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A Survey of Price Risk Management in the Australian Cotton Industry

Tim Ada, Bill Malcolm and John Williams

Tim Ada, Department of Primary Industry, Victoria

Bill Malcolm, Faculty of Agriculture and Food Systems, The University of Melbourne

John Williams, Price Risk Management Consultant and Educator

Abstract

Over 95 per cent of Australian cotton producers have attempted to manage price risk at some time, using a range of management strategies. Nearly 60 per cent of Australian cotton producers surveyed in this study stated that price risk management had a positive effect on their farm business. Findings from the study suggest that price risk management is only one of a suite of business management tools. Strategic use of price risk management tools can have positive outcomes.

A lack of understanding of price risk management and, more specifically, recent currency exchange losses and high production risks were the key contributing factors for the 21 per cent of the surveyed producers who stated that price risk management had a negative impact on their business.

Approximately 10 per cent of the cotton producers surveyed operated dryland production systems. These producers often incurred a broader range of production risks, and the resulting production uncertainty inhibited effective use of some price risk management strategies.

One in four of the surveyed cotton producers had an agriculture-related tertiary qualification, yet few (around five per cent) had undertaken any form of specialist price risk management training.

The primary conclusion from the study is that the uptake and effectiveness of price risk management in the Australian cotton industry is constrained by the extent of producer experience, confidence and understanding of price risk management principles and processes.

Introduction

The trade of Australian agricultural commodity exports generated over $250 billion over the period 1980 – 2000 (ABARE 2001). Cotton is around Australia's fourth largest rural export, valued at over A$1.15 billion in 2002/03 (ABARE 2004). When cotton production peaked in 2000/01, ABARE (2004) reported that cotton exports were valued at approximately $1.95 billion. The deregulated nature of the Australian cotton industry exposes individual cotton producers to global market signals and price variations. Producers in the cotton industry must manage a broad range of risk variables for continued viability.

The reasons why farmers do or do not use futures market instruments has been studied quite a lot in the United States, much less so in Australia. Simmons (2002) is one example. The research conducted in the US cotton industry has tended to find that the use of forward pricing instruments by farmers is related to farmers' education, experience, farm leverage, farm size, off-farm incomes, expected income changes from hedging and beliefs that hedging could stabilize income (Shapiro and Brorsen, 1988). Apsluns *et al* (1989) found age, attendance at seminars, use of computerized information, farm size, farm leverage, and participation in government commodity programs influenced the extent to which farmers undertook price risk management activities. Isengildina and Hudson (2001) found that use of hedging by cotton producers was affected positively by farm size and leverage and was affected negatively by marketing training, belief in the benefits of pools and personal marketing preferences. Vergara *et al* (2004) found that choice of marketing techniques by cotton producers was affected by the number of acres they cropped, which positively influenced pooling and negatively influenced use of cash sales. Cotton producers prepared to incur higher marketing transaction and training costs tended to choose futures and options and forward pricing. Producers keen to speculate chose pooling while the risk averse producers did not do so. Those producers who regarded the markets as being efficient preferred cash sales.

The aim of this study is to assess the extent to which effective on-farm price risk management practices are currently influenced by a range of demographic, agronomic, biophysical and individual factors. The objectives of the study are:

i. Quantify the uptake of on-farm price risk management in the Australian cotton industry.
ii. Identify the characteristics of effective uptake of on-farm price risk management.
iii. Identify barriers that prevent effective uptake of on-farm price risk management.
iv. Investigate the relationship between price risk management and farm business management.

Risk

There are a high number of risk variables affecting the marketing and the production of agricultural commodities. Some industries and indeed some producers are more responsive than others to fluctuating prices. Australian cotton producers have a modest share of the world cotton market and thus are price-takers. However, they have the opportunity to directly improve price performance by adopting marketing (e.g. forward selling or hedging) or diversification strategies (e.g. grain, pulses, oilseeds and cattle).

Despite the majority of Australian cotton being grown under irrigation, the cotton crop is subject to a broad range of production risks. For instance, the availability of water supplies and pest and disease incursions affect quantity. Seasonal temperatures can affect quality, and growers can receive large penalty discounts for poor quality. Rambaldi and Simmons (2000) suggest that

significant price variability is the result of these production risks that influence the supply of cotton; this in a context of inelastic demand and protectionist policies in key markets.

While global cotton prices were supported above US60 cents/lb for much of the last quarter of the twentieth century, the price of cotton dropped to as low as US28.65 cents/lb (in November 2001), highlighting the marked price variation.

