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Market liberalisation and drought in New Zealand: a case of 'double exposure' for dryland sheep farmers?

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Abstract

Market liberalisation/globalisation and climate change are two great global political/economic challenges of our time. Researchers have noted that the coincidence of these events has resulted in 'double exposure' where the positive or negative effects can overlap creating a pattern of winners and losers, particularly in the agricultural sector. However, existing research has been focused on developing economies leaving the issue of double exposure in economically developed economies relatively under-researched. To address this gap, this paper examines three droughts that occurred in North Otago/South Canterbury (New Zealand) over the last 30 years, and focuses on how market liberalisation in 1984 influenced dryland sheep farmers' ability to cope with drought. From in-depth farmer interviews we find that neoliberalism's impact has changed as the neoliberal project has developed from a position where there were few winners (1980s), to few losers (1990s), and, currently, to increasingly sectorally based winners and losers (2000s). We relate this to the developing influence of neoliberalism and suggest how neoliberalism may be influencing the vulnerability of agriculture to future droughts. A key finding is how neoliberalism has promoted the reconfiguring of rural space around the expanding dairy industry and how this is now influencing the vulnerability of both dryland sheep and dairy farmers to future droughts. Finally, we briefly consider the implications of the findings for the 'double exposure' framework.

Keywords: neoliberalism, climate change, drought, agriculture, New Zealand

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1. Introduction – neoliberalism and climate change response'

Global politics have recently been dominated by two major themes. The first is the attempt to restructure global economies around the philosophy of "neoliberalism" – a "near-global project over the past few decades to reconfigure economic and political governance in line with many of the founding precepts of liberal theory, most notably faith in the 'self-regulating market', as the institution and guiding metaphor most likely to produce optimal social outcomes"(McCarthy, 2005: 997). The second concerns international political efforts to both adapt to and mitigate the climatic changes that are endangering the planet. Despite recent attempts to derail agreements on greenhouse gas emissions – most notably "climategate" (Salinger, 2010) – governments are pushing ahead with climate change programs as evidence for anthropogenic climate change continues to strengthen (IPCC, 2013; World Meteorological Organization, 2013). Consequently, on one hand, there are global efforts to promote a self-regulating and globalised market while, on the other, global efforts to regulate markets in order to address climatic challenges. Many maintain that these two objectives are simply incompatible (Okereke, 2006; Blandford, 2010; Fieldman, 2011).

O'Brien & Leichenko (2000) were amongst the first to consider the combined effects of neoliberalism/globalisation and climate change. The authors put forward the theory that 'double exposure' – simultaneous exposure to the negative (or positive) impacts of climate change and economic globalisation[1] – would lead to some regions, sectors, ecosystems and social groups being 'winners' and some 'losers' (also see O'Brien & Leichenko, 2003). They noted that

[1] O'Brien & Leichenko (2000: 225) see economic globalisation as "a set of processes whereby production and consumption activities shift from the local or national scale to the global scale" as manifest through, for example, rising levels of international trade, foreign investment, falling political barriers to trade, integration of financial markets and integration of production activities across international borders.

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> "Winners are considered those countries, regions or social groups that are likely to benefit from the ongoing processes of climate change or globalisation, while losers are those that are disadvantaged by the processes and likely to experience negative consequences." (O'Brien & Leichenko, 2000: 222).

Leichenko et al. (2010) observe that the double exposure framework provides a basis for investigating interactions between environmental change and globalisation. A critical advantage of this vulnerability framework, they argue, is that it recognises the highly dynamic nature of the interactions between environmental and economic change – rather than simply viewing the economic environment (predominantly globalisation) as a context within which adaptation occurs. Thus Leichenko et al. (2010: 966) argue that double exposure "results in measurable outcomes, which might, in turn, affect the processes as well as the context in which future changes are experienced" with the outcomes depending on the extent of the exposure and the actions taken by affected individuals or other actors. The exposure framework, they contend, could focus on a spatial, political or ecological region; an economic sector; or a network of institutions.

In the 'double exposure' framework, O'Brien & Leichenko (2000) refer to 'economic globalisation' with market liberalization and 'free trade' seen as the main economic manifestations of globalisation. However, while there are a variety of different perspectives, this interpretation of globalisation and neoliberalism underplays the interconnected nature of the two. For example, Peck et al. (2010) suggest that 'neoliberalism' refers to the ideological and political constructions accompanying globalisation, while Kotz (2002) observes that neoliberalism did not cause globalisation (as globalisation existed prior to neoliberalism) but played an important role in accelerating the globalisation process. That they are increasingly recognised as two sides of the same phenomena can also be seen in the growing use of the term 'neoliberal globalisation' to refer to the current globalisation process (Barton & Murray, 2009; Hopewell, 2013). Consequently, while O'Brien & Leichenko (2000) focused on globalisation as the driver of 'double exposure' we consider it useful to apply the notion of

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'double exposure' to both globalisation itself and its current inseparable ideological and political partner, neoliberalism.

Since O'Brien & Leichenko (2000), many studies of parallel or overlapping effects have been conducted. These have tended to focus on vulnerable populations in economically developing countries as farmers' "vulnerability" and "adaptation strategies" are now top issues on the agenda of the development community (Barbier et al., 2009). For example, Mozambique has been the subject of a number of studies following liberalisation of its markets in 1987 (e.g. Leichenko & O'Brien, 2002; Osbahr et al., 2008; Eriksen & Silva; 2009; Silva et al., 2010). Here, researchers observe that these policies have done little to reduce the vulnerability of agriculture. Leichenko & O'Brien (2002) for example, note that market liberalisation in Mozambique may have accelerated the country's move away from agriculture following the floods of 2000. Eriksen & Silva (2009) observe of the Mozambique drought of 2002-2003 that initially a greater availability of market-based strategies assisted poorer farmers, however, as the drought lengthened, the cash economy effectively closed down leaving farmers few alternative market opportunities.

Examples from the developing world also illustrate how climatically sustainable agricultural practices such as farming small plots of land with varied microclimates (Mozambique – Silva et al., 2010) or growing crops/varieties with higher drought tolerance but lower market value (Mexico – Keleman, 2010; Morocco – Schilling et al., 2012) can be negatively affected by neoliberal economic policies that favour commercial scales and intensive market oriented production. Consequently, there is growing concern that the impact of double exposure in these drought prone regions is likely to be negative, particularly for smaller farmers with limited access to capital and who are not employing intensive commercial practices.

The potential for market liberalisation to influence agricultural vulnerability in economically developing economies may not be surprising. Countries where institutional and economic circumstances are less favourable are believed to be more vulnerable to climate change impacts than countries with strong institutions (both state and private) and economies (O'Brien &

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Leichenko, 2003; Schilling et al., 2012). However, there is also evidence that market reforms within developed economies can influence farmers' vulnerability to climate change (as O'Brien & Leichenko, 2000, contended). For example, Kvalvik et al. (2011: 36) observe how, in northern Norway, rationalization of agriculture has resulted in the use of heavier farming equipment which, in turn, "reduces the farmer's adaptive capacity to cope with the future exposure sensitivities of wetter autumns." However, opportunities to examine this phenomenon in developed economies are limited as many (including Norway) still operate strongly protectionist policies including export subsidies, import tariffs and direct subsidies to farmers.

