates about the risks associated with nuclear power wax and wane, the insurance industry has made it’s own determination.⁶

⁶ Nuclear states have instead created international agreements, for example the 1960 Paris Convention on Third Party Liability in the field of Nuclear Energy to regulate to some extent liability, losses and compensation (see Hayes & Smith, 1993). Such arrangements provide a

Yet insurers do continue to provide cover for oil rigs, coal mines, gas pipelines and other greenhouse gas-intensive infrastructure developments, and continue to do so even as scientific certainty around anthropogenic climate change solidifies – and estimates of current and future damages, while difficult to predict with accuracy, are considerable. Stern (2006) for example estimates that abrupt and large-scale climate change could cost 5%-10% of global GDP.

Thus insurance plays a crucial facilitative role in the contemporary creation of the reflexive risk of climate change. In the following section we focus on two leading players – governments and the insurance industry – in relation to the strategic use of insurance towards effecting socio-economic change.

STRATEGIC USE OF INSURANCE IN SUPPORT OF POLICY AND PRACTICE OBJECTIVES

The relationship between the social institution of insurance and the pursuit of specific social, economic and ecological outcomes provides the context for specific questions about the relationship between insurance and climate change. Two ways in which insurance is used to effect specific social and economic outcomes are through:

1. government using insurance in support of public policy objectives, and;
2. firms and representative industry associations effecting social change towards loss reduction.

The exploration of the above will set the scene for investigating the potential for applying insurance in support of specific ecological outcomes.

Government in the driver's seat: Insurance as a policy tool

Governments use insurance to achieve specific policy outcomes. States fill gaps in insurance markets by providing access to insurance when a public policy goal or socio-economic benefit is identified, but where risk levels are higher than the insurance market is willing to bear. One example, reprising the purpose of the earliest insurances, is insurance to facilitate export trade. Most industrialised states, and many low income countries too, maintain export credit and investment insurance agencies: public agencies which provide state-backed loans and insurance to firms in order to facilitate high risk exports and overseas investments (Phelan et al., 1999; Phelan et al., 2004; Norlen & Phelan, 2002).

The creation of welfare states is the most far reaching example of socio-economic reordering on a grand scale (Lengwiler, 2003). Typical forms of social insurance include publicly funded unemployment benefits, age pensions and universal health care. In the welfare state various forms of insurance are both legislated for and publicly funded. Contemporary western society is deeply dependent on insurance. Lengwiler (2003) describes this as the “insurance society”.

framework to allow the existence of nuclear power plants, as opposed to a source of funds to guarantee appropriate financial compensation for possible losses.

In advanced welfare states since the 1970s, governments have divested from insurance provision to greater or lesser extents as part of a broader privatisation trend. In New South Wales, Australia for example, the government insurance office was privatised during the 1990s, as were other publicly-owned financial sector institutions (Walker & Walker, 2000, p.84). This trend was matched in Europe, where “[b]y the end of the 1990s, public enterprises in the financial sector had declined dramatically in most EU countries” (Clifton et al. 2003, p.117, cited in Clifton et al. 2006, p.747). The trend extends beyond the privatisation of whole entities such as government insurance offices, banks and telecommunications providers, to the privatisation of aspects of what are key insurance-dependent elements of the welfare state, such as health (Cook, 2006). However neither the retreat from public provision of insurance nor the dismantling of the welfare state have been complete, and the continued resilience of welfare states continues to be debated (e.g. Clifton et al., 2006; Blomqvist, 2004; Niggle, 2003; Taylor-Looby, 2002; Pierson, 1996; Vettenranta, 1986).

Direct provision of insurance is not the only way that states use insurance in pursuit of public policy objectives. Governments also legislate for insurance but leave provision of the insurance to a highly regulated market. An example of market-based and state-legislated insurance is workers’ compensation insurance (e.g Kulp & Hall, 1968). Access to insurance is itself a public policy goal in its own right, and this is supported by legislation. States regulate the insurance sector heavily towards ensuring both continued access to insurance and continued viability of the sector and individual firms (Denenberg, 1964b). Pfeffer and Klock’s (1974) description of regulation of the sector in the US in the early 1970s is instructive. While the details of regulatory arrangements vary from jurisdiction to jurisdiction and over time, the general role of the state as regulator and supporter of the insurance industry is clear, and recognisable elsewhere:

It has even been suggested that the insurance industry is a public utility, in that the chartering provisions of companies are restrictive, rates are subject to regulation, licensing of agents is designed for the protection of the public, triennial audits are intended to secure performance of obligations, freedom of selection of insureds is somewhat limited, the right to cancel policies is restricted, and a public body has been appointed with the powers of a public utility commission to license corporations seeking to engage in the business and to regulate their practices in specific ways to protect the public. If the full public utility designation has not been yet earned, it is a pronounced trend (Pfeffer & Klock, 1974, p.186).