While enterprise diversification has been a traditional method of managing price risk on farms, Australian cotton producers are becoming more specialised because of large capital investment requirements and the need to capture economies of scale to remain internationally competitive. As a result, cotton producers are more vulnerable to price risk due to a higher proportion of farm revenue dependant on single commodity.

Profarmer (1998) suggested that over the ten years to 1998 many Australian agricultural producers had confined 80-90 per cent of their revenue streams to only two or three commodities, and as a result their risk exposure had intensified. Specialised commodity producers may have a greater need to manage price risk than more diversified producers.

A broad combination of knowledge of commodity and financial markets, financial and business management skills, and the ability to interpret past experiences are usually required to identify, design and implement an effective price risk management strategy. Producers or their agents who are not proficient in one or more of these areas find it difficult to effectively manage price risk. There are a diverse range of service providers that offer relevant price risk management education and technical training programs to cotton producers.

Risk variables

Position risk

Position risk is the most fundamental risk taken by all commodity traders, including cotton producers. A position in the market is established as soon as the first dollar is spent and the risk continues until cash settlement is concluded (Williams and Schroder 1999).

For a cotton producer, a market position is taken at the time of buying seed, fertiliser and chemicals and is at risk until final cash settlement, potentially six months (or more) later. Indeed, a position in the cotton market is initially taken with investment in specialised infrastructure – land, irrigation, plant and equipment. A decision to produce can only be made by analysis of historical price data and using the probability of future success as a guide for decision making.

Traditional methods of position risk management have been enterprise diversification, typically into grain crops and cattle for dryland cotton producers. However, position risks are changing as farm businesses become more specialised.

Farm business risk

In the identification of risk variables in the New Zealand agriculture sector (which included survey data from over 2,500 producers), Martin (1996) found that agricultural producers nominated six broad risk categories and classified them in order of importance:

- Market risk (product prices, input costs and world and domestic economic variation)
- Financial risk (interest rates and land prices)

- Production risk (rainfall and climatic variability, disease and pest incursions, yield variation)
- Regulatory risk (changes in Governments, programs and policies)
- Human risk (accidents, health problems and changes in family situations)
- Miscellaneous (theft, changes in technology and labour and contract problems)

Martin (1996) concluded that 'changes in product prices' was ranked as the most important risk source in almost every case.

Furthermore, Martin (1996) characterised risk in two categories – business and financial risk. Business risks are those that affect the net operating income of a farm business and incorporate production risk and market risk (including price risk). Financial risks are those that affect net cash flow and are usually associated with debt servicing (e.g. the risk of interest rates rising or lack of finance).

Jolly (in Martin 1996, p. 33) suggested that there are two broad strategies for producers to manage risk; those that can be used to minimise business *risk exposure*, and those that aim to minimise the *impact of production and financial risk* on the farm business. Business risk exposure can be minimised by activities that reduce the variability of income such as enterprise diversification (spreading risk), production inputs (e.g. use of irrigation) and niche marketing (reducing price variability). Alternatively, the impact of risk on the farm business can be minimised by activities that increase the capacity of the business to absorb unfavourable downturns and include productivity increases, debt reduction and maintenance of a cash reserve, as well as price risk management.

Price risk

Prices fluctuate primarily due to changes in the supply of and/or demand for a commodity and are influenced by both historical prices and future market expectations. Theoretically, assuming the same demand, the greater quantity of commodity available for purchase will lower the price; while any reduction in quantity will result in a price increase. However, the relative market position to competing commodities (e.g. substitutes) and the paradox that many growers expand operations in a falling market (e.g. to maintain income) tend to contradict the theory.

The drivers of this changing balance between supply and demand are therefore many and varied, but usually include production variations caused by climatic or disease impacts, economic or political instability or psychological factors. Stocks on hand, substitution and price relativities are also important factors that influence the supply and demand dynamic and thereby also effect commodity prices.

Kingwell (2000) stated that price risk varies according to farm enterprise. For example, coefficients of variation of price (calculated using de-trended real prices) indicated that during the 1990's, cotton producers faced less price risk (lower price variation) than both wheat and lamb producers, but faced greater price risk than wool and canola producers. Kingwell also found that price risk (for any given agricultural commodity) could vary significantly over time.

The demand for textile fibre is relatively *inelastic.* However, large price movements in one particular fibre can result in substitution for other fibres. Where commodities have similar functional properties and end-uses such as natural and synthetic fibres, textile millers are extremely sensitive to relative price movements among competing fibres.

Jacobson and Smith (2001) found that "in over half of cotton's total end-uses, price was a serious competitive consideration; hence; anything that inflated it worked to cotton's disadvantage" (p.