This study examines 'double exposure' in the developed economy context of New Zealand. New Zealand has been described as "unequivocally liberalized" (Koester, 1991) or a "laboratory" for free-market policies (Sautet, 2006), and is touted as one of the best countries in which to study the effect of neoliberalisation on agriculture (e.g. Le Heron, 2003; Haggerty et al., 2009). The paper begins by outlining how the market liberalisation process affected New Zealand agriculture, and then presents the results of a survey of mostly sheep/beef farmers in North Otago/South Canterbury – a dryland farming region on the east coast of the South Island. The survey focuses on the response of dryland sheep farmers to the impact of three major droughts that occurred at approximately 10 year intervals and, specifically, details how their response changed over the 30 year period. Results are then discussed in the context of 'double exposure' and an assessment made of how neoliberalism is currently constructing the context for vulnerability to future drought.

2. The neoliberalisation of New Zealand and its agricultural sector

2.1 The nature of neoliberalism/globalisation

What is neoliberalism? Harvey (2007: 22) defines neoliberalism as "… a theory of political economic practices proposing that human well-being can best be advanced by the maximization of entrepreneurial freedoms within an institutional framework characterized by

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private property rights, individual liberty, unencumbered markets, and free trade." However, rather than comprising a single identifiable project, neoliberalism consists of "a complex assemblage of ideological commitments, discursive representations, and institutional practices, all propagated by highly specific class alliances and organized at multiple geographical scales" rendering the "notion of a consistent set of defining material practices and outcomes that comprise neoliberalism" problematic (McCarthy and Prudham, 2004: 276 – also see Davis, 2006). Bailey (2007: 545) similarly observes that neoliberal ideas are not simply transmitted across geographical, social and political boundaries but rather neoliberalism "shapes spatial, historical and ecological contexts" and, at the same time, incorporates and responds to them. As these authors argue, neoliberalism is highly specific and situated, consequently, rather than engage in an extensive description of the nature of neoliberalism here we present the story of neoliberalism as it shaped and was shaped by development in the New Zealand context (see Peck & Tickell, 2002; Harvey, 2005, 2007; Castree, 2010, for detailed accounts of the nature of neoliberalism).

2.2 The neoliberalisation of the New Zealand agricultural sector

New Zealand's neoliberal reforms began in 1984 with the election of a Labour government. In line with neoliberal theory of economic management the new government immediately announced the removal of agricultural production subsidies (Supplementary Minimum Prices – SMPs), deregulation of the market (July/August), the lifting of an existing wage freeze, the phasing out of fertiliser and noxious weed subsidies, partial cost recovery on product inspection, and a rise in Rural Bank and Finance Corporation interest rates to market rates (November). Over the next few years New Zealand floated the dollar, phased out assistance for land development, introduced cost recovery of advisory, research, animal health and quarantine services, introduced indirect taxation in the form of a Goods and Services Tax while reducing personal and company tax rates, reduced tariffs, and sold the state owned Rural Bank (Cumberworth & Jarvis, 1994)[2].

[2] For more details on the pre-1984 policy conditions see Le Heron (1989).

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To provide a framework for studying drought adaptation we have divided these reforms into three stages based on the type and extent of the impact on the agricultural sector (Figure 1).

Figure 1: Key agricultural features of the stages of neoliberal development (Source: Authors. Data: Statistics New Zealand, 2004, undated a; LIC & DairyNZ, 2012). Note that gaps in the sequences for cattle and sheep result from a failure of the agricultural production survey to be conducted in 1997, 1998, 2000 (except horticulture) and 2001. Dairy cow numbers are industry figures. Information on the area of land covered by dairy are LIC and DairyNZ (2012) figures. Figures for the land usage of other industries were not included as there are no consistently reported measures available (MacCleod & Moller, 2006). However, MacKay et al. (2012) observe that since 1990 the total area in sheep and beef production has decreased by 28% from 12.5 to 9 million hectares.

Stage 1: Restructuring (1984 – 1991).

The first stage of neoliberalism constituted a period of "intense legislative change" (Moran et al., 1996: 166) which, we argue, was more or less finished by the time the Resource Management Act (RMA) was implemented in 1991. The initial impacts of the reforms on farmers were predictably dramatic. Many experienced heavy indebtedness in the 1980s as the result of a combination of a 40% decline in real land values, a general downward trend in returns for produce, the removal of all forms of subsidies, added costs of inputs, and higher interest rates for loans. This led to the widespread slashing of discretionary expenditure (Smith & Montgomery, 2003), engagement in off-farm income generating activities (Le Heron & Roche, 1999; Johnsen, 2004), and/or, de-stocking, de-intensification, cost-cutting and agricultural diversification (MacLeod and Moller, 2006). While indebtedness was a major problem for many farmers there was some respite in the form of an extensive program of 'debt forgiveness' (20% of total farm debt – Smith & Montgomery, 2003) that accompanied the removal of the subsidies.

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The dairy industry emerged from this difficult period in the best condition for two main reasons. First, while eligible for SMPs, dairy farmers had received virtually no direct subsidies from the scheme (1.5% of the total and none since 1978/79 - Griffith & Grundy, 1988) meaning that, whereas many hill country sheep farmers lost a considerable proportion of their income, for dairy farmers the impact was minimal. This also allowed the dairy industry to compete with sheep/beef on more even terms (Smith & Montgomery, 2003). Second, while much of New Zealand's agriculture remained tied to traditional markets (predominantly the UK where access was progressively cut back following EC membership – Haggerty et al., 2009), the New Zealand Dairy Board had been developing alternative markets as far back as the 1960s as well as consolidating its operations in Europe and establishing an efficient international marketing program (Barnett & Pauling, 2005). Thus, when the reforms came, the dairy sector was well positioned to cope with the new demands of marketing and product development.

In the first year following liberalisation sheep farmers did relatively well on the back of a 20% devaluation of the currency (Cumberworth and Jarvis, 1994) and a lump sum termination payment from the SMP scheme that effectively meant support continued for sheepmeat production until September 1985. However, the situation then deteriorated rapidly. First, following currency floatation in 1985, the New Zealand dollar unexpected strengthened leading to a decline in product prices (Johnson, 2000). Next, wool prices collapsed dramatically and remained low throughout the rest of the 1980s. Finally, between 1986 and 1988, lamb prices slumped to 27.3% of their 1979-81 value and mutton prices collapsed completely so that slaughtering animals represented a net loss (Cumberworth and Jarvis, 1994). Understandably this contributed to a rapid decline in sheep numbers during this period (see Figure 1) leading, in turn, to a process of restructuring across the commodity chain as stock numbers fell and processors were forced to close (Le Heron & Roche, 1999). Overall, sheep farmers (particularly hill country farmers - Smith & Montgomery, 2003) suffered severely in this period.

In terms of drought response, following a report in 1986 suggesting the need for the Government to encourage farmers to decrease their reliance on government support in times of drought (Dickinson & Sandry, 1986) the Government tightened the eligibility criteria for

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drought assistance and changed the type of assistance available. However, as a result of a significant increase in Government expenditure on drought relief in the late 1980s a policy review in 1989 led to a further tightening of eligibility criteria in 1990 which shifted the emphasis for managing "inherent but predictable risks" to individuals, industry organizations, and local government agencies, with central government (Keen, 1996). Thus, as with Australia's revision of the National Drought Policy in 1992 (see Higgins, 2001; Botterill, 2003) responsibility for drought response in New Zealand was moved rapidly from government to individuals and communities who have "primary responsibility for risk mitigation and preparedness in adverse events" (MAF, 2009: 1).

