Drought and climate adaptation program

Drought Climate Adaptation Program

Producing Enhanced Agricultural Crop Insurance Systems

Summary Report

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Executive Summary

Queensland farmers are subject to highly variable climatic conditions, including drought and floods, which can undermine production. Insurance could play an important role in helping Queensland farmers manage their climate risk. However, currently the use of insurance to manage climate related production risk is poorly understood and utilised by farmers. This project aims to address this gap by providing information on climate risks and the role of insurance for managing these.

This project conducted focussed reviews on climate risk in agriculture and on how insurance products could be used to address these risks. The project also carried out on-ground surveys from cotton and sugar industry and conducted modelling to assess risks and the role of insurance for cotton and sugar cane farmers in Queensland. Prototype climate assessment risk and reporting tools were also developed.

The reviews carried out in this project identified that Queensland's agricultural sector is highly exposed to production volatility as a result of weather risks. It is our view that the Queensland agricultural sector has an excellent opportunity to provide its farmers with protection against uninsured seasonal risks to crop production.

Key climate and farming systems risks were identified by interviewing a total of 55 farmers (23 cotton growers and 32 sugar cane growers) across Queensland. Key climate risks to the cotton industry include hail, drought/dry years (lack of rainfall during planting and season), quality downgrade (discolouration), excessive heat, floods and wet weather (during season and especially during harvest). Similarly, for the sugar industry, key climate risks include, drought, flood, excessive rainfall during harvest, cyclone, pests and disease. Key messages from farmer surveys are that current insurance products available to Queensland farmers (specifically, cotton and sugar cane farmers) may not address critical risks to the production and/or profitability of these systems and that farmers would prefer to have comprehensive insurance products available that cover them against profitability losses across multiple risk factors.

Based on survey findings three prototype insurance products were developed for the cotton industry Insurance products developed were Drought Cover: insufficient rainfall during the planting season – August to November; Drought Cover: insufficient rainfall during growing season – November to February; and Wet Harvest Cover: excessive rainfall during harvest season – March to June

Two prototype insurance products were developed for the sugar industry. They include; Cyclone Cover: crop damage during cyclone season – November to April; and Wet Harvest Cover: excessive rainfall during harvest season – June to December Rainfall-indexed based worked examples were also developed for sugar and cotton industry growers.

1. Introduction

Australia is susceptible to high temperature and precipitation variability (Botterill & Hayes 2012; Parry et al. 2007). These changes have large implications for agricultural production, farm financial viability and the agricultural sector's contribution to Australia's economic stability (Webb 2006). Despite the extreme vulnerability of Australian agriculture, Australian farmers are some of the least protected against climate variability in a globally competitive market.

While several types of insurance products are currently available in Australia, they are not sufficiently comprehensive to address farmers' concerns (NRAC 2012). Among the available options is the ambiguously named 'multi–peril crop insurance' (MPCI) which is misleading as it only covers just a portion of risk (e.g. fire, frost, hail) but often fails to cover certain events including drought, which is one of the most problematic of all risks faced by farmers.

Given the nature of drought and other climate risks, and with the abandonment of Exceptional Circumstance (EC) grants in 2012, there is an urgent need to investigate options to establish a liquid and viable market for agricultural insurance in Queensland, and as well as in other Australian states.

Agricultural insurance can assist farmers effectively manage the risks associated with extreme climate and weather events (Hatt et al. 2012). However, prior research concludes that currently available crops insurance is currently not commercially viable. Further, the demand for unsubsidised agricultural insurance products including index-based and weather derivatives that have been introduced into the Australian market has been limited, causing problems with market liquidity and resulting in the withdrawal of many of these products (DAFWA 2009, Hatt et al. 2012, NRAC 2012).

While there has been a policy trend led by government within Australian to wind back direct and ongoing industry assistance and protection, there may be a role for government to facilitate the development of a robust agricultural insurance market. Rather than by premium subsidy, this would most likely be through support for the provision of data collection, verification and supply systems needed to refine risk models and reduce information asymmetries. The intended consequence of this would be to reduce the price of insurance and reinsurance.

An identified issue that is consistent across all products introduced in Australia to date is access to independent and reliable information. This data problem impacts re/insurance product design, pricing, administration and the ability to obtain reinsurance (NRAC 2012). Hatt et al. (2012) concludes there may be a case for government to facilitate the provision of the needed data and/or assist the development of new products. Similarly, NRAC (2012) considers there is a role for government to assist farmers to become more self-sufficient through provision of information needed to enhance decision making and assist insurance product development.

In this summary report we summarise some of the key findings from the project. Namely we:

- Give an overview of insurance products and how this applies to agriculture and climate risk in Australia;
- Provide two worked examples of insurance products for two high value Queensland crops (sugarcane and cotton);
- Discuss mechanisms, such as mutual funds, for making crop insurance products over the long term;
- Provide some recommendations about the role of insurance for Queensland agriculture and outline possible policy directions.

2. Insurance products – worked example on insurance products and their benefits

Insurance Products and Value Related Aspects

In this section, we address the potential insurance products available from the insurance market that provide coverage against the key risks identified by sugarcane and cotton farmers. The concepts outlined herein are equally applicable to producers of other crops in any geographical region.