Substantial state oversight of the insurance industry reflects social recognition of the critical role insurance plays in contemporary societies and economies. Threatened and actual collapses of insurance firms are profound events and reverberate throughout financial and public administration systems, and societies more broadly.

Thus insurance is an important public policy mechanism for governments. In the next section we focus on the insurance industry and its role in social change.

Industry in the driver’s seat: the insurance industry as ‘custodians of the insurance function’ and as a change initiator

The insurance industry pursues socio-economic change in support of minimising financial losses. Three types of insurance industry activity have been identified by a

number of writers (see Dickson, 1960; Kline, 1964a; Supple, 1970; Pfeffer & Klock, 1974; Clark, 1999; Mills et al., 2005): (a) direct engagement in socio-economic systems; (b) research; and (c) lobbying.

Whilst none of these represents a direct application of the insurance function, a key interest of ours, each is an example of firms and industry associations using their roles as custodians of the insurance function to effect change. We use the phrase ‘custodians of the insurance function’ to highlight several things. First, the businesses that comprise the industry self-identify as an industry, and are represented by industry associations. Second, the term ‘custodians’ allows for the substantial diversity in the industry, across insurance lines and across size and structure of insurance providers, including, for example both mutuals and corporations. Third, as well as operationalising the insurance function, the industry generates research on insurance issues with public policy implications. Lastly, the industry is heavily regulated, and this regulation is a central component of the ongoing stability of the industry. As custodians of the insurance function, insurance firms and industry associations have a unique vantage point and capabilities that are directed to effecting social change. The industry’s vantage point is unique by virtue of its size and core capacities in financial and risk management (Mills & Lecomte, 2006).

Thus there are three areas of insurer activity directed at effecting change are worthy of consideration. First, the classic example in the literature of direct engagement by insurers in support of minimising financial losses is insurers establishing and financing the first effective fire brigades in the early eighteenth century (Dickson, 1960, pp.62-7; Supple, 1970, pp.95-8). “Fire insurance offices themselves... attempt[ed] to safeguard those houses bearing each company’s own firemark” (Clark, 1999, p.2). Benjamin Franklin is credited with forming the first independent fire fighting groups in North America, in Philadelphia (Kline, 1964a).

Second, insurers have historically been heavily involved in research aimed at loss prevention. Kline (1964a) discusses early involvement of American insurers in fire and building research before tracing insurer involvement in research focussed on industrial accidents and other areas. Mills and others (2005) also refer to insurers jointly financing research efforts, for example the Underwriters’ Laboratories in the US.⁷ Mills and others (2001) are careful to note however that the industry’s historical involvement in loss reduction has been local in focus; the industry addressing a global challenge such as climate change is unprecedented.

The third area of activity initiated by the insurance industry itself is the lobbying of politicians and other decision-makers with regard to socio-economic policy around loss prevention, as well as public relations campaigns with the same intent (Mills et al., 2005). Lobbying and public relations campaigns of this nature are related to the research efforts noted above.

⁷ The Underwriters Laboratories (UL) describes itself as ‘an independent, not-for-profit product safety certification organization that has been testing products and writing Standards for Safety for over a century. UL evaluates more than 19,000 types of products, components, materials and systems annually’ (UL, 2007).

The three areas of action intertwine and over time have resulted in the enactment of new legislation and safety standards in support of financial loss reduction, for example building construction standards (Kline, 1964a, Mills et al., 2005). Each of these examples demonstrate insurance industry initiatives in support of social change. This opens up space for consideration of the possibilities for the insurance industry – and the insurance function – being applied towards social change with ecological ambitions, specifically, significant reductions in greenhouse gas emissions.