Stage 2: Recovery (1992 – 2001)

The second phase of neoliberalism occurred between 1991 and 2001 (the formation of the Fonterra cooperative) and had two stages. The early period of the 1990s saw agriculture begin to recover as the exchange rate became more favourable and land values increased. For New Zealand, this increase in land values and subsequent good years for agriculture were driven, in part, by the 1994 signing of the Uruguay Round of the General Agreement on Tariffs and Trade which provided the market access that New Zealand so desperately needed following liberalisation (see Bollard, 2004). An improvement in dairy incomes which started in 1988 accelerated after 1991 and, consequently, the number of dairy cows rose appreciably over the period while the number of sheep continued to decline (see Figure 1). For the sheep sector this period witnessed the return to relatively good international prices for lamb. In addition, strong productivity gains in the sector (higher lambing percentages and heavier lamb carcasses) meant that, despite the continued decline in sheep numbers the total tonnage of lamb production rose (Le Heron, 2003; Morris, 2009). The sheep industry itself witnessed a dramatic change with a move to contract production and the development of closer buyer-seller relationships (Le Heron, 2003). The general improvement in the condition of agriculture in combination with apparent environmental improvements from decreasing sheep numbers led some to proclaim the neoliberal reforms a success (e.g. Johnston & Frengley, 1994; Scrimgeour & Pasour, 1996; OECD, 1998).

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At the same time as reforming agricultural policy, New Zealand made significant changes to its environmental policy with the implementation of the RMA in 1991. In line with neoliberal principles, responsibilities for environmental management decisions were transferred from central government to regional councils, city authorities and unitary authorities (Aerni et al., 2009) and the RMA focused on the 'environmental bottom line' as its measure of sustainability while allowing market forces to create the optimal situation for resource use (Pearce & Kingham, 2008). Further, the RMA shifted the balance of proof such that the "benefits of intervention need to be demonstrably superior to the results that will otherwise occur through market interaction" (Robertson, 1996: 214) and, according to Rosin & Campbell (2012), gave a 'free pass' to farmers by providing no legal grounds for objecting to existing agricultural practices. Whereas the previous period was characterised by environmental improvement as destocking of sheep, low profitability, and lack of cash income led to a substantial reduction in fertiliser inputs, by 1995 inputs were back to pre-1984 levels (Smith & Montgomery, 2003). Consequently, by the end of the decade the environmental situation was again deteriorating (OECD, 1998; Hall et al., 1999).

Although responsibility for drought had been made the responsibility of local government agencies, drought response was not included in the government plans required by the RMA – even in dryland areas where recurring droughts had been experienced. Keen (1996) believes that this was the result of local government agencies' traditional responsibilities for flooding, erosion and land instability hazards, and their subsequent lack of experience in managing drought. Instead, she contends, as the need for a local economy to be at risk to qualify for assistance proved exceptionally difficult to quantify, the degree of government assistance depended on the effectiveness of local farming lobby groups.

Stage 3: 'Dairy world': expansion, environmental exploitation and sectorisation (2001 – present)

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The 2000s were characterised by a continued recovery in the fortunes of agriculture in general, but these fortunes proceeded along strongly sectoral lines. The sheep and beef sector had been in decline almost since liberalisation (Stock and Peoples, 2012) and a number of years of poor returns in comparison to options such as dairy support, cropping, dairy and beef finishing led to a general retreat from sheep production (Butcher Partners Ltd, 2009). By the end of the 2000s the diversification in sheep farming that began in the 1980s was almost complete with researchers observing that there are now few specialised sheep or cattle farms in New Zealand (Morris, 2009; Beef & Lamb NZ, 2012). An important change in this period was the increasing reliance of sheep/beef farmers on the dairy industry – for example, dairy expansion has been responsible for the maintenance of land prices and many farmers have now diversified into dairy service provision. The beef sector also became increasingly dependent on the dairy industry to provide cull dairy cows and bobby calves (Beef & Lamb NZ, 2012).

In October 2001 *Fonterra* was formed from a merger of the New Zealand Dairy Board and two of the largest dairy cooperatives into a single cooperative covering 96% of New Zealand's milk production. With high prices for dairy produce during the decade (MAF, 2008) production increased dramatically, both through intensification (LIC & DairyNZ, 2012) and expansion into former sheep/beef heartlands. Fonterra is now the world's largest processor of raw milk and contributes 7% of New Zealand's GDP (Gray & Le Heron, 2010). Although initially the impact of the neoliberal reforms was to bring much of the sheep production off the hills (Johnson, 2001; MacCleod & Moller, 2006) the expansion of the dairy industry (and cropping to a lesser extent) has forced sheep and beef farming back onto dry hill country and unirrigated plains (Bywater & Moot, 2011).

More generally, this stage was accompanied by an increased focus on the intensity and profitability of all forms of agriculture in New Zealand (Kenny, 2011) while, aside from a developing rhetoric of sustainability with vague environmental overtones, political concern for the environmental impact of agriculture appears to have been minimal (see Burton & Wilson, 2012). As a result, this period witnessed a dramatic reduction in rural environmental quality across a range of indicators (Dodd et al., 2008) with many rivers and lakes in pastoral areas of

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New Zealand have shown "extensive increases" in nutrient status and biological productivity in the periods of 1990 to 2006 and 2005 to 2010 (MFE, 2007; NIWA, 2010) – largely as a result of the intensifcation and spread of dairy production Baskaran et al. (2009).

In terms of drought response policy, in April 2007 the Adverse Events Recovery Policy (AERP) was introduced in an attempt to simplify and formalise assistance for coping with climatic (and biosecurity) hazard events. Emphasis on individual responsibility was again an important part of the policy. However, the key addition in 2007 was a framework for recognising and determining the level of government response to the event – divided into 'local scale', 'medium scale' and 'large-scale' events (see Ministry for Primary Industries (undated) for details). For each category the range of assistance measures to be made available varies depending upon the scale of the event, the degree of economic and social impact, and the availability of risk management options. One of the strategies of the AERP has been to formally incorporate Rural Support Trusts (RSTs – community-based voluntary support organisations that emerged in the late 1980s to assist rural families) into the framework by providing financial support and payment for Trust members during adverse events (Melyukhina, 2011).

3. Methodology

Our study focused on dryland sheep/beef farming in the North Otago/South Canterbury on the east coast of New Zealand because of the occurrence of major droughts from 1988 to 1989, and 1997 to 1999 (He, 2000) and, with the area experiencing a prolonged dry period, the strong prospect of a new drought at the time of the interviews (see Butcher Partners Ltd., 2009). This provided three droughts at approximately 10 year intervals against which to compare the development of the neoliberal project and drought vulnerability/adaptation. It should be noted that, while 'drought' does not necessarily equate to 'climate change', in this particular region of New Zealand and along the entire of the east coast *the main* impact of global warming is

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expected to be an increase in the severity and frequency of drought (Hennessy et al., 2007)[3]. Thus, we contend, looking at adaptation to drought is a valid approach to exploring climate change through the double exposure framework.