117). For example, if the price of cotton were to increase above US65 cents/lb, there could be increased substitution for synthetic fibres such as polyester, assuming other variables such as exchange rate relativities remained the same.

Substitution can also occur with the production or supply of a commodity, particularly when there are limited resources such as land or water. For example, if market indicators were to forecast a significant fall in cotton prices, producers may choose to grow another crop (i.e. a substitute such as grain sorghum) in preference to cotton. Therefore, the price relativities between competing crops are important in determining how much cotton is produced in any given season.

Price risk management

Theoretically, price risk is a measure of both upward and downward deviations from the mean (average price). In the case of producers however, it may only be the downward deviations that are of primary concern (Tomek and Peterson 2001). The role of price risk management is not necessarily to maximise profits, but rather to reduce (or smooth) the deviations in price that results from the 'ebb and flow' in supply and demand. Furthermore, it can be implemented to control losses.

Managing price risk can be as simple as putting money into fixed-term bank investment deposits during years when prices are good and withdrawing these investments when prices are low.

Tomek and Peterson (2001) in their review of risk management in agricultural markets suggest that producers have three key marketing strategies available to them to manage price variation. They are (i) spot-market strategies, (ii) forward contracts, and (iii) hedging by utilising futures and/or options contracts. More recently, hedging strategies have included over-the-counter (OTC) products available through merchant banks.

Pricing and marketing strategies in agricultural forward markets usually contain one or more tools to manage price and/or currency risk. There are seven main price risk management tools available – forward contracts, buy and sell futures, and buy and sell put and call options.

The more common price risk management strategies for cotton growers are summarised as follows:

1. Pool (averaging) Contracts: A pool contract between a producer and cotton merchant (or cooperative buying organisation) enables the producer to deliver (sell) a predetermined quantity of commodity, in return for a final price determined by the average price received for all commodity sold through the pool (for a particular period). Pool contracts can help reduce annual price variation by averaging price over a number of selling periods and a number of export markets.
2. Forward Contracts: These are contracts between a producer and merchant (buyer) to sell a commodity at an agreed price at a future point in time with predetermined delivery specifications. Forward Contracts cannot usually be freely traded due to their specific nature (Lubulwa et al. 1997). When roll-overs, to defer delivery into the next year are permitted (usually at a discount), these contracts can be designated with flexible 'force-majeure' clauses. Such contract clauses enable producers to significantly reduce the risk of not producing to specification in any one year. A Call-Pool Contract is a forward contract that allows the producer maximum flexibility in determining when the futures price, currency and basis are

locked-in. This contract can also include force-majeure clauses and can provide additional taxation benefits (through price and/or payment deferment).

3. Hedging using a Sell Futures Contract: Sell Futures Contracts establish a short position in the futures market and profit when prices fall. A producer, with downside risk (i.e. prices will fall) could use Sell Futures Contracts to lock in a price, in which case it would be referred to as a 'short futures hedge'. Alternatively, a merchant could offer a Call-Pool Contract to a producer, and the producer decides when futures (sell), currency and basis are locked-in (as outlined above in 2). With the Call-Pool Contract, the merchant handles the futures and currency accounts, thus minimising the responsibility for the producer.
4. Hedging using Buy Put Options (establishes a floor in the market): A producer can establish a price floor by taking out Buy Put Options. The level of the floor price is determined by the strike price and the premium of the Buy Put Options. When merchants utilise Buy Put Options and offer physical upside benefits to producers in a Forward Contract, the contract becomes a Minimum-Price Forward Contract or a Guaranteed Minimum Price Contract.
5. Cash/forward sale plus Buy Call Options (establishes a floor in the market): A producer could either sell physical cotton or take out a Forward Contract, and then take out a Buy Call Option. This may be done to cover the forward seller in the event of crop failure and having to buy in the spot market to deliver the forward sold cotton. The forward seller is covered if the spot price has risen since the forward contract was struck. This is equivalent to a Minimum-Price Forward Contract or a Guaranteed Minimum Price Contract.
6. Over-the-counter (OTC) Products: Several Australian merchant banks offer 'swaps', 'floors' and 'collars'. At least one bank offers a participating forward product which facilitates a zero-cost floor but with 50 per cent gain on the upside. These products are designed to offer pricing flexibility up to three years in advance, with no delivery component.
7. On farm storage: A simple strategy can involve storing the product for sale at a more opportune time.

Selection of these strategies by cotton producers may differ prior to harvest, at harvest or post harvest and an astute producer may typically select a combination of complementary strategies and tactics to best manage price risk. Lubulwa et al. (1997) stated that with the ability to establish some forward contracts, some futures contracts with different contract months and contract prices, and some options contracts that have different strike prices and expiry dates, it is often possible to derive a diversified price risk management strategy. If production risk is high, then strategies with force-majeure clauses and/or some OTC products can be used to avoid the problem of delivery default.