THE INSURANCE SECTOR AS A FORCE FOR CHANGE IN GLOBAL CLIMATE POLITICS? GREEN HOPES IN THE MID-NINETIES

Climate change has moved to centre stage over recent years, and at an accelerating pace. “Climate change is a key issue for the world in the 21st century” according to the Association of British Insurers (ABI, 2005, p.3). Simultaneously the incidences of adverse weather-related events and subsequent financial losses are both increasing to unprecedented – and unpredicted – levels (Leroy, 2006; Mills et al., 2005). In 1992 Hurricane Andrew hit Florida. This caused a record US\$16b in insured damages, bankrupted several insurance firms and brought attention to the potential of extreme weather events to severely disrupt the industry (Paterson, 2005, p.21). Hurricane Katrina in late 2005 has since exceeded the bar set by Hurricane Andrew for a single catastrophic weather event with a bill of insured losses in excess of US\$40b (Insurance claims payment process in the Gulf Coast, 2007). Swiss Re identified 2005 as the costliest year ever for property insurers, as a result of:

almost 400 catastrophes, which caused damage totalling more than US\$230 billion.
About one third, or US\$83 billion, was covered by insurance. (Swiss Re, 2006b)

Of this insured amount, US\$77 billion – more than 90% – was from weather-related events (Swiss Re, 2006b).

Climate change was acknowledged as a potential phenomenon – and one with implications for risk management – by the insurance industry at least as far back as the 1970s (Munich Re, 1973). Beginning in the mid-1990s environmentalists, particularly climate change activists began looking to the global insurance industry as potential allies (e.g. Leggett, 1993). Scholarly analysts also considered this possibility (e.g. Sachs et al., 1996), as did some industry figures (e.g. Dlugolecki, 1997, 1999).

At that time environmentalists considered insurers to be likely potential allies for several reasons⁸: perceived industry exposure to climate change-related financial risk, a sense that the industry takes a long view and is more cautious than other business sectors in its approach to financial risk, and the perception that the industry would have a substantial understanding of the significance of the climate change problem given the industry’s focus on risk. Jeremy Leggett’s (1993) report titled Climate change and the insurance industry: Solidarity among the risk community? written for, and published by Greenpeace

⁸ The cover of Jeremy Leggett’s (1993) report for Greenpeace for example includes the following three questions: ‘Is human-induced climate change a real threat? How will it affect the world’s biggest industry? What can the insurance business do to safeguard its future markets?’ The

International provides a clear and concise example of the understanding and perspectives held by large environmental civil society groups at that time about the potential for insurers to be allies in global climate politics.

Of course neither the insurance industry nor the environmental movement are homogeneous. Some analysts writing from a green perspective strike an overtly partisan tone in drawing attention to the “hypocritical stance of the insurance companies investing in those very industries that underpin catastrophic climate change”, leading to financial losses those same insurers are providing coverage against (Bunyard, 2000, p.55). This connects to the related and wider literature around socially responsible investment (e.g. Bakshi, 2006; ASRIA, 2007; CDP, 2007).

Paterson (2001) argues that at the time environmentalists focussed on the scope for using the industry’s considerable investments proactively, for example by divesting from fossil fuel intensive industries and instead investing heavily in the renewable energy sector. Hunt (2001) estimates that the global insurance industry controls “some 30% of equity value” in stock markets globally (Hunt, 2001, p.ii). Dlugolecki and Keykhah (2002) argue that given the scale of the global industry’s financial holdings it is reasonable to expect that the industry might exert significant financial leverage. Acknowledgement of the opportunity presented by insurers as investors is evident in Leggett (1993, p.45-46) where the call for strong insurance industry action on climate change begins with a focus on industry investments.

However Leggett (1993, p.45-46) also points to other areas of potential action for insurers, for example encouraging technological and design changes to deliver risk reductions that also have an associated climate benefit, for example solar power for buildings offering reduced fire risk as well as reduced greenhouse gas emissions.

The third and last area for potential industry action that Leggett identifies is organising as a lobby to counter the fossil fuel lobbies at climate negotiations and other fora and processes. At the time of the 1992 United Nations Conference on Environment and Development (the Rio Summit) the concern of many environmentalists was that business had hijacked the Rio process and the wider sustainable development discourse (e.g. Hildyard, 1993). Thus the prospect of garnering support from an industry sector for real action on climate change was very attractive (Paterson, 2001).