The study involved in-depth interviews with 20 farmers/farm couples (18 sheep/beef farmers and two dairy farmers) as well as an interview with a local drought advisor. Interviews were conducted in early 2008. As one of the reasons for selecting this study area was to compare the changing experiences of drought the sample deliberately targeted those with long experience in drought adaptation in the area. To ensure farmers had experienced all three droughts, respondents had to be living on a farm in the study region during the drought/dry periods (at least as a young adult in the case of the 1980s drought). An outline of the characteristics of the farms (total area, average rainfall, production and farmer age) is provided in Table 1. One result of this selection strategy was that only two dairy farms in the region were involved in the study. While dairy is increasingly common in the region it has a relatively short history. McCrostie-Little et al. (1998) note, for example, that in 1978 there were only two dairy units in the whole of the Waitaki (North Otago) region and that it was the economic conditions during the 1980s that led to early conversions from sheep to dairy.

Table 1: Characteristics of the farms in 2008. Note: (a) unknown, (b) actual number not provided, (c) lamb finishing only, stocking units vary, (d) began farming deer in 1992.

Interviewees were located using a chain referral (snowball) methodology (Salganik & Heckathorn, 2004). While the problems with such sampling methods are well recognized the technique is widely used in farm surveys as a result of difficulties obtaining valid sampling frames (see Burton and Wilson, 1999). A qualitative approach was employed because of the complexity of the issues and our objective of understanding how farmers have adjusted their systems to cope with drought over the decades. In such environments, quantitative assessments

[3] Hennessy et al. (2007: 515) observe to the IPCC "In New Zealand, severe droughts (the current 1-in-20 year soil moisture deficit) are likely to occur every 7 to 15 years by the 2030s, and every 5 to 10 years by the 2080s, in the east of both islands, and parts of Bay of Plenty and Northland. The drying of pastures in eastern New Zealand in spring is very likely to be advanced by one month, with an expansion of droughts into both spring and autumn."

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are less effective as they tend to search for regularities and differences representative of wider society, whereas qualitative research focuses on understanding complexity and difference (Borch, 2007).

In the interviews the drought periods were explored chronologically with farmers asked to explain the adaptation strategies they used and how these strategies were influenced by surrounding events. No specific mention of neoliberalism was made by the interviewer as the main objective of the project was to investigate and categorise historical adaptations to drought rather than to specifically relate it to political/economic changes. Interviews lasted between 1 and 2 hours and were recorded and fully transcribed. Thematic analysis was conducted using the NVIVO qualitative analysis software and a cross-sectional code and retrieve approach was used with a common system of conceptual and analytical categories applied across the data set to enable the search and retrieval of labelled data (Spencer et al., 2003).

As the impact of dairy expansion on sheep/beef farmers' adaptation strategies emerged in the analysis stage, information from documentary sources, statistical data and relevant literature concerning the dairy industry have been introduced to compensate for the limited number of interviews with dairy farmers. Statistical data has been sourced from a combination of publically available information from Statistics New Zealand as well as figures gathered by private organisations on the bequest of the industry – in particularly the annual dairy statistics gathered and reported on by the Livestock Improvement Corporation (LIC) and Dairy NZ (see www.lic.co.nz/lic_Publications.cfm) and Beef & Lamb NZ (www.beeflambnz.com). In addition, resources and reports from government organisations such as the Ministry for Agriculture and Fisheries (later the Ministry for Primary Industries) have also been employed (see www.mpi.govt.nz/). Although, in retrospect, it would have been preferable to interview more dairy farmers to provide additional contextual information for understanding dairy expansion and conversion (see Forney, 2012; Stock & Peoples, 2012 for recent research on this subject) the key issue of the shifting vulnerability of the sheep/beef sector was able to be addressed with the data available. The results section thus provides a detailed historical-

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geographically specific case study of the impact of double exposure on sheep/beef farmers[4] while, based predominantly on an analysis of the literature, the discussion places this in the broader context of the expanding dairy sector and political/economic events of the time.

4. Drought adaptation in North Otago/South Canterbury post-liberalisation

4.1 Drought in the first stage of neoliberalisation – a crisis for farming

Drought in the 1980s occurred during a unique phase of New Zealand's agricultural development. Prior to full market liberalisation a strong emphasis on meat and wool production meant that farmers across New Zealand had become ideologically and structurally entrenched in sheep and, to a lesser extent, beef production with little concern for diversifying risk (Haggerty et al. 2009; Stock & Peoples, 2012). The occurrence of the El Niño drought in 1988-89 thus caught the industry unprepared. Farmer B observed that many farmers at the time:

> "didn't know anything else to farm. They hadn't farmed cattle or dairy grazing wasn't really around then either as an option. So sheep was the only thing they'd done and that was what they stuck to."

Farmer P similarly reports his father's experience with drought in the 1980s:

> "I think they grain fed, feed out hay and they'd *get in the poo* [get in trouble] because they'd only have large numbers of sheep so they just, yeah, the sheep got skinnier and they just ... wishful thinking it was going to rain."

This was a particular problem with the 1980s drought. It was the first time sheep farmers had to address the possibility that sheep alone may not provide them with a reliable future income.

[4] The use of detailed historical-geographically specific case studies has been noted as essential to study the impacts of neoliberalism/globalisation because of the need to unpack the complex interplay between neoliberalism/globalisation, policies and system change (McCarthy & Prudham, 2004; Leichenko et al. 2010).

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While the economic difficulties in changing enterprise during a drought are clear, what is often not considered is that strong cultural links between farmers and forms of production can inhibit change in enterprise type (McLeman et al., 2007; Burton et al., 2008). As farmer C observed, the drought led farmers to realise that the way of life (reliance on sheep) that had developed under the previous agricultural policies was no longer sustainable and "it so undermined your confidence." This culturally-based reluctance to convert from sheep/beef to dairy has been observed by other researchers (e.g. Fornay, 2012; Stock & Peoples, 2012). However, another possibility suggested by McCrostie-Little et al. (1998) is that, for the North Otago region in the 1980s, the Government owned Rural Bank (through which most borrowing was undertaken) was not inclined to look favourably on sheep farmers in the region converting to dairy because of a belief that dairy expansion was better suited to the more climatically amenable Southland.

Two other economic conditions were observed as particularly important. Farmers recall that the removal of SMPs had a major impact on land values and, where farmers had borrowed money to purchase land, high inflation and high interest rates made servicing mortgages difficult, "The 1980's were terrible years for income and expenditure as [we had] the high interest rates and high inflation" (farmer D). Cumberworth and Jarvis (1994: 15) confirm this, observing that for farmers in South Canterbury "In some instance overdraft rates exceeded 30% if clients exceeded a predetermined overdraft limit" (also see Le Heron and Roche, 1999). At the same time, the removal of SMPs left commodity prices open to market fluctuations and in the 1980s the fortunes of sheep farmers declined dramatically. First, in 1985 wool prices collapsed and remained low throughout the rest of the 1980s, then between 1986 and 1988 lamb prices slumped to 27.3% of their 1979-81 value and mutton prices collapsed completely so that slaughtering animals represented a net loss (Cumberworth and Jarvis, 1994).