Active price risk management can be contrasted with the status quo, which in many business cases may be a do-nothing strategy. Here the price received is entirely subject to the spot-market price at the locality and time of sale. The benefits of such a strategy include no delivery risk, but the risk of downside price movements can be high.

Uptake of price risk management

Martin's (1996) risk management study in New Zealand agriculture, found that while price risk was the most significant risk faced by all producers, only 58 per cent (average) actively employed price risk management strategies. Of this 58 per cent only 32 per cent (or less than 20 per cent of all producers) utilised forward or futures contracts. Furthermore, Lubulwa et al. (1997) found that only 4 per cent of Australian wheat producers and 2-3 per cent of wool producers used futures contracts. However, more recent estimates of wheat growers using merchant-based forward pricing products have been as high as 25-30 per cent in some years (Kingwell 2000; Williams 2002).

Simmons (2002) noted that published estimates of the use of futures and options contracts by cotton producers are not available, but suggests significantly more widespread use than in the Australian wheat and wool industries. Through personal observations, Simmons (2002) suggested wide use of the New York Cotton Exchange (NYCE) by Australian cotton producers for hedging, in conjunction with exchange rate hedges. One reason for this may be the close correlation between the Australian and international cotton price, with the latter being based on the New York Cotton Exchange futures price (which is taken as the international price discovery benchmark). Basis risk during hedging on the NYCE is therefore minimal compared to other agricultural commodities (and their relevant futures exchanges).

In his study into price risk management for Australian broad-acre farmers, Kingwell (2000) proposed that because many Australian agricultural commodity producers do not generate large cash incomes (less than a fifth of Australian farms generate annual farm cash incomes of more than $100,000) and are in a reasonably sound equity position, many producers see little merit in expenditure on price risk management. He went on to suggest that farms with large cash incomes and/or large cash expenditures are more likely to see merit in investing in price risk management. Most Australian cotton producers fall into this category.

In addition to Kingwell's findings, Brorsen's (1995) studies into price risk management found that more highly geared producers (i.e. high levels of borrowings) were more likely to use futures hedging due to their greater exposure to loan repayment schedules. In 1998, ABARE found that Australian cotton producers have, on average, significantly lower equity (73 per cent business equity ratio) than wheat and wool producers (83 per cent and 90 per cent respectively). This is consistent with evidence that suggests that cotton production is highly capital intensive. Brorsen's and ABARE's findings support Simmons (2002) observations that a greater proportion of Australian cotton producers are likely to use futures contracts in their price risk management strategies, relative to Australian wheat and wool producers.

Simmons (2002) concluded his study with a pragmatic view – that futures markets may simply provide a forward price discovery mechanism; and that the majority of individual commodity producers are unlikely to directly use futures contracts for hedging for a variety of reasons. However, producers may be more likely to utilise the benefits of futures and options when merchants package them as forward-pricing products.

Most current price forecasts suggest that agricultural commodity prices will continue to decline in real terms. Furthermore, some industry observers predict greater price volatility in the future. It is therefore likely, that such dynamics will lead more agricultural commodity producers to investigate and/or review their price risk management strategies in future years, so as to hedge against low prices and capitalise on periods of high prices (Kingwell 2000).

There are many factors including attitudinal, financial and physical impediments that can impede effective price risk management. Other externalities, such as market sentiment, market liquidity and foreign exchange volatility also affect the ability of producers to effectively manage price

variation. Little is known about the extent to which cotton growers use price risk management methods.

Research Method

The primary research objective for this study was the identification of cotton producer's understanding and uptake of on-farm price risk management strategies. To effectively meet the study objectives two separate, but inter-related case study data collection procedures were developed. The two procedures were a producer questionnaire and an industry representative interview process.

Producer questionnaire

A survey questionnaire was designed to collect farm, production and business management information directly from a sample of Australian cotton producers.

Questionnaire sample

A sample of 500 cotton producers was obtained. The sample had been collated through direct contact with producers, merchants, farm business management consultants and rural suppliers over the period 1990 – 2003; and was a very comprehensive, independent sample of any Australian agricultural commodity industry (Williams 2002). Cotton Australia estimated that in 2003 there were approximately 1,500 cotton producers in Australia. The sample of 500 cotton producers represented approximately one third of the industry. One quarter of the sample represented NSW producers, while the remaining 75 per cent represented Queensland producers. This is consistent with evidence that there are a greater number of small producers in Queensland, even though the majority of the cotton (by volume) produced comes from NSW. There was no prior knowledge of farm demographics or production data of the sampling frame.