MORE RECENT CONSIDERATION OF THE POTENTIAL OF THE INSURANCE INDUSTRY TO ACT CONSTRUCTIVELY ON CLIMATE CHANGE

More recently, new approaches have been made to explore the relationship between climate change and the global insurance industry. Paterson (2001, 2005) argues that the insurance industry has a limited commitment to a reduction in global greenhouse emissions. Paterson’s view is that rather than tackling causes of climate change, insurers are instead making use of two new approaches that allow a continuation of business as usual: that is, for insurers to remain profitable even in the face of global ecological crisis.

report can be read as a reaching out to the industry to engage with the issue of responses to anthropogenic climate change.

The first approach is to spread financial risk outside of the insurance sector and into capital markets via financial instruments such as catastrophe bonds, which makes available a new and larger pool of capital. The advantage of this for insurers is that it provides for a substantially larger capacity to assume risk. Paterson (2001) gives a clear explanation for the principles at play here and provides direction to other researcher's fuller explanations, e.g. Cabral (1999) and Tynes (2000). The academic and industry literatures chart and analyse the use of such instruments in recent years, e.g., Barriau & el Karoui (2003), Crompton (2003), Pollard et al. (2006).

The second is to make use of advances in meteorological sciences in the hope of more accurately predicting the likelihood of some extreme weather events over twelve to eighteen months ahead of time, which fits neatly with standard reinsurance periods (Paterson, 2001). A thorough analysis of this area is beyond the scope of this paper, but it's worth noting that the North American 'Hurricane season' of 2005, including Katrina, was not predicted such that insurers were able to avoid financial losses.

Paterson (2001, 2005) sounds a note of caution against a simplistic view of insurers as natural allies for environmentalists in global climate politics. Certainly his argument fits with the pattern of insurer behaviour over the period of the mid- to late-nineties. Industry investments, Leggett's (1993) first recommendation for action by the industry, are a case in point. A thorough analysis of insurance company investments patterns over the period since the early nineteen-nineties would be useful to identify any changes in the nature and extent of insurance industry investment holdings over the period. For the purposes of this paper it suffices to say that the industry overall has not engaged in wholesale divestment from fossil fuel intensive investments; nor have insurers shifted their financial bulk into renewable energy investments. "So far, environmentalist hopes have been unfulfilled", and this is consistent with the sector's "instinctively conservative outlook" (Paterson, 2005, p.21). As such Leggett's (1993) call has gone largely unanswered.

However the industry is not uniform in its perspective on many issues, including climate change (Dlugolecki, 1999; Mills, Roth & Lecomte, 2005). Some in the industry have taken up the challenge of first acknowledging, and then acting to reduce greenhouse gas emissions. Insurer's own administrative practices are an area where activity is evident. Swiss Re (2003), has committed to achieving greenhouse neutrality for its operations over a ten-year period.⁹

Leggett (1993) also pointed to the opportunity for insurers to encourage technology and design changes that result in reduced risks, and include a climate dividend. This area has received more focus in recent years, for example from Mills and others (see Mills, 2005; Mills, Roth, & Lecomte, E., 2005; Mills, & Lecomte, 2006).¹⁰

⁹ This commitment applies to Swiss Re's operations, for example emissions generated through building and operating offices and business travel, and a preference for using suppliers that make similar commitments (Swiss Re, 2008a). However it does not include reference to Swiss Re investments. As indicated elsewhere the insurance industry has substantial investments.

¹⁰ Examples from Mills & Lecomte (2006) and others include low energy interior lighting delivering reduced fire risk and reduced energy consumption and motor vehicle insurance premiums calculated in part as a function of distance travelled: the less the vehicle is on the road

Leggett's (1993) third recommendation was insurance industry lobbying in support of policy change. Insurers in recent years are beginning to demonstrate a greater commitment to networking and lobbying in support of policy change. One international example is the establishment of the UNEP Finance Initiative Insurance Working Group (IWG, 2007). In Australia, where government policy on climate change has been directed and in some cases drafted by fossil fuel lobbies (Pearse, 2007), two insurers – one domestic and one international – have joined with other major corporations and an environment group to establish the Australian Business Roundtable on Climate Change (ABRCC, 2007). In both the UK and the US industry associations are also beginning to focus on the implications of climate change for functioning insurance industries (e.g. ABI, 2005).