Willis Towers Watson's (WTW) collective resources – in Australia and the UK – have many years of experience in arranging adverse weather covers for a range of different industries, spanning the agribusiness, power, construction and entertainment sectors among others. This expertise can be harnessed to structure and execute the protections outlined in this paper. WTW likewise possess the actuarial and analytical resources required to support the recommendations in this report and are well placed to provide stakeholders with a full understanding of the potential risk transfer options.

Overview of the role of insurance

The payment of insurance premiums whether it be for one's home, possessions, car, business or even life may not be an expense that is always greatly appreciated. Yet few who chose to make such a payment would doubt the benefit of the coverage it provides.

Insurance – in one form or another – can trace its roots back through to trading systems of ancient (pre-Minoan) civilisations. The industry as we know it became more formally established following the Great Fire of London in 1666 and the development of insurance trading in Edward Lloyd's coffee shop in 1688. It was underpinned by the maxim that "the misfortunes of the few fall light upon the many".

Today insurance is an essential part of everyday life, playing a crucial role in both economic development as well as in supporting wider societal ends. Insurance helps oil the engine of the economy and it is impossible to conceive of commerce and civil society today without insurance playing its role.

Aside from the basics of issuing contracts of insurance and paying claims when called upon to do so, the insurance industry performs a broader role than is sometimes realised. For example in:

- Efficiently protecting the public through innovative risk management techniques.
  - acting as an agent for the promotion and, implementation of risk reduction standards
- Freeing up businesses and professionals from everyday risks and encouraging innovation and competition.
  - thereby protecting jobs
  - providing confidence and stability to promote growth and technological progress
- Relieving the burden from the state and providing comfort to individuals by providing safe, effective and affordable pension savings, protection and products that convert pension savings into retirement income
  - insurance companies are amongst the largest investors in any economy.

Crop insurance in Australia

Multi-peril products were first offered in Australia during the 1970s, but have not been widely taken up as a result of a detrimental cycle of adverse selection, poor results and increasing premium costs. Since that time a number of insurance companies and agencies have continued to offer products, especially so-called named peril coverage e.g. for example hail or frost. In addition other offerings are available such as farm level yield cover for broad acre crops and index-based products. The latter being relatively new to the market and, as discussed further, representing promising potential for development.

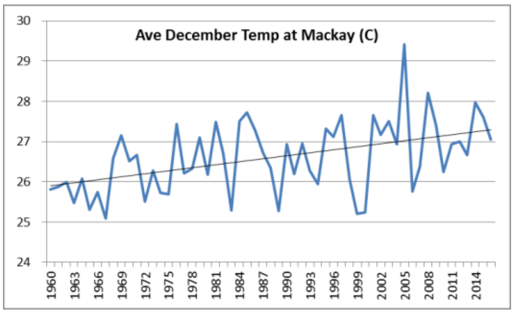
Australian farmers are not widespread adopters of crop insurance despite the fact that agriculture in Australia faces some of the greatest weather-related challenges of any developed farming economy. In simple economic terms, this suggests that the cost of insurance has not yet reached an amount at which supply and demand are reasonably satisfied.

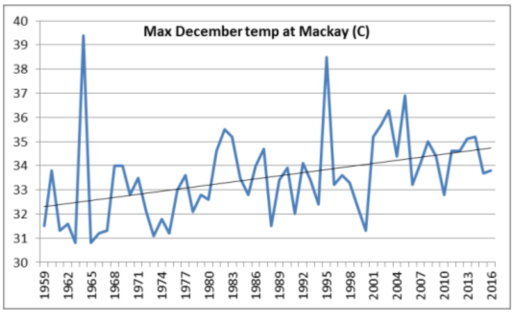
What is crop insurance for?

It is recognised that all crop producers confront season-to-season production and revenue volatility. Numerous factors are responsible for this variability but it is recognised that most of these are beyond the scope of management or control by the farmer. Crop insurance is best thought of as a means by which such exogenous risks can be transferred from the farm account: the overall yield of the farm business is thereby reduced by the amount of the premium paid but the downside unpredictability is taken care of. Crop insurance is usually a discretionary purchase as the farmer can choose whether or not to take it out and assume the cost of the premium within the farm budget. On occasions crop insurance may be a requirement of a farm seasonal loan.

Crop insurance has an important role to play in a production environment confronting climate change. Few involved in the farming sector with first-hand experience of the impact of weather on their business would disagree that, even if trends are scarcely noticeable, weather extremes and seasonal uncertainty has become more frequent.

The charts below show the visible trend for temperatures recorded at Mackay, QLD (WMO: 94367) for the 59 year period on record from 1959 to 2017. Both charts, showing December temperatures (the average and the maximum for the month) show a marked increase of approximately 1.25°C and 2.5°C, respectively, across the period. These data were selected from a single site and a single month at random but, nonetheless, are representative of the pattern shown by the data more broadly.





So how do insurers play a role in assisting the farming sector deal with climate change? Clearly insurers cannot ignore the trend in these data and the calculation of a temperature-related contract would certainly take this into account. But it is the increased uncertainty about next year's temperature (or other weather element) which insurers can help to manage.