Design of questionnaire

The survey questionnaire was designed to capture a broad range of quantitative and qualitative data for analysis and to maximise participation by producers. A mailed questionnaire approach was chosen, due to the restrictive costs associated with face-to-face and phone interviews. The questionnaire was limited to two A4 pages with only eight questions. Where possible, tick boxes were provided to limit the amount of writing required. The key questions were stated in a specific manner so as to encourage detailed responses, yet were sensitive to personal information such as any reference to income or profitability. The key questions were developed to explore the 'hows' and 'whys' rather than simply the 'dids' and 'did nots'.

The eight key questions were designed to capture the following information.

Producer and farm-specific demographics, including name and locality, years in industry, qualifications, farm size, production system, cotton crop area and relative farm income.

i. Whether price risk was managed; and if not, why not.
ii. The specific strategies employed by producers to manage price risk.
iii. Whether price risk management strategies changed annually - and why/why not.
iv. Whether producers or merchant and/or licensed futures advisers managed price risk on behalf of producers.
v. The primary motivators for producers to manage price risk.
vi. How price risk management affected farm businesses.

vii. Further relevant information relating to on-farm price risk management (inviting producers to attach copies of price risk strategies, etc.).

The questionnaire was mailed to the sampling frame (500 cotton producers) in November 2002. November was considered an appropriate time, approximately two months after sowing and five months prior to cotton harvest, when price risk management and related issues would be highly relevant to producers.

Case study literature suggested that an average response-rate to a 'randomly-mailed' questionnaire was in the order of 10 to 25 per cent. At the outset of the research, a target response-rate of 75 completed questionnaires (representing 5 per cent of the cotton industry) was established, as it was considered to be of sufficient significance to enable credible analysis.

Industry representative interviews

The industry representative interviews were designed to facilitate an initial interrogation of the questionnaire-generated data, so as to identify any significant irregularities and to guide data-analysis. A sample of five cotton industry professionals was identified (herein called 'industry representatives'). These representatives were drawn from the cotton marketing, finance and farm-service (advisory) sectors. The industry representative interviews were designed to test the credibility of, and help interpret, the data obtained from the producer questionnaires. A semi-structured interview format of approximately 40 minutes was conducted. Key interview questions were developed in line with the objectives of the study to capture the following information.

i. The validity and credibility of the producer questionnaire generated data.
ii. An interpretation of the data collected from the grower questionnaire – i.e. what do the findings mean in an industry context.
iii. Views regarding the cotton industry generally - specifically in regard to industry structure, financial performance, and adoption of price risk management (relative to other Australian agricultural commodity industries).
iv. Definition of the role of cotton industry service providers (merchants, consultants/advisers, financiers) – specifically in regard to price risk management.
v. Identification of emerging trends within the cotton industry – in regard to industry dynamics and the likely impact on industry viability.
vi. Views regarding the future challenges for the cotton industry

Results and Discussion

A total of 105 completed questionnaires were returned out of the 500 sent out, representing a response rate of approximately 21 per cent. The response rate was 26 per cent if incomplete questionnaires were counted.

The study sample (105 producers) of the Australian cotton industry is characterized below:

- The total area of cotton produced by the respondents equates to 51,500 hectares, which represents approximately 12 per cent of Australia's cotton production area; based on a 98/99 – 02/03 average annual crop area of approximately 425,000 ha per annum.
- The study sample equates to approximately 309,000 bales per annum; assuming the 00/01 season average yield of 6.6 bales/hectare (227 kg/bale).

- The study sample represents approximately $170 million per annum worth of cotton; assuming an average price of A$500/bale.
- 70 per cent of the respondents were from Queensland; 30 per cent from New South Wales.
- 90 per cent of the respondents produced cotton using irrigated production systems.
- 27 per cent of the respondents had an agriculture-related tertiary qualification.
- The average experience of respondents (in terms of years in the cotton industry) was 18yrs.

The study sample represents a total farmed area of 255,000 hectares, which equates to an average farm size of 2,450 hectares (i.e. total farmed area / no. of respondents). With an average cotton crop area per farm of 490 hectares, cotton represents approximately 20 per cent of average farm production, by area. However, in regard to income generation, the study found that on average, cotton accounts for 64 per cent of farm income, suggesting that cotton is a high value and potentially resource intensive crop.

In Figure 1 is shown that the proportion of farm income derived from cotton increases as the proportion of cotton grown (by farm area) increases.