In better years farmers may have been able to agist their stock or to purchase feed but the low commodity prices closed this option for many. Some farmers coped by reducing almost all expenditure. For example, farmer F argues: "you were quite ruthless with how you went about spending and stuff. If it didn't fit, it didn't fit." One high country farmer (farmer G) farmed his

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way through the 1980s drought using a 'bottom drawer' approach. This strategy, as he describes it is:

> "... where you uplift your cheque book and you turn round, you've already got your bottom drawer open, and you drop it in it and you throw the cheque book in it and shut it. Now high country properties used to be able to do that, so I just shutdown […] and we lived on mutton. It was just pretty crazy stuff."

Despite the hardships, in some ways the drought hastened adaptation to the new economic realities. Keen (1996) observes that many farmers had responded to the 1984 market reforms by increasing stock numbers in an attempt to maintain profitability – to a level sustainable only in ideal climatic conditions. Consequently, when the drought arrived in 1988 stock numbers were high, feed reserves were low and stock were in poor condition, worsening its impact. Johnsen (2003) observes that at the time of the reforms farmers in the Waihemo region of North Otago were very culturally entrenched in sheep production and, as a result of the highly variable levels of rainfall in the region, were averse to making rapid changes to their farming systems. Results here suggest that the severity of the situation forced farmers to diversify their production or change management structures to improve efficiency (see Section 4.2), thus breaking the cultural/economic lock-in to existing systems.

4.2. Drought in the 1990s – reaping the benefits of neoliberalism

One interesting and unexpected finding was that despite the 1997-99 drought being almost as severe meteorologically as the 1988-89 drought (He, 2000) very few farmers recalled it as a serious event. Interviews revealed that three key features contributed to this, namely; changes to the farming system, changes in attitudes towards drought, and the economic conditions immediately preceding the drought.

First, the 1980s drought had prompted farmers to initiate better coping strategies (also see Johnsen, 2003; 2004). In particular, by the late 1990s many sheep farmers had diversified into

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cattle and deer (see Table 1) to increase resilience to price and climatic fluctuations (a key strategy for drought survival – Bradshaw et al., 2004) although none had yet diversified into dairy production. Today only one of the interviewed farmers is wholly reliant on sheep. Other strategies involved simply changing the nature of the system, for example taking more trading stock relative to capital stock to provide flexibility in drought response (farmer C), weaning lambs earlier (farmer G), or decreasing the field size to allow more effective grazing control (farmer B). Overall, in the 1990s sheep farmers in the region were far better prepared for the drought under the new economic realities of neoliberal governance.

Second, the 1980s drought in combination with the neoliberalisation experience had created "a real 'tough it out' attitude" in farmers (farmer G, also H and I) as well as leading to a change in the relationship between farmers and their livestock. For example, farmer (E) observed that his main lesson from the 1980s drought was "not to fall in love with your stock" which consequently enabled him to make the hard decisions in drought adaptation. Whether this toughening of attitudes would have occurred without the 1980s drought is debatable, but the lack of compensatory payments is likely to have contributed to farmers' declining sentimentality in their decision-making.

Third, as one farmer (K) observed, "some of our best years were probably in the 90s, relatively speaking in profit terms." By the late 1990s interest rates had declined, land values had increased and, importantly, prices for lamb had recovered significantly. Consequently, sheep farmers were in a far better financial position to cope with drought[5]. In addition, adaptation options that had not been available in the 1980s were now open to them. Farmer B recalls his best memory of the drought in 1998 was that:

[5] Note, however, that beef prices crashed in the same period leading Dungan et al. (2011) to observe that the 1997-99 drought had severe consequences for beef farmers in their (geographically broader) survey and led some to invest in irrigation and/or seek off-farm employment.

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> "... we had a lot of stock grazing in South Otago. The thing I can remember really is at one stage we had 1500 sheep grazing in South Otago and sheep were actually grazed out for a 12 month cycle during those two years."

In the 1980s farms had been in a poor financial situation with few being able to agist sheep out of the region. Lower interest rates, higher equity in their farms and higher lamb prices following recovery from the neoliberal restructuring process meant that in the 1990s animal feed could be purchased or stock agisted relatively easily. In addition, the geographical distribution of the drought meant that traditional agistment areas, at this time still largely in sheep farming, were available for drought relief.

4.3 Farming in dairy world: coping with drought in the 2000s

Within the study region one key change had occurred since the 1990s drought – namely, the expansion of dairy farming into almost all areas of the country with reliable rainfall or irrigation. While there are no exact statistics available for the study area Statistics New Zealand (2007) observe that between 1981 and 2006 the number of dairy cattle in the South Island of New Zealand increased from 225,000 to 1.5 million. In some provinces, such as Southland (formerly a key agistment area for North Otago dairy farmers) dairy expansion was even greater – from 25,000 in 1990 to 418,337 in 2008 (Smith & Montgomery, 2003; LIC & DairyNZ, 2012). With "record high" (MAF, 2008) dairy prices up until the second half of 2008 coupled with 3 years of depressed prices for lamb (Meat and Wool, 2008), sheep/beef to dairy conversions in the South Island continued at a rapid pace – particularly in lowland areas with reliable summer rainfall (MacLeod and Moller, 2006; Monaghan et al., 2007). As the analysis below suggests, although not all aspects of drought adaptation are related to the growth of the dairy industry, the impact of this change in land use on sheep/beef farmers' drought adaptation options has been considerable.

Rapid dairy expansion in the South Island has brought with it a significant enhancement of land values for other farming sectors. For example, farmer E contended: "Our values around

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here wouldn't be anything like they were if it wasn't for the dairy farmers. Especially now they're moving in, you know pretty much next door" (also farmers H, I, N). Enhanced land values had two major positive impacts on drought adaptation. First, it provided easy access to capital as farms could be used as collateral (unlike during the 1980s drought when land values were low). One farmer who observed he was experiencing full drought conditions contended that it was the land values that were keeping him afloat financially (farmer A). Second, farmers wishing to leave farming during the drought could do so with a considerable lump sum for establishing themselves elsewhere (noted by farmers E, I) – thus there was not the pressure on farmers to keep up productivity in the current conditions. However, at the same time, rising land values affected farmers' ability to develop their farms. For example, farmer Q observes how land leasing was made more difficult by dairy expansion

> "We had one lease of nine years, that was ticking along pretty good, the dairy industry started to grow and that was in the 90s and they were approached by dairy, and we couldn't match the money they were offering."

One strategy for coping with drought is currently to distribute the farm properties geographically to take advantage of local rainfall variations (noted as a drought survival strategy for communal farming in Mexico – Vásquez-León, 2009). For example, farmer F suggests that "we're in a dry spot but we're just, the difference between here and the hill, which is only three miles away, is 10 inches per annum, yeah, 250 ml." (also I and R). Farmer Q, similarly, has a number of rented blocks of land dispersed over a wider area and observes that, "once we spread a little from the initial lease, we had diversity of country, which gave us that flexibility." This raises the question of whether the competition for land with dairy will reduce the ability of farmers to develop such geographical solutions to minimising drought impact in the future.