Protection for Growers

The individual farmer research carried out by the project team (by means of questionnaires and on-farm interviews) has established that there is generally a very low take-up of the 'conventional' crop insurance available to farmers at present. These insurances include:

- **Single/'named' peril crop insurance**: typically hail, frost or fire cover (higher take-up rate for cotton and sugarcane insurance)
- **Multi-peril crop insurance**: typically whole farm yield loss protection (equivalent to 'all risks') where exclusions are specified in the policy such as failure to carry out good farming practice

- **Area yield coverage**: though, to the best of our knowledge, it is not the case that this is available for either cotton or sugarcane growers in Australia; and, finally Weather index-based protection.
- **Weather index-based crop insurance**: as further described in this report and available from at least one provider in Australia.

Although an awareness of the potential use of crop insurance as a means of risk management was found to be widespread, its take-up was very low. The reason for its low take-up was generally cited as being due to its perceived high cost; and the relatively better value of other risk management strategies (whether or not they strictly deliver an equivalent level of protection). Typically these may be better described as risk avoidance strategies, such as alternative or no planting options.

That said, for both cotton and sugar cane, there is important demand for cotton hail protection and sugarcane fire coverage both of which appear to be largely well catered for by existing insurance products. These would appear to be perfectly adequate wheels that do not need reinvention.

It is also questionable how much awareness there may be of the different types of crop insurance that are commercially available. However, again from the project's investigations, it is not clear that the insurance industry has gone far enough to explore what farmers might wish to buy if it were available. It is clearly not reason enough to maintain that premiums per se are just too expensive. If we make the assumption that the market for crop insurance is free and competitive, it follows that the market price for premiums would be 'fair' or, in other words, properly reflective of the underlying risk. And it is not refuted here that the underlying risk of crop insurance is potentially high; so it follows that the fair premium would logically reflect this and the loss history of the sector. Nonetheless high premium cost is prohibitive and accounts for the very low take-up of crop insurance by Queensland farmers and, indeed, by farmers all over Australia and in other countries.

Index-based vs traditional or MPCI insurance

The conventional indemnity-based insurance policy offerings have certain apparent benefits, especially insofar as they are usually contracted on an individual farm basis with actual losses (or physical damage) being measured at the farm itself. Conversely, index-based contracts infer the relationship between actual on-farm performance and that of the index; with the attendant concern that there may be differences between the two.

However, aside from their simplicity of operation, index-based policies offer certain distinct advantages which – under circumstances where traditional insurance either does not exist or is not economically feasible – enable the implementation of valuable risk management where it would otherwise not be possible.

The challenge faced by insurers in issuing multi-peril crop insurance stems from the costly and complicated requirement to obtain farm-level risk information and provide loss adjustment services. Index-based policies require neither of these, which reduces costs, enabling index-based programmes to be costed with lower overhead. Due to the limitations of MPCI we focus on weather index-based insurance.

Weather Index-Based Insurance

Although, as set out above, weather indexed-based products have been available to farmers in Australia for a number of years but, as yet, have failed to achieve scale, it is the conclusion of this report that such products are best likely to meet farmers' needs for affordable and effective insurance to cover their key risks.

Weather risk management contracts have evolved over the past 25 years to protect weather sensitive industries against precipitation, temperature and other index-based weather perils. These contracts generally reference an independent arbiter of actual weather conditions, such as the Bureau of Meteorology (BOM) in Australia.

Key contract variables such as attachment points, pay-outs and limits are structured to compensate the buyer for a pre-defined weather outcome, as opposed to actual loss (or strict indemnity). For this reason, the analysis and structuring components of the cover are critical in order to eliminate, or at least minimise, basis risk – i.e. the risk that actual losses are not well represented by the index. Correlating weather outcomes to increased costs, or reduced revenue, is an actuarially driven process using either actual or modelled financial and historical weather data.

As outlined in earlier sections of this report, the project has entailed an in-depth understanding of the potential cost to farmers in the event of insufficient or excessive rainfall or extreme temperatures resulting in loss of yields. The information provided by individual farmers and industry bodies can be used to structure and execute any number of weather risk transfer contracts, although initially we address:

Cotton

- Drought Cover: insufficient rainfall during the planting season – August to November;
- Drought Cover: insufficient rainfall during growing season – November to February;
- Wet Harvest Cover: excessive rainfall during harvest season – March to June

Sugarcane (perennial crop)

- Cyclone Cover: crop damage during cyclone season – November to April
- Wet Harvest Cover: excessive rainfall during harvest season – June to December

A Worked Example: Cotton

In this example, we examine the case of cotton grown in the Dalby area in the Darling Downs region of Queensland. Cotton is extensively grown around Dalby and two gins are located within a short distance of the town.

We obtained a historic yield series for the 24 year period from 1992 to 2015. The series is largely complete, with only two missing years (1994 and 2000) which are therefore ignored for the purposes of this illustration. We have also obtained the daily rainfall data series for Dalby from the Bureau of Meteorology.

Analysis of these data shows a strong correlation between the yield of cotton in a given season and the total rainfall recorded during January and February of that season. Figure 2-1 below enables a visual comparison between high/low and high/low yields.