Swiss Re and Munich Re are the two primary examples of individual insurance houses making public comment, with each putting effort into research and advocacy on the issue over some years (Swiss Re, 2008b; Munich Re, 2007). This is reminiscent of earlier efforts by insurers on building, lift and vehicle safety (Mills & Lecomte, 2006). The past two years has seen a small flurry of insurance industry lobbying on climate change. For example, Allianz Group partnering with the World Wide Fund for Nature to produce the report *Climate Change & the Financial Sector: An Agenda for Action* (Allianz & WWF, 2005). Mills and Lecomte's (2006) report opens with a number of quotes, including the following attributed jointly to Chief Risk Officers of nineteen major insurance houses:

Climate change has the potential to develop into the greatest environmental challenge of the 21st century. The recent period of intense tropical cyclone activity most likely reflects the effects of both natural climate variability and a superimposed global warming trend due to human causes.

However there has been little in the way of action beyond what was described by one industry journalist in a piece titled "The Sky is Falling" as 'research, policy papers and official corporate stances on the matter' (Wade, 2006, p.18).

Research and analysis

Large reinsurance houses have become important sources of statistical information and analysis relating to individual catastrophes and trends, maintaining web-based resources, publishing research reports on climate change and making presentations at climate change conferences. The research and analysis area is where industry responses to climate change are most visible and perhaps most developed. Industry research focussed on climate change, losses, mitigation and adaptation is consistent with earlier industry behaviour in support of social change. The differences are in terms of: (a) scale – a global-scale risk rather than localised risk such as fire; and (b) nature of the ambitions – explicitly ecological ambitions.

Increasing numbers of research reports have been released by major reinsurance houses on climate change-related material. For example Munich Re, Swiss Re and Lloyd's in recent years have produced and made accessible research materials including statistical

the less the chance it will be involved in an accident, and the less the amount of carbon dioxide released into the atmosphere.

records and analyses.¹¹ This is of assistance to those researching the industry as well as a foundation for industry lobbying work: the Association of British Insurers (ABI, 2005) for example, representing the British industry, has also published material in this regard. Yet however impressive as this research output may be, it's a far cry from the apparent potential for action on climate change by the world's largest industry, one with core capacities in the risk and loss management area, and one with a long and rich history of active engagement in loss reduction activities.

PROSPECTS FOR MOVING BEYOND RESEARCH AND ANALYSIS AND TOWARDS APPLYING THE INSURANCE FUNCTION IN SUPPORT OF SIGNIFICANT REDUCTIONS IN GREENHOUSE GAS EMISSIONS

As climate change impacts intensify and the public debate also intensifies, as it has done very recently, questions around the capacity of the insurance industry to play a constructive role continue to be asked. Mills and others, in research commissioned by activist investor group Ceres,¹² look to ways the insurance industry itself might be encouraged to pursue actions that would have a climate benefit consistent with the industry's historical role of undertaking research and advocacy in support of minimising financial losses (Mills et al., 2005; Mills & Lecomte, 2006). The Mills and Lecomte (2006) report includes results of a survey of insurance houses globally, providing a spread of steps that insurers are taking that support reductions in climate change-related losses – and reductions in greenhouse gas emissions. Mills and Lecomte's (2006) aim is to reach out to insurers, and make – and win – the argument for insurance industry activity on this front.

Albrecht & Rapport (2002) go deeper by adopting a complexity approach (e.g. Holling, 2001; Walker et al., 2004) to propose a radical reorganisation of the insurance industry in support of a stable climate and ecological sustainability. This would involve explicit recognition of societal dependence on ecosystems services, such as clean air and water, for ecosystem health. The approach relies on the use of an upstream intervention point: compulsory insurance (like automotive third party insurance) cover globally would provide some recognition of the monetary value of ecosystems services. Premiums would be set according to an analysis of the ecological footprint of insured activities: the higher the risk of negative ecological impact, the higher the premium. Premiums would be paid into a global environmental fund, which would be available as a source for ecological remediation measures where required (Albrecht & Rapport, 2002).

The extent to which insurance firms, and the global industry generally regard climate change as a threat is important because this then drives industry motivation to be active

¹¹ See for example the websites for each.