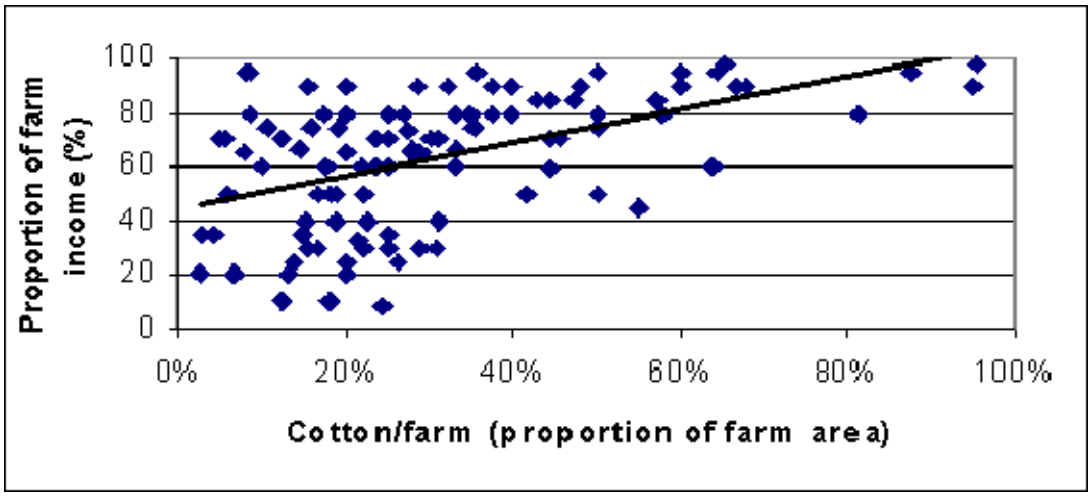

Figure 1. Cotton production (proportion of farm area) versus proportion of farm income derived from cotton.

In Figure 2, the use by cotton producers of forward contracts and five other price risk management strategies - enterprise diversification, cotton storage, Call-Pool Contracts, futures and option contracts and over-the-counter (OTC) bank products - is illustrated. Forward contracts, Call-Pool Contracts, futures and options contracts, and OTC products will herein be referred to as pro-active strategies, to distinguish them from on-farm enterprise diversification and cotton storage. Most growers have used forward contracts, and around half have used futures or

options or call-pool contracts.

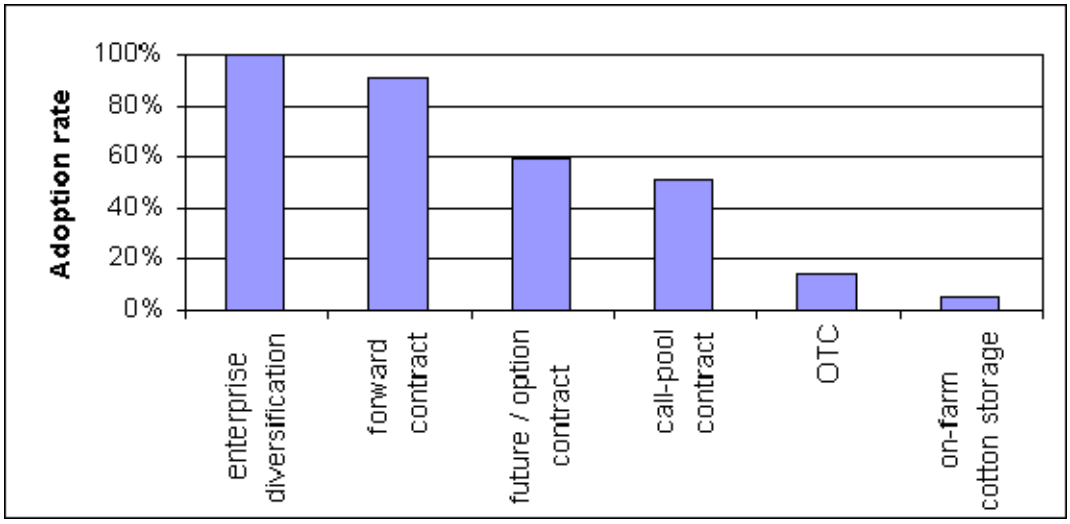

Figure 2. Adoption of on-farm price risk management strategies.

In Figure 3 it is indicated that every Australian cotton producer has some level of enterprise diversification. This finding is consistent with Cotton Australia's (2002) assumption that 100 per cent of Australian cotton farmers have diversified operations. However, only 3 per cent of the cotton producers had passively managed farm business risk through enterprise diversification alone. Meanwhile, 97 per cent of the cotton producers had used pro-active price risk management strategies in addition to enterprise diversification.