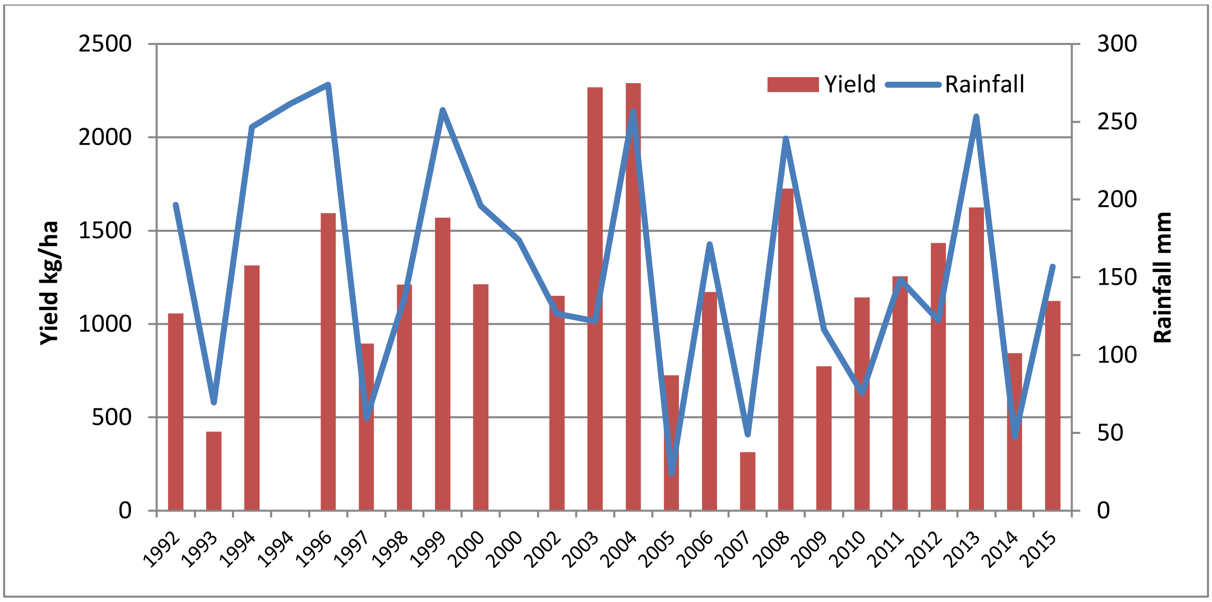


Figure 2-1 Cotton yield versus rainfall (Dalby)

In particular, it is clear that years in which the yield of cotton was markedly less than the long term average of 1,180 kg/ha were characterised by low Jan/Feb rainfall. These years were 1993, 1997, 2005, 2007, 2009, 2014: 6 years out of 24 (25%). Also, importantly, there were no years of low yields in which rainfall was not also low.

An average frequency of occurrence for poor crop yield of 1 year in 4 is rather high but is reflective of the natural variability of growing conditions in this region. A conclusion of this analysis and these observations however is that low yield can be attributed to low rainfall, regardless of other production factors and external influences.

On this basis it would be feasible to design an index-based insurance product that is referenced to the recorded rainfall during January and February as reported by the BOM at Dalby Airport. Figure 7.2 below shows the rainfall and a ‘strike’ level below which an index-based policy might payout. In this instance, for illustrative purposes, the strike level has been set at 50% of the long-term average rainfall for January and February which equates to approximately 80mm.

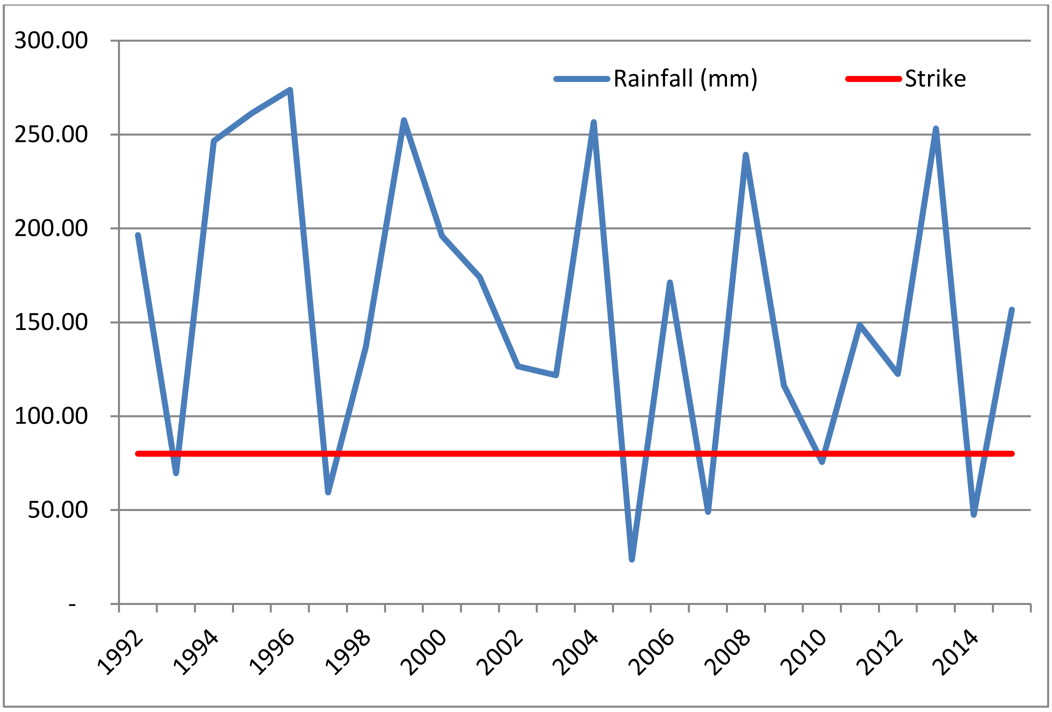


Figure 2-2 An illustration of rainfall and the selection of a trigger point

At this level of strike, it can be seen that the contract would have made payments in each of the low yield years with the exception of 2009.