The growth of the dairy industry also provided an opportunity for farmers to enter the dairy service industry (providing winter grazing and feed) which, farmer E enthused, was "a pretty good option." The key value of dairy service is that it enables farmers to both diversify income

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and lower capital stock numbers. For example, farmer B was able to reduce his capital stock by 75% so that, should there be a good season, he could grow extra feed as silage, barley or hay for sale to the dairy industry. In a drought season, the additional feed could be consumed by his own animals, thus limiting the need to divest the farm of capital stock (at a low price). Farmer I observed that the practice of providing dairy support is becoming increasingly widespread "there's a lot of guys getting out of sheep to, um, just to support the dairy. They're going dairy support really, for winter grazing and stuff like that."

The influence of dairy expansion on supplementary feed costs (including agistation) has not been quantified, but it is clear that the dairy industry had substantially greater resources for purchasing feed than the sheep/beef industry at the time of the survey (Butcher Partners Ltd, 2009). This was exacerbated, at the time, by the upward pressure on feed prices caused by dairy farms becoming increasingly dependent on imported feed (MacLeod and Moller, 2006). For some of the sheep/ beef farmers, there was considerable concern that high dairy prices left them unable to compete – making one of the key strategies for drought adaptation more difficult (e.g. A, E, J, K, N). For example, farmer J runs a large dryland farm and suggests that in the dry conditions "you're out looking for other feed, like we have to this year and it's excessive because of the dairy – things have gone crazy." Even one of the interviewed dairy farmers (farmer H) observed that he can afford to pay "extortionate" prices for feed:

> "We'll buy it at whatever it costs because they're paying us for the milk, which is a relatively new thing, where we might have culled more cows. This way we can afford, if we can keep the cows in milk, then they're going to pay for it even, even at extortionate prices."

An additional impact of dairy expansion was the pressure that the dumping of surplus stock from dairy conversions put on slaughtering facilities and, in turn, how this impacted on farmers' stock retention in dry areas. For example, farmer F reports that he "should have had 1,500 [ewes] away, three weeks ago" and some of his stock had been waiting 3 months. Farmer O had 500 lambs that have been kept for an extra month. Another farmer (farmer J) had to retain 1500 ewes. He notes:

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> "You try and keep them just on a maintaining plain but, you know, that sort of feed that they've eaten could have carried other stock into the winter, another two months."

For one farmer (farmer A) in a full drought situation the condition became very serious when the processing company could not take the 2000 lambs and 400 ewes he had previously booked in. He reported his conversation with the procurements manager as: "I said 'I've supported you guys for 20 years. I need more than this' ... I mean, I held my head in my hands. That was devastating."

Dairy expansion has also influenced sheep/beef farmers' drought resilience through its impact on communities. While there was little animosity towards dairy farmers, there was an underlying concern that rural communities are being changed through the arrival of dairy farmers and dairy workers. The main issue raised was that

> "those people are less able to be involved in the community because of their hours and things, you know and in sporting, coaching sports and taking clubs, it's changing the community that way" (farmer C)

or "they're not part of the community. They're too busy" (farmer P, also farmers B and Q). While there are no direct economic implications from non-participation, communities provide very important moral (and sometimes economic) support and a source of shared information for farmers in times of drought (see Johnsen, 2003; Stehlik, 2003; McLeman et al., 2007). On the positive side, as farmer B observed, the dairy industry creates opportunities for farmers' children to find employment in rural areas and has "actually brought some of those [jobs] back for our kids to do in the community" – something that helps to strengthen the community and keep drought adaptation skills within the local area (also see Forney, 2012).

One impact of neoliberalism on drought adaptation only partly related to the dairy industry is the decline in the ability of off-farm employment to provide a means of coping with drought.

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According to farmer E, off-farm employment to support the farm – a realistic prospect in the 1980s and one which many farmers engaged in (e.g. farmers E, G, K, and Q) – has ceased to be a viable alternative as the cost of maintaining a farm is now substantially higher relative to the wages that could be earned in off-farm employment (farmers E, G, and K). Thus, while the dairy industry has created new opportunities for employment in rural areas the inflationary effect of dairy's economic success has meant that these additional jobs have not translated into significantly decreased drought vulnerability.

Finally, a key feature of the recent drought/dry was its geographical extent. Farmers observed that during the 1990s drought they were able to send stock away for grazing or purchase food grown near the region (with relatively low transport costs). In contrast, as farmer R describes, "one of the worse features I think of this 2007/2008 dry spell is that it's dry everywhere. It's dry from the North Cape to the Bluff, or has been." A geographically widespread drought creates more problems for farmers than a local drought of the same intensity as drought response occurs simultaneously between regions – buying feed, seeking agistment, dumping stock, buying stock (after the drought), and so on. For example, farmer A suggested that as the historical droughts were more localised "the store lamb market was a bit better. We had markets for stock and you could still get a reasonable return." For a nationwide drought, the cost of adaptation and recovery is much greater, leaving those farmers experiencing drought conditions in a weaker position than for a regional drought. A particularly unusual aspect here was the combined impact of the geographical extent and the economic strength of the dairy industry. As a result, to alleviate drought conditions it was reportedly economically viable for dairy farmers to buy feed from North Otago and transport it to the Waikato in the North Island (almost 1000 kms distant) (dairy farmer H).

5. Discussion

In the above section we have outlined farmers' experiences of three consecutive droughts in North Otago/South Canterbury and illustrated how adaptation was influenced by the

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coincidence of drought and the restructuring of the economy under neoliberal principles. In the first drought farmers were neither structurally nor psychologically adjusted to the requirements of farming without subsidies but were heavily reliant on sheep, culturally and emotionally attached to sheep production and mostly unaware of alternative production forms or systems. With the traditional options of purchasing feed or agisting stock limited, coping mechanisms during the drought centred around the minimisation of expenditure and uptake of off-farm employment. Yet, despite having to resort to these survival measures and contrary to what may have been expected under a 'double exposure' scenario the number of farms reported to have gone out of business in the North Otago/South Canterbury region was minimal (Fairweather, 1992)[6].

We attribute this to the historical origins of New Zealand agriculture. In particular, at the time of liberalisation New Zealand's agricultural industry was already heavily export oriented – and had been since the first frozen meat shipments in 1882 (Love, 2008). In fact, as a late settler colony, New Zealand had never developed a peasant class or significant local market for key agricultural produce. Consequently farming had been based on large commercial units almost from the outset. Agricultural statistics (Statistics New Zealand, undated b) indicate that the average farm size (total area in occupation/number of farms) fluctuated between 190 ha and 327 ha between 1901 and 1996 (277 ha in 1984) while statistics for farm size categories indicate an *increase* in the number of smaller farms since liberalisation due to easing of planning restrictions and subsequent emergence of 'lifestyle blocks' (Fairweather, 1992). In contrast, reports of the negative impacts of neoliberalism and climate change in the developing world have centred on highly vulnerable traditional farming communities such as the smallholding *ejidos* farmers in Mexico (Eakin, 2005; Keleman, 2010) or farmers in rural Mozambique where average farm size is 2.4 ha (Silva et al., 2010). Thus, the vulnerability caused by a transition from peasant to industrial agriculture or the simultaneous collapse of the local market with the occurrence of drought (e.g. Eriksen & Silva, 2009) simply did not occur.

[6] Although, as Smith & Montgomery (2003) observe in the context of the restructuring, "... just why a farmer leaves the land is hard to establish and subject to different interpretations, even by the farmers themselves."