¹² Ceres describes itself as 'a national network of investors, environmental organizations and other public interest groups working with companies and investors to address sustainability challenges such as global climate change', and its mission as 'Integrating sustainability into capital markets for the health of the planet and its people.' (Ceres, 2007a). Ceres runs a range of activities from research through to corporate reporting initiatives and activist investment, including coordinating 'the Investor Network on Climate Risk (INCR), an alliance of leading U.S. institutional investors that collectively manage over \$3.7 trillion in assets' (Ceres, 2007b).

on climate change, and the nature of any such action the industry might take. Below we begin to articulate this question and sketch two possible answers.

Climate change is both a challenge to insurer profitability and perhaps to the very existence of the industry. Scientific certainty has solidified around the reality of anthropogenic climate change. Yet great uncertainty remains: the extent, pace and nature of the change remains unclear, and this degree of risk uncertainty presents challenges to insurers. To take one example, will sea level rise over this century be measured in centimetres or in metres? The IPCC (2007) leans towards centimetres, but openly acknowledges this projection excludes evaluation of factors for which information is not complete, specifically around the fate of the Greenland and West Antarctic ice shelves, and leaves open the possibility that metres is a more appropriate scale of measurement. Others in the scientific community (e.g. Hansen, 2007) argue that over the coming decades changes in the melt of the ice sheets will be the major contributors to changes in sea level and – that on the basis of existing evidence of non-linear change – business-as-usual climate change will “yield a sea level change of the order of metres on the century timescale” (Hansen, 2007, p.4).

Changes in earth systems may be better understood as thresholds that are crossed, rather than as linear, progressive change. Increasing rates of polar ice sheet melt are just one example of non-linear change. But the science is not well enough developed to provide certain prediction – or even detection – of thresholds (Keller et al., 2007). Some thresholds have surely already been crossed; others still lie ahead. The manner in which the impacts of climate change will be distributed geographically and across economic sectors poses difficult questions for scientists. If a broader question is possible, we could ask to what extent the biosphere is moving generally into a period of greater unpredictability. With a focus on insurance, the next question is what the impact of greater unpredictability might be on societal capacity to maintain viable insurance systems, irrespective of whether providers are states or businesses.

If anthropogenic climate change represents an existential threat to the global insurance industry, rather than being limited to a threat to profitability, what are the implications for contemporary societies and their economies? Insurance plays a critical facilitative role in the growth and continuation of contemporary societies and economies. Insurance and emergency relief originating with states, business and charities also play a critical role in disaster and catastrophe responses (Leigh et al., 1998). However neither states, businesses nor charities are sources of unlimited funds, and periodic or narrowly targeted financial support of this nature is not extendable to a general provision of insurance where markets have failed on massive scale.

Sections of the highly diverse global insurance industry have, to a greater or lesser extent, demonstrated through their behaviour acknowledgement of the threat of climate change in both proactive and reactive manners. Proactive responses to increasing risk of financial loss include actions described above such as publishing research and lobbying for public policy change on this basis.

Reactive measures in response to increasing risk of financial loss include refusing to offer cover for certain risks in certain areas (e.g. hurricanes in Florida) declining to renew cover

(e.g. New Orleans post-Katrina) and imposing limits to cover (Mills & Lecomte, 2006). Such measures are perhaps reminiscent of insurers declining to offer liability cover for nuclear power plants. Whether intentionally or otherwise, such measures may potentially provide important signals from the insurance industry in support of changes to public policy on climate change and greenhouse gas emissions. Given the social importance of access to insurance, reactive responses such as these invite important questions about equity and justice.

CONSISTENCY BETWEEN THE SOCIAL INSTITUTION OF INSURANCE AND BIERMANN'S EARTH SYSTEM GOVERNANCE PRINCIPLES

Governance remains a contested concept, and critiques from various perspectives abound (see for example Jagers et al., 2005). For the purpose of this paper we limit ourselves to a brief review of Biermann's (2007) concept of earth systems governance, situated at a connection point between earth system analysis and governance theory. Biermann explicitly attempts to transcend traditional natural and social sciences boundaries, in recognition of the scale and nature of the challenge that sustainability globally presents. Biermann introduces the concept as having several dimensions, including as an (ambitious) political program, and identifies four core governance principles he argues would be necessary features of a successful earth system governance system. In this section we make some brief comments on potential consistencies and inconsistencies between these four principles and the social institution of insurance. This comparison draws on the preceding discussions of past and current strategic use of insurance by both state and non-state actors in support of explicit policy and practice goals. It is made in the light of the potential application of the insurance function towards significant cuts in global greenhouse gas emissions, the focus of this paper.