In practice, it is likely that a policy that pays one year in four is likely to be more costly than is commercially attractive. So in the design of the index policy an attachment point needs to be found that balances the risk management objectives of the buyer with its premium price point. Table 2-1 below show how, for this rainfall series at Dalby Airport, a changing strike point alters the how the policy would have paid in the 24 years in question.

Table 2-1 The effect of changing the contract 'strike' point

Strike (mm):	40	50	60	70	80
1993	-	-	-	0.4	10.4
1997	-	-	0.6	10.6	20.6
2005	16.4	26.4	36.4	46.4	56.4
2007	-	1.0	11.0	21.0	31.0
2010	-	-	-	-	4.4
2014	-	2.6	12.6	22.6	32.6
No years	1	3	4	5	6
Probability	4%	13%	17%	21%	25%

For example, setting the strike point of the policy at 40mm from 80mm reduces the frequency of payment to a single year during the period. Arguably 1 year in 24 is not sufficiently frequent to provide protection in a range of years with poor yield, so a higher strike point might be preferable. We shall choose a strike point of 50mm for this illustration.

There are two further contract assumptions which are integral to the function of all index-based contacts. First is the basis on which the contract pays after the trigger point has been reached: the so-called 'tick' value is the amount paid for every millimetre recorded that is less than the strike point. In this case we have chosen a tick value of $120 per millimetre. Secondly, there is a contract limit which is the maximum payable under the contract regardless of the rainfall, here $3,000 per hectare. For the purposes of this example we make the assumption that all values apply 'per hectare' which is a simple and practical basis of operation and in line with traditional insurance procedure.

Figure 2-3 below shows how the selected trigger, tick and limit values determine the payment outcomes of the contract according to the level of rainfall recorded.

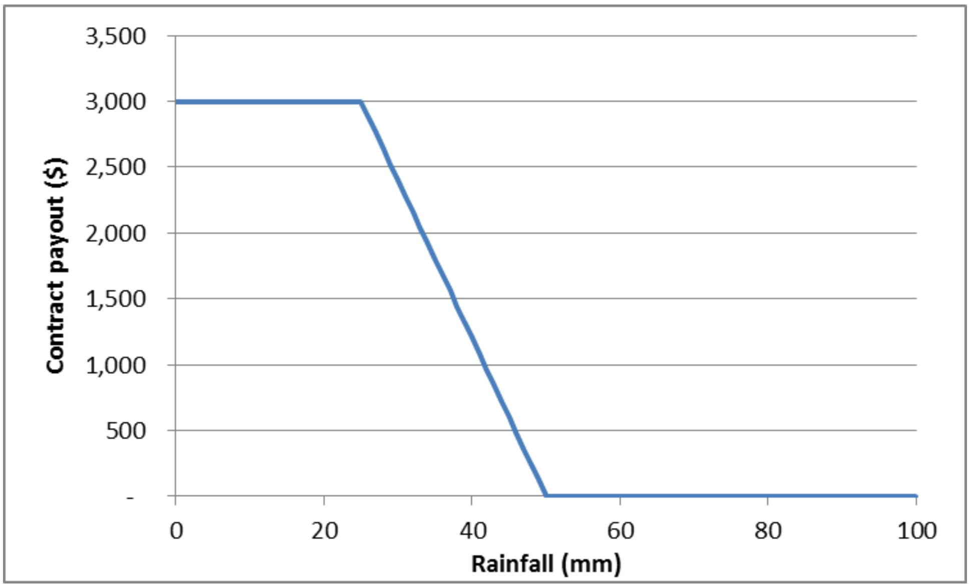


Figure 2-3 The relationship between rainfall and contract payments

On this basis Table 2-2, below, shows the payments that would have been received in each of the three years for which a payment would have been triggered.

Table 2-2 Illustration of an index-based contract payout

	Strike (mm)	**Tick** ($/mm)	**Limit** ($/ha)
	50	120	3,000
2005	26.4	3,168	3,000
2007	1.0	120	120
2014	2.6	312	312

In this case, as there would have been no payments made in any of the other years since 1992, the average payment for the entire time series would have been $143 per hectare (being $3,432 ÷24). It is this average payment which forms the basis of calculating the premium. In practice this simplifies the process that an insurer might typically use to model the expected loss under the contract. In addition, of course, the final premium charged would include a commercial margin to cover expenses, profit etc.

A Worked Example: Sugarcane

As a contrast to the previous worked example for cotton low yield resulting from a shortage of rain, a situation which develops over a moderate period of time, weeks and months, we consider below a distinctly different cause of crop loss, namely damage to and loss of yield of sugar cane resulting from cyclones.

It is well recognised that tropical cyclones occur with some regularity in the Northern Territory, eastern and western states of Australia and their destructive impact on the sugar cane industry in Queensland can be very severe. Canegrowers who participated in the survey upon which this report is based responded that while valuable fire insurance was available they were not availed of any suitable coverage for cyclone related damage.