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Farmers noted that by the time of the second drought their systems were more diversified, new drought management strategies had been developed, and their attitudes towards their livestock had changed. A recovery of prices in the 1990s meant that the economic condition of the farms had improved significantly and, along with the regional nature of the drought, an increase in land values and a decrease in interest rates, farmers could afford to return to more traditional drought adaptation approaches of agistment and the purchase of supplementary feed. That the impact of the drought was relatively limited suggests that farmers were no longer experiencing negative effects from the *combination of* drought and neoliberalism and, in fact, neoliberalism may have been working in their favour.

By the 2000s, neoliberal policies were no longer being experienced as clearly distinguishable economic conditions (such as debt or interest rates) but manifested themselves through a reconfiguring of the rural industries around the dairy industry – neoliberalism's most economically successful sector. As a consequence of massive dairy expansion in the 2000s, the ability of farmers to agist stock to Southland had largely disappeared, slaughtering facilities were full as a result of dairy conversions, and, with the dairy industry also experiencing drought, there was strong competition for supplementary feed. On the positive side, 'dairy service' diversification was enabling farmers to reduce the number of capital stock and, to some extent, to share in the dairy bonanza. High land values also improved sheep/beef farmers' ability to adapt to drought in the short term, but, at the same time, competition for land meant that diversifying the farm geographically to reduce drought exposure was becoming increasingly difficult.

For future droughts the impact of double exposure may be different again. In particular, while at the moment New Zealand agriculture is experiencing a dairy-led revival in fortunes – fortunes which are being redistributed to the sheep/beef sector through the provision of dairy service – the sustainability of dairy world under scenarios of climate change is questionable. Of particular concern is Hennessy et al.'s (2007) prediction that climate change will increase the frequency, extent and intensity of droughts in the main areas of dairy expansion (the east

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coast). Expansion of dairy into dryland farming territory has long been viewed as troubling. Over a decade ago Kenny (2001: 7) observed in a report to the Ministry for the Environment

> "The vulnerability of the dairy industry to drought could increase if the planned expansion into Canterbury occurs. In the 2000/01 season Canterbury dairy farmers faced irrigation bans, which led to high supplementary feed costs. The situation could be repeated with greater frequency in future because of increased water demands for expanding and more productive farms, even without considering the effects of climate change."

Since Kenny's observation the number of dairy cows has increased by 285% in North Canterbury and 331% in even more drought-prone South Canterbury (LIC, 2004; LIC and DairyNZ, 2012). While this expansion is widely seen as a positive development – one which Clark et al. (2007) suggest is likely to continue as issues of water availability are "resolved" – evidence from Australia illustrates that irrigation does not provide a guarantee against drought. For example, Dibden & Cocklin (2010: 419) observe that areas with reliable irrigation systems that had previously been centres of dairying have been badly affected by new conditions of persistent drought that rendered irrigation water supplies "unreliable and sometimes non-existent." Similarly, Hennessy et al. (2007: 516) predict that under IPCC climate change scenarios agricultural industries on the east coast of New Zealand, "…are likely to experience negative effects due to lower water availability in spring and summer, their time of peak demand." At the same time high investment costs mean that dairy's profit fuelled expansion into areas at greater risk of climatic change is accompanied by correspondingly higher economic risk. It has been suggested that a severe downturn in dairy incomes could see as many as 33% of dairy farms foreclose through high levels of indebtedness (Hargreaves & Williamson, 2011) an event that would have catastrophic consequences for the vulnerability of both sectors to any coinciding drought.

As with the growth of the dairy sector, this growing vulnerability to climate change can be linked with neoliberalism. In particular, neoliberal policies display a preference for industrial scale technologically oriented agricultural investment over possibly more environmentally

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sustainable or peasant forms (e.g. Minoia, 2012; Schilling et al., 2012) and a reliance on markets to deliver politically 'neutral' resource allocation (Budds, 2004). This, in combination with limited environmental requirements, effectively leaves the decisions for where the intensification of dairying occurs to organisations and individuals that may not share the same concerns for long-term climate change or national resource allocation as a government perhaps should. As Bardsley & Pech (2012: 140) contend from a study of neoliberalism and system resilience in Australia

> "the neoliberal paradigm limits the state's capacity to explicitly support transformations for effective adaptation and if too much faith is put into a market-led approach to govern risk, many vital socio-ecosystems could struggle to anticipate future change and adapt effectively."

Nor can responsibility be left to individuals. Although governments in New Zealand and Australia have determined that coping with agricultural drought is a matter of individual rather than state responsibility (Higgins, 2001; Botterill, 2003; MAF, 2009) drought is a *socially constructed* event driven by a discrepancy between water availability (in temporal, spatial or real terms) and the socially constructed demand (Botterill, 2003; Bakker & Bridge, 2006). Social vulnerability to drought at the time of occurrence is therefore a key driver of the extent and nature of the impacts (Wilhelmi & Wilhite, 2002). It is apparent from this study that the main driver of vulnerability in all three droughts was not the water deficit (which the farmers in the area are used to coping with – Johnsen, 2003) but rather the broader social/economic context within which the droughts occurred. Sheep farmers in North Otago/South Canterbury cannot stop the loss of agistment areas nor the growing demand from 'drought' hit dairy farmers in the Waikato – nor can they, as individuals, plan or even influence a trans-regional response that reflects the increasingly integrated nature of the New Zealand agricultural industry.

The example of the dust-bowl drought in Oklahoma (1932–36) illustrates how drought experiences can be constructed as a result of market-oriented policies enhancing the vulnerability of local communities and demonstrates some similarities to the New Zealand

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situation. In this case, McLeman et al. (2007: 12) observe that prior to the drought, expansion of the cotton industry into the region had been driven by favourable climatic conditions and high commodity prices for cotton. The cotton industry had thus reshaped communities around itself such that cotton production was "what Sequoyah County farmers knew and did best" and rural infrastructure had consequently developed to support it. Key contextual factors driving the severity of the drought in this case were the collapse of cotton prices in 1930-31, the dominance of rental land (80%) disincentivising environmental management[7], the cultural and economic domination of cotton production, and the laissez-faire policies of the Hoover administration that were "inadequate to deal effectively with the problem" (Wilhite 1983: 44). Interestingly, the dust bowl drought was not climatically anomalous. There have been events of similar and even greater magnitude meteorologically since (Wilhite, 1983; McLeman et al., 2007) but more recent droughts have passed relatively unnoticed because of a return to more sustainable land uses (mainly cattle).

In New Zealand there are three key features of neoliberal policy that we contend are currently contributing to the construction of future droughts.

Firstly, the division of responsibility for environmental management into 16 different authorities with each applying their own interpretation of the RMA means any coordinated action (necessary to cope with social-ecological systems change according to Bardsley & Pech, 2012) is unlikely – particularly if coordination involves one region limiting the growth of dairy in order to promote overall national sustainability of agriculture[8]. This is despite the integrated requirements for drought adaptation by the agricultural sector as is evident, for example, from the agistment of stock to Southland or the purchasing of supplementary feed from North Otago by dairy farmers in the Waikato. Rather than integrated planning, current thinking in New Zealand is more along the lines of Valentine et al's (2007) observation that environmental

[7] In New Zealand we contend that environmental management is disincentivised by lax environmental regulation rather than land ownership issues.
[8] Jay & Morad (2007), observe that given the option and promise of economic growth some Regional Authorities have chosen to place virtually no restriction on dairy development.