Cotton Australia (2002) asserted that the majority of cotton producers forward-sold. This is consistent with the questionnaire findings that 90 per cent of the surveyed cotton producers had used forward contracts with merchants and cotton processors. It is likely that the majority of cotton producers opted to forward-sell their crops to avoid selling into the spot-market at picking in autumn, when Australian cotton prices are usually at their lowest.

Approximately half (51 per cent) of the surveyed cotton producers had used Call-Pool Contracts, while almost 60 per cent had used futures and/or options contract strategies. Only one in ten (or 12 per cent) cotton producers had used OTC bank products, which makes them the least used pro-active price risk management strategy out of those covered in the questionnaire. Less than 5 per cent of producers had used cotton storage as a price risk management strategy, as stored cotton is prone to quality degradation.

While the proportion of cotton producers that had undertaken specific price risk management training is low, one in four cotton producers had an agriculture-related tertiary qualification. This figure is higher than that in other agricultural commodity industries. Figure 6, shows that 100 per cent of producers with tertiary training had used forward contracts. This is a 10 per cent greater uptake than the industry average. Furthermore, 75 per cent of producers with a tertiary qualification had used futures and/or options contract strategies, a 15 per cent greater uptake than the industry average.

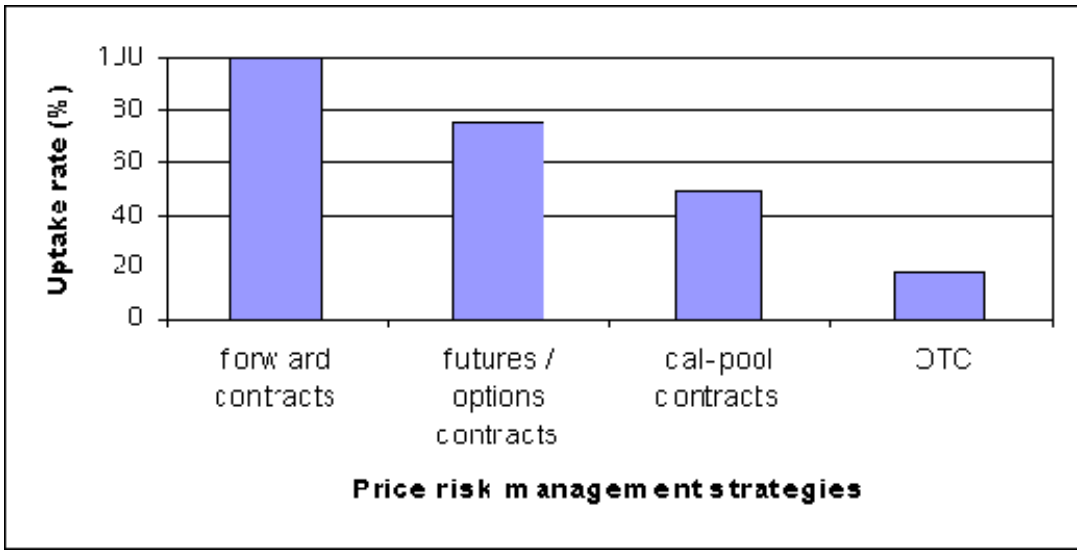

Figure 3. Uptake of price risk management strategies bycotton producers with an agriculture-related tertiary qualification.

It was found that approximately 90 per cent of the surveyed cotton producers operated irrigated production systems - a finding that was again consistent with industry assumptions (Cotton Australia 2002). The remaining 10 per cent of the cotton producers operated dryland (or non-irrigated) production systems. The adoption and use of price risk management strategies differed significantly between dryland and irrigated systems.

In Figure 4 it is shown that 94 per cent of irrigated cotton producers had used forward contracts. Many of these producers forward sold approximately 30 per cent of the predicted crop in the months prior to planting (when cotton prices are usually at their highest), with another 30 per cent of the crop forward-sold following crop establishment when yield estimates were more accurate.

Greater uncertainty of water availability and therefore uncertainty about successful crop development meant that only 69 per cent of the dryland cotton producers had used forward contracts. The relatively high production risk usually requires dryland producers to use forward contracts following crop establishment, thereby foregoing opportunities of higher contract prices prior to planting.