The effect of cyclone on sugarcane is largely twofold: (i) mechanical, whereby the stems are snapped and torn by the strength of the wind leaving the plant compromised and (ii) water logging as a result of the extreme rainfall associated the cyclone.

Figure 7.4, below, shows sugar cane yields in the shire of Burdekin recorded since 1970. It shows that 2 out of the 4 years with yields below the long term coincide with cyclone activity in the area. However low rainfall is also associated with yield short fall.

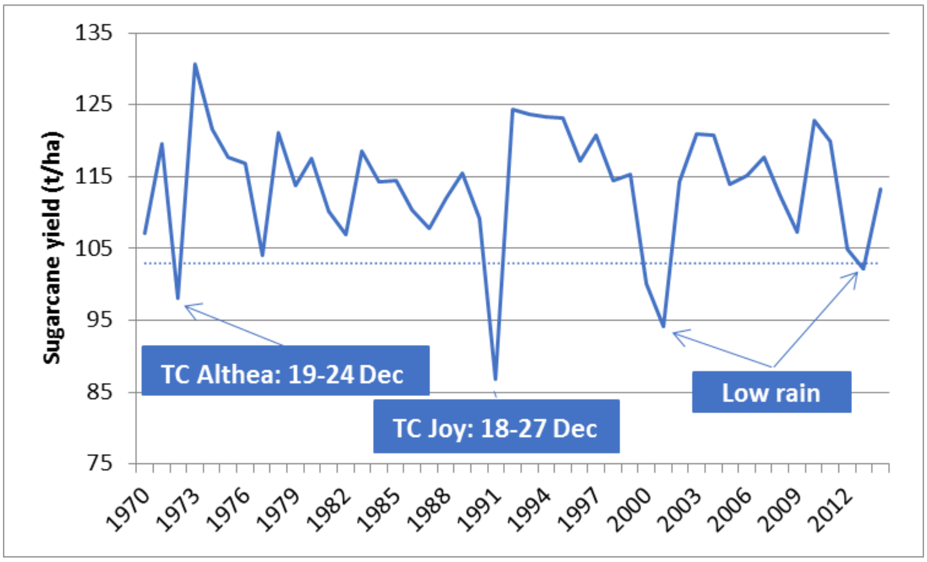


Figure 2-4 Sugarcane yields in Burdekin

However, it seems that extreme rainfall on its own does not reflect years of low yield in the historical yield records. Table 3 shows the maximum daily and aggregate 3-day rainfall recorded at Mackay. There are some events of unprecedented magnitude reflected in this dataset and a comparison with more localised yield history than was available from this project's survey would be expected to reflect damage and yield loss associated with rainfall of this magnitude.

Table 2-3 Extreme rainfall events at Mackay

Daily Max (mm)	3-day max (mm)	Daily ave for month (mm)	Date of occurrence
388.6	796.1	9.3	01 March 1963
356.0	543.6	11.3	15 February 2008
326.0	414.0	3.1	17 November 2000
314.0	781.6	5.8	29 December 1990
302.8	467.6	11.3	06 February 1979
286.0	357.6	9.1	05 January 1996
255.8	513.2	9.1	03 January 1991
249.6	438.4	11.3	02 February 2007
249.0	484.8	9.3	29 March 1976

Conversely, we note some correlation associated with low rainfall seasons which are shown both in Figure 7.4, above and Figure 7.5, below which compares grower records of sugarcane yield at Mount Kanigan with the accumulated rainfall in September, October and November.

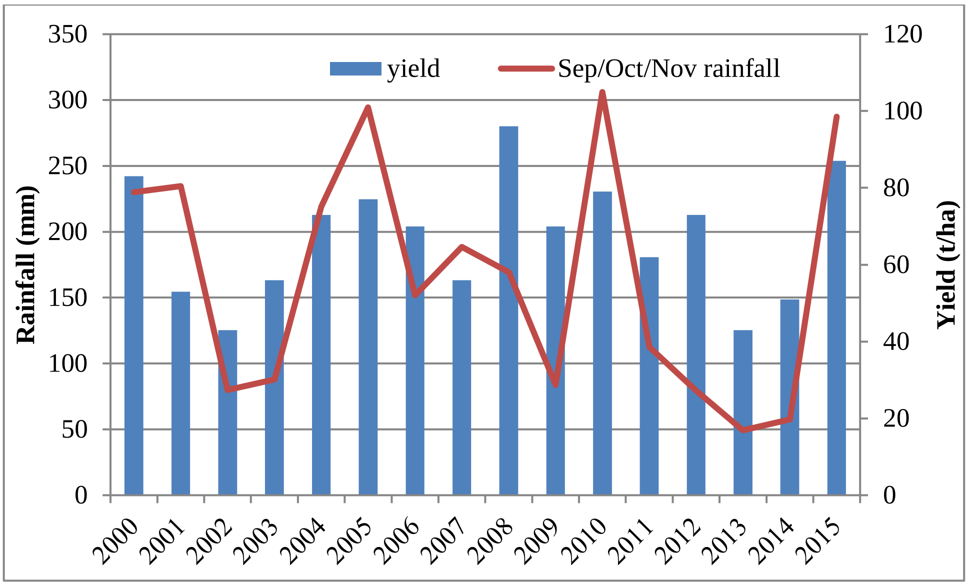


Figure 2-5 Sugarcane yield vs rainfall at Mount Kanigan

We note that there is not only a wide range of periodic rainfall such as that shown in Figure 7.5 above but also the variability of monthly rainfall can also be extreme. Figure 7.6 below shows the monthly profile of rainfall recorded at Mackay and that the maximum rainfall may be ten or more times the monthly average.