Biermann (2007, p.328) acknowledges that 'governance' is not uniformly defined, but that it typically means "new forms of regulation that differ from traditional hierarchical state activity and implies some form of self-regulation by societal, private-public cooperation in the solving of societal problems, and new forms of multilevel policy". Thus the term 'governance' allows roles in societal organisation for actors beyond governments, including for example the firms, industry associations, government providers, regulatory frameworks and socio-economic reliance on the insurance function that constitute the social institution of insurance.

Levy & Newell (2005, p.2-3) use the term 'environmental governance' to refer to:
the broad range of political, economic, and social structures and processes that shape and constrain actors' behaviour towards the environment [and] the multiple channels through which human impacts on the natural environment are ordered and regulated. It implies rule creation, institution-building, and monitoring and enforcement. But it also implies a soft infrastructure of norms, expectations, and social understandings of acceptable behaviour toward the environments, in processes that engage the participation of a broad range of stakeholders" (Levy & Newell, 2005, pp.2-3).

Biermann (2007, p.331) outlines four core principles of earth system governance. Below we list each of the four principles and make some brief passing comments about the potential for the social institution of insurance to provide support to each. Our claim is

not that insurance can on its own deliver everything Biermann (2007) calls for; rather we limit our claim to suggesting that the social institution of insurance shows some degrees of support or at least consistency with Biermann's (2007) four core principles. Our aim below is simply to note a high degree of consistency between the social institution of insurance and one useful theoretical model of earth system governance, thus supporting the argument that there is a role for the social institution of insurance in earth system governance generally, and in response to climate change in particular.

1. **Credibility** – the governance system must create credibility necessary for governments and others to believe in the reciprocity of interaction partners across varied scales of time and space.

Insurance, through either direct state provision or through familiar and intensive state regulation of non-state providers across the global industry demonstrates consistency with this principle. Insurance itself is used to provide credibility for parties engaged in commercial transactions, for example to manage risk associated with export markets and overseas investments. The viability of insurance systems is dependent on shared social belief that insurers are: (a) solvent; and (b) have the capacity to meet future claims as they arise. Substantial state oversight frameworks have been developed over long periods and are geared to those purposes.

2. **Stability** – the governance system must be stable over long time-scales, i.e. decades and centuries (rather than, for example, electoral or investment return cycles).

The social institution of insurance has a long history and currently plays a significant role in ensuring stability of contemporary socio-economic systems. Biermann (2007, p.331) notes that “effective transnational institutions and governance systems with a time-horizon of centuries are rare”, and singles out the Catholic Church as perhaps “the only transnational empirical example”. The oldest surviving firms date back to the early eighteenth century, a significant feat in the history of business, but certainly there is no single firm that rivals the Church's lifespan. However if we adopt an alternate vantage point to bring into focus governance systems as constituted of a “broad range of political, economic, and social structures and processes” (Levy & Newell, 2005, p.2), insurance as a feature of governance frameworks predates the Catholic Church by perhaps 2000 years.

3. **Adaptiveness** – participants in the governance framework must have the capacity to respond to changing situations without damaging either the credibility or the stability of the system.

Managing risk and uncertainty is core business for the insurance sector. Thus insurers have existing expertise in this area. As argued above, some of the larger reinsurance houses have become important sources of research on climate change impacts. Further, insurers have a clear and direct financial motivation for “adaptation to changed circumstances” (Biermann, 2007, p.331). The capacity to adapt is evident in the longevity of some firms. In response to climate change however, adaptiveness is not a straightforward proposition. Recall for example Paterson's (2001) argument that insurers are seeking to adapt to climate change risk by limiting their exposure, rather than tackling the creation of the risk.

4. **Inclusiveness** – the interdependence and complexity of the earth system requires that the governance system be inclusive, irrespective of participants' relative strength or weakness.

We have argued above that insurance provides a socialised risk management foundation within and for capitalist socio-economic organisation, and this suggests a degree of inclusiveness. Yet the insurance industry is not geared towards inclusiveness, in fact the reverse is true:

Security is a commodity bought like any other: and as its rate of tariff falls in proportion not with the misery of the buyer but with the magnitude of the amount he [sic] insures, insurance proves itself a new privilege for the rich and cruel irony for the poor (Proudhon, as quoted in Ewald, cited in Jagers et al., 2005, p.249).