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management at the national level is being replaced by regional decision-making which, the authors contend, is the optimal scale for land management decision-making as it provides for the involvement of stakeholders.

Secondly, the expansion of the dairy industry has been facilitated by weak environmental policy allowing (some) dairy farmers to boost profitability by effectively ignoring obligations to environmental management. Baskaran et al. (2009, 388), for example contend that the main reason New Zealand dairy products remain cheap is that the gate price does not "reflect the external costs of depleting environmental resources or causing environmental degradation." Similarly, Cassells & Meister (2001) contend that if NZ unilaterally imposed environmental control costs on farmers the result would be a reduction of NZs dairy export volumes, decline in the total value of dairy exports and a potential loss of competitiveness for the NZ global dairy market. Measures to tackle the environmental issue have followed the neoliberal philosophy of volunteerism but have been largely ineffective. Despite the "Dairying and Clean Streams Accord" of 2003 (a voluntary agreement between farmers, local government and central government to reduce dairy pollution) in 2011/2012 27% of New Zealand's dairy farmers were not fully compliant with environmental regulations (i.e. they failed to appropriately treat and discharge farm dairy effluent), only a six per cent improvement on the proportion that were non-compliant at the time of the Accord's establishment (MAF, 2010; Ministry for Primary Industries, 2013a).

Thirdly, despite the introduction of an amendment to the Resource Management Act in 2004 (RMA, 2012) to ensure Local Authorities plan for the effects of climate change, the current government continues to push for developments in line with neoliberal perspectives. For example, when an elected Regional Council (Environment Canterbury) was perceived to be blocking irrigation development for dairy expansion it was removed and replaced with an unelected body (Burton & Wilson, 2012). In 2011 an "Irrigation Acceleration Fund" was established to "help realise the potential for irrigated agriculture to contribute to sustainable economic growth throughout New Zealand" and in 2013 a new company created to act as a bridging investor for regional water infrastructure development based on an $80 million

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government investment for irrigation (Ministry for Primary Industries, 2013b). Thus, in the government's view, preparing for climate change appears to be a matter of applying technological growth-based solutions rather than the development of lower impact but potentially less productive systems.

Future patterns of 'winners' and 'losers' from double exposure are difficult to predict. One key area where an enhanced neoliberal position could make a difference is any move towards a reduction in drought assistance programs. In New Zealand (as in Australia – Higgins, 2001; Dibden & Cocklin, 2009), drought assistance remains one of the few areas where government is prepared to deviate from strict adherence to neoliberal principles and, although proposals are not currently on the table, removing drought assistance would seem a necessary step towards a fully market oriented agriculture. However, this seems very unlikely. A recent drought in the first quarter of 2013 hailed as most extreme since 1945-46 (Porteus & Mullan, 2013) has seen additional money allocated to Rural Support Trusts, tax relief made available, and Rural Assistance Payments distributed to farmers in extreme hardship (Ministry for Primary Industries, 2013c). It can be assumed from the high debt levels in the dairy sector, its continued expansion into drought prone areas and the likelihood of increased drought in the future that government intervention will become more frequent rather than being phased out.

6. Conclusion

Researchers concerned with the combined impact of globalisation and climate change proposed the notion of 'double exposure' to explain how coincidence of negative or positive impacts can lead to 'double losers' and 'double winners' (O'Brien & Leichenko, 2000; 2003; Leichenko et al., 2010). In the case of developing countries, it is often possible to identify a group of farmers who are particularly disadvantaged – namely, smaller, poorer 'peasant' farmers who when drought occurs, are restricted in their ability to respond by factors such as the need to compete against cheaper imports, a lack of access to capital, a weak local economy, and lack of access to irrigation (e.g. O'Brien & Leichenko, 2000; Leichenko & O'Brien, 2002; Eriksen & Silva,

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2009). The question we raised in the introduction was whether similar effects are present in the developed economy context of New Zealand – a country where both the agricultural sector and the wider economy moved from highly state controlled to unequivocally liberalised over a period of less than a decade.

In general the answer is a qualified 'yes' there has been a sectorally based effect as suggested by O'Brien & Leichenko (2000). However, our interviews suggested that the extent to which farming sectors could be defined as 'winners' or 'losers' has been in a state of almost constant flux since the reforms – with each drought raising a new set of challenges and opportunities. In addition, and unlike the developing world examples, New Zealand's agriculture was already strongly export-based at the time of 'globalisation' meaning that farmers were to some extent buffered from the initial impacts of the restructuring process. After 30 years of neoliberal governance a fixed pattern of winners and losers has yet to emerge. While sheep/beef farmers are currently at a considerable financial disadvantage to dairy farmers they are also benefiting from dairy's success through the reconfiguration of the industry towards dairy service, the improvement in land values, and the maintenance of rural communities. At the same time, the dairy industry appears to be making itself increasingly vulnerable to climate change.

This raises an issue concerning the practical application of the double exposure framework. Although in the early stages of the process it is relatively easy to observe the consequences of neoliberal globalisation and attribute them to 'double exposure' this study suggests that over time the impacts become more diffuse and therefore difficult to attribute to the political restructuring. As Barnett & Pauling (2005: 275) observe, the problem with studying the effects of neoliberalism is that it is impossible to distinguish between what would have happened under a 'business as usual' development pathway as opposed to a reform pathway and, as a consequence, it is *impossible* to provide definitive, irrefutable proof of the impact of neoliberalism. The same may be said in this case. Farmers experienced enhanced vulnerability in the first drought through direct economic impacts such as interest rates and higher debt, but by the third drought vulnerability was affected not by the overt manifestations of fiscal policy change but the impact these policies had on the restructuring of the rural sector. Distinguishing

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the impact of the reforms thus becomes very difficult over time despite clear evidence that processes associated with neoliberal globalisation continued to be applied throughout the period (Roper, 2011).

A final question to address is whether the effect would be the same in other developed countries. This seems very unlikely. Australia's experience of neoliberalism, for example, has been quite different. In particular, Dibden & Cocklin (2010: 420) observe that despite an export oriented industry and the introduction of neoliberal governance similar to New Zealand's and at a similar time, strong deregulation of Australia's dairy industry meant farmers experienced "a cost-price squeeze which undermine[d] the profitability of many farms" and left dairy farmers economically struggling. In contrast, through the continuation of the established cooperative approach, New Zealand's dairy farmers found themselves in a position of power with the near monopoly Fonterra largely dictating milk prices to both supermarkets and competing milk processors (leading to a Commerce Commission enquiry in 2011 – Commerce Commission, 2011). The multitude of other factors that, in combination, create a unique context for agricultural liberalisation in New Zealand include historically large farm sizes, the effect of Supplementary Minimum Prices immediately prior to liberalisation, the speed with which the reforms were introduced, the approach to climate change chosen by the government, and so on. Thus the outcome of the neoliberalisation of other developed economies is unlikely to be the creation of a series of 'dairy worlds' (or 'sheep worlds'), but rather a patchwork of continually evolving agricultures both responding to and creating new contexts for the neoliberal project.

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