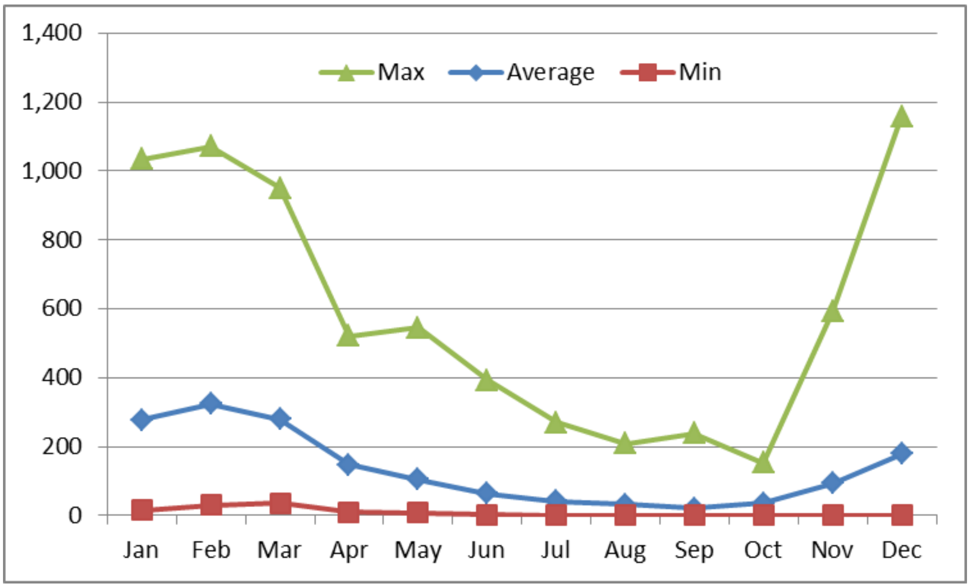


Figure 2-6 Profile of monthly rainfall at Mackay (1960-2016)

This report notes the potential suitability of a different design of index-based insurance product known as a "cat-in-a-box". This form of protection is suitable for event related loss such as that arising from the occurrence of a cyclone. The index definitions include: (a) a defined area, (b) the definition of the event occurring within that area and (c) the payment criteria associated with (a) and (b). Although this style of protection refers to a "box", the shape of the area may equally be a circle, rectangle or other defined polygon.

The definition of the event normally refers to the magnitude of the insured element, in this case the magnitude of the cyclone which may be defined by reference to one or more physical measurements or, perhaps, more simply being a 'named' cyclone. By definition, these have reached a set threshold of magnitude in terms of wind speed and therefore damage potential.

The payment under the contract is usually defined as being a function of either (a) binary i.e. any event within the 'box' or (b) a time-dependent payment whereby the longer the period of time event remains within the 'box' the greater the payment.

Under certain circumstances, the 'box' may have a series of boundaries, for example concentric circles for which events occurring in the inner circle(s) – closer to the assets at risk – receive a higher level of payment than events occurring in the outer circle(s). This design style is appropriate for elements such as windstorm and earthquake where the damage impact attenuates with distance.

So, with cyclone activity, events passing some distance from the sugarcane growing area may bring high wind and rainfall but neither sufficiently in excess to cause damage. Indeed, plentiful rainfall may have a beneficial impact on subsequent yield.

It is the observation of this report that the sugarcane industry in Queensland would benefit from the availability of cyclone coverage. For reasons set out elsewhere in this report – and as borne out by the lack of coverage currently available to growers – we believe that an innovative approach to the design of this coverage is needed to deliver an appropriate product that is as affordable as the variable climatic conditions allow. An index-based 'cat-in-a-box' style of coverage offers the potential to extend the present fire coverage to include an element of cyclone protection without the need for a costly insurance infrastructure. Such an index-based product may also be supplemented with either extreme low or high rainfall protection.

Mechanisms for making crop insurance products over the long term

Group Buying Power

Queensland Farmers Federation members, Canegrowers and Cotton Australia, are in a position to use their size and scale of their membership base as a way of providing more cost-effective cover to growers. Mechanisms, such as a captive insurer or discretionary mutual fund (DMF), can be used to pool risk common to growers. Such arrangements can facilitate efficient risk sharing among growers by aggregating low value, high frequency losses and funding these from a dedicated pool of shared capital, meaning that external insurer capital would only be used – and paid for – to protect against an accumulation of smaller losses or one-off large losses in excess of Canegrowers' or Cotton Australia's risk appetite.