This is the insurance function defined narrowly: as a contractual financial arrangement. Insurance in a broader sense, for example as exemplified by the welfare state, where individuals' risks are socialised by virtue of citizenship provides, perhaps offers a model of inclusiveness that is consistent with Biermann's principle. However earth system governance necessarily calls for a global-scale framework. Currently insurance cover defined both narrowly and more broadly is concentrated in populations of industrialised countries, and even then unevenly.

Needless to say Biermann's (2007) model for earth system governance does not yet exist. Nor is insurance yet being focussed strategically towards achieving climate change mitigation and adaptation. In the next section we explore the context for potential application of the insurance function in support of significant reductions in global greenhouse gas emissions and provide some conclusions and recommendations in this regard.

CONCLUSIONS AND RECOMMENDATIONS

We offer the conclusion that there is potential for applying the insurance function towards significant reductions in global greenhouse gas emissions. In other words, there is scope for the social institution of insurance to play a constructive role in a form of earth system governance which includes the aim of addressing climate change. There are several bases for this view.

First, as insurance has facilitated economic growth and development, the insurance industry – and insurance markets and coverage – are concentrated in economically developed areas of the world. This coincides with where global greenhouse gas emission levels are highest. Insurance is comprehensively and intimately embedded within the carbon economy, and it plays a critical facilitative role. The modern global economy functions on a scale that is dependent on access to insurance. Thus insurance is ideally located to effect change.

Second, the history of insurance shows that insurance has been applied by governments towards policy objectives around provision of welfare in a broad sense. Climate change presents a major challenge to social welfare and the inclusion of insurance in strategies to pre-empt socio-economic challenges has precedents.

Third, insurers themselves have initiated action toward policy objectives around loss reduction. As Mills and others (2001) identify, the industry has core capacities in risk and financial management. Mills and others are also careful to note however that loss reduction action by insurers has been localised in focus, i.e. financial loss prevention and recovery, as opposed to a focus on preventing a global-scale phenomenon.

Fourth, the scientific and political contexts for use of insurance in response to climate change continue to shift. On the one hand there is greater scientific certainty behind the phenomenon, and so in a sense it has become more real. Paterson's explanation for industry inaction on climate change since the mid-90s is compelling. However anthropogenic climate change continues to become increasingly recognised and accepted in both political and broader socio-economic contexts, perhaps allowing insurers more political space in which to act – and forcing them to do so.

Paterson (2001) describes insurers as attempting to avoid climate change. Yet it has become increasingly apparent that climate change is unavoidable. Other writers (Leggett, 1993; Dlugolecki, 1999; Crichton, 2001; Mills, 2005) focus on how insurers might proactively respond to climate change, and contribute constructively to mitigation and adaptation strategies. Our view is that several approaches should be implemented to investigate the potential for the insurance industry to play a significant role in climate change mitigation. At the base of this recommendation is the view that this area lends itself to a transdisciplinary approach (Higginbotham et al., 2001; Somerville & Rapport, 2000). As such a number of further areas for inquiry open up. First, the complexity area (e.g. Holling, 2001) may prove fruitful for exploring the relationship between earth systems and the global insurance industry as a human social system, towards considering the threat that climate change presents the insurance industry, as well as the potential for industry responses. Second, the sociology of risk area (e.g. Beck, 1992), may be useful for considering societal understandings and expectations around climate change as a threat and insurance as a key mechanism for constructing a degree of certainty in an uncertain world of our own making. Third, the threat of withdrawal, collapse or otherwise removal of insurance carries substantial equity and justice implications. It may be that an environmental justice theoretical framework (e.g. Bullard, 2001) will be useful for exploring this dimension. Lastly, an extension beyond investments, research and lobbying to an investigation of how might the insurance function be harnessed towards significant cuts in greenhouse gas emissions would build on the work outlined above. Some additional analysis from the political economy discipline (e.g. Paterson 2001) may be useful at this stage also. These all provide important areas of inquiry and pursuing them may provide fruitful insights into the role that the insurance industry may play in reducing greenhouse gas emissions. Clearly climate change is an enormous challenge. Equally the social institution of insurance has the potential to be a extremely powerful. Thus consideration of how insurance can be applied constructively to address climate change makes for an intriguing and important research focus.

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