Captive Insurer

The establishment of a captive insurance company is one way for organisations to exercise an enhanced degree of control over the provision of risk transfer products. Additional benefits that could accrue from the creation of a captive include:

- Direct access to reinsurance (wholesale) markets which would streamline the delivery of the products discussed previously and therefore reduce frictional costs
- Quarantining of exposure to insurance products within a special purpose vehicle under the full control of the organisation
- The creation of a risk management framework and culture within the organisation which could link with Best Management Practice (BMP) framework already in place to accommodate growers' existing exposures.

Discretionary Mutual Fund

Another commercially proven mechanism to provide insurance-type protection to growers is by the establishment of a DMF. An industry DMF could be established in a shorter timeframe and at a lower cost than a captive. WTW has experience in establishing DMFs and has the requisite relationships with legal firms and taxation advisers to obtain clearance of all documentation and a tax opinion before submission of necessary paperwork to the Australian Securities and Investments Commission (ASIC).

WTW operates a global Captive Management Practice with operations in all key captive domiciles which has considerable experience in establishing and managing captives and DMFs for a range of client size and industry.

The author recommends that priority be given under the DCAP 2 Project to investigating the benefits for growers of group buying power.

Insurance Products Conclusion & Recommendations

It is our view that the Queensland agricultural sector has an excellent opportunity to provide its farmers with protection against uninsured seasonal risks to crop production. It has been observed in the responses to the farm-level questionnaires carried out during the course of compiling this report that there remains unfulfilled demand for such protection to be made available. The Australian agricultural sector in general and the cropping sector in Queensland in particular, is extremely highly exposed to production volatility as a result of weather risks.

Index-based weather risk management contracts can be extremely simple in terms of their operation, transparency and settlement process. The payments made from these contracts can be used to compensate for lost revenue or reimbursement of costs for almost any type of agribusiness weather peril. The analytical and structuring undertaking to arrive at the most appropriate index and pay-out levels, in the interests of minimising basis risk, is however somewhat time consuming and labour intensive. For this reason, we recommend extending the DCAP project to enable the development of the most appropriate offering to Queensland's farmers.

An important part of our analysis would also allow potential solutions to be presented to farmers and develop a range of products for a variety of crop exposures for different seasons and regions. The examples used in this paper are a snapshot of the many options that can be structured, and alternative pilot programmes should be considered for analysis and structuring.

Our recommendation is that we work together to develop a pilot programme for a discreet set of exposures for a single cropping season. This would not only allow Willis Towers Watson to more fully demonstrate the value and effectiveness of such products, but also minimise the up-front cost and complexity of the analysis. Should the pilot programme gain acceptance from Queensland Farmers Federation's member bodies, additional solutions can be tailored for other crops, perils and regions.

A range of options, including multi-year and risk sharing versions, would be included in a detailed report produced from our analysis. The opportunity to build on this pilot programme would seem to be substantial given the range of weather perils faced by farmers.

Formal insurance market quotes for one or more of the options presented would then be sought from a range of highly-rated Australian and global insurers, reinsurers and specialist weather risk management underwriters. This would allow for sufficient competitive tension and counter-party security for such contracts. Capacity in excess of $200m per contract is available from specialist markets and their supporting carriers.

Internationally there are examples of Governments providing a partial insurance subsidy to reduce their financial exposure for any weather-related support. Whilst it is yet to be seen if this is a viable option for Australia, these types of initiatives should be thoroughly investigated to determine any potential savings for the Government.

3. Possible Policy Directions

Agricultural production in Australia, particularly in Queensland, is subject to volatile weather and climatic conditions such as drought, floods, storms, frost and cyclones. These risks will pose increasing challenges for farmers, as it is predicted that climate change will increase the frequency and impact of such events. Further, the Australian farm sector experiences a higher degree of production risk than other sectors of the economy.

It has been observed in the responses to the farm-level questionnaires completed while delivering this project that there is a demand for appropriate risk management tools (insurance) to be made available. Key messages from farmer surveys are that current insurance products available to Queensland farmers (specifically, cotton and sugar cane farmers) may not address critical risks to the production and/or profitability of these systems and that farmers would prefer to have a more options when deciding on insurance products that meet their business needs.

Government policy and investment can have large impacts on agricultural insurance. The South Australian, Victorian and New South Wales state governments have recently removed stamp duty from agricultural insurance, a positive and proactive step to drive agricultural insurance uptake. The Western Australian Government and New South Wales Government are also investing in weather station infrastructure to assist the agricultural insurance market.

The level of premium is still a major concern for farmers. Effective policy decisions, coupled with self-supporting low cost products may be able to deliver attractive and affordable insurance products for farmers.

Potential recommended products are climate index-based insurance for crops (e.g. sugarcane and cotton). The project has recommended index-based insurance products as it recognises the necessity for self-supporting low cost products.

The project has shown the potential for more affordable insurance projects. However, in order to ensure product affordability, innovative mechanisms need to be identified to roll out index-based insurance products. This may involve investigating options of new funds 'such as discretionary mutual funds' to roll out optimal insurance options.

It may also be possible that farmers with the appropriate Best Management Practice (BMP) accreditation benefit through a premium rate discount. The effects that viable agricultural insurance would have on risk profiling of rural lending is another area that needs to be researched with government support.

Large parts of the agricultural sector are unaware of the potential benefits of agricultural insurance and its use as a risk management tool. Therefore, there is a need to educate farmers about the value of insurance, through shed meetings and one on one facilitated meetings (e.g. phone or in person).

4. References

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