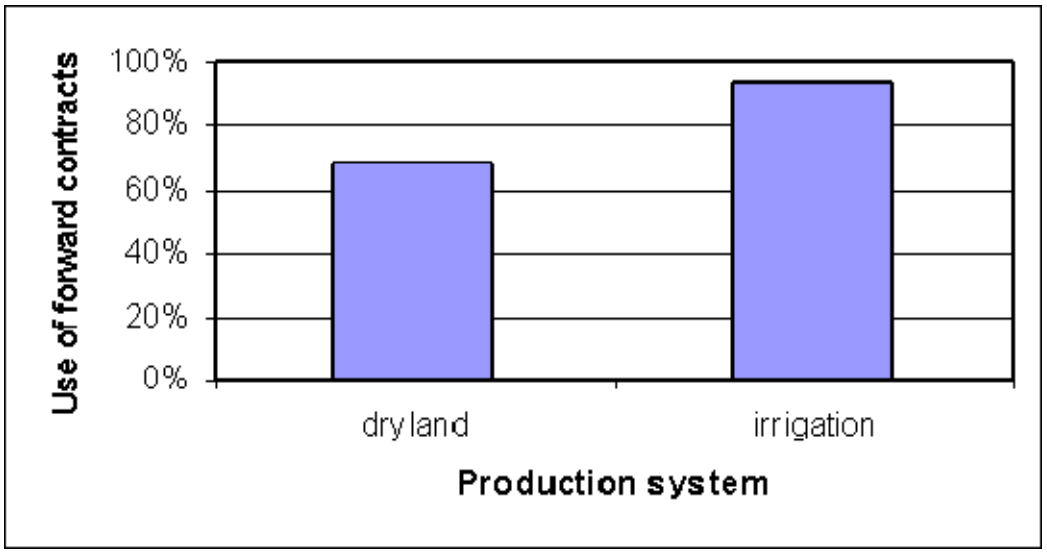

Figure 4. Use of forward contracts versus production system.

Approximately 85 per cent of dryland cotton producers had used Call-Pool Contracts that offered *force-majeure* clauses that enabled roll-over or cash-out provisions if cotton yield was less than anticipated (Figure 5). In comparison, less than half of irrigated producers had used Call-Pool Contracts due to greater certainty of production, and therefore the greater use of potentially more profitable price risk management strategies. Some producers who used Call-Pool Contracts noted that they also did so because of their tax effectiveness (due to price or payment deferment).

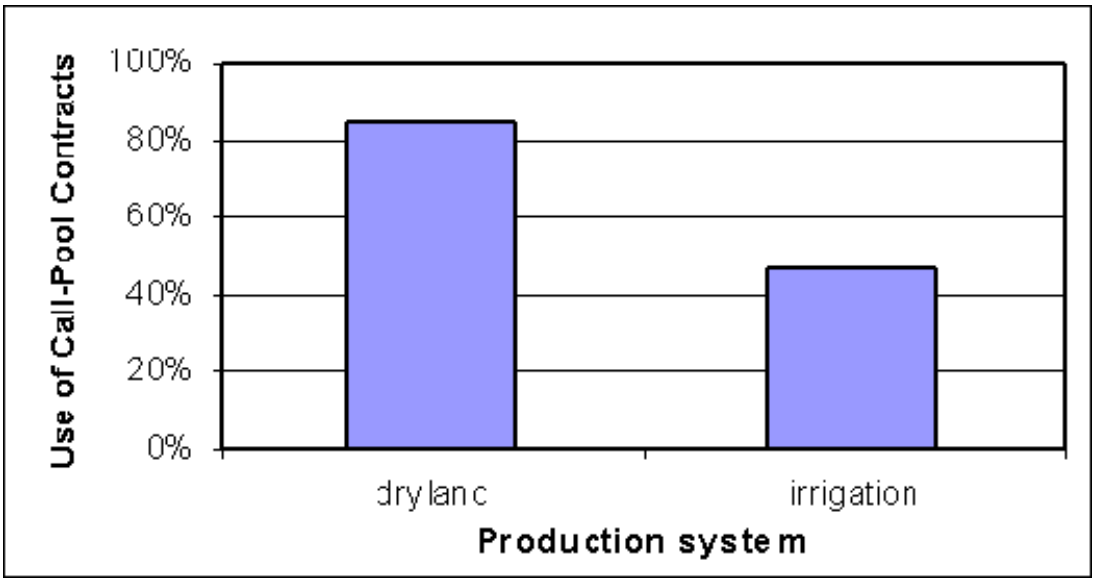

Figure 5. Use of Call-Pool Contracts versus production system.

In regard to futures and/or options contracts, less than 40 per cent of dryland producers had used them, reflecting relatively high production risk. On the other hand, over 65 per cent of irrigated

producers had used futures and/or options contracts, reflecting a lower level of production risk. Regardless of the production system (irrigated or dryland), many producers noted that market (price) and climatic information prior and during crop establishment guided the uptake of futures and/or options positions (see Figure 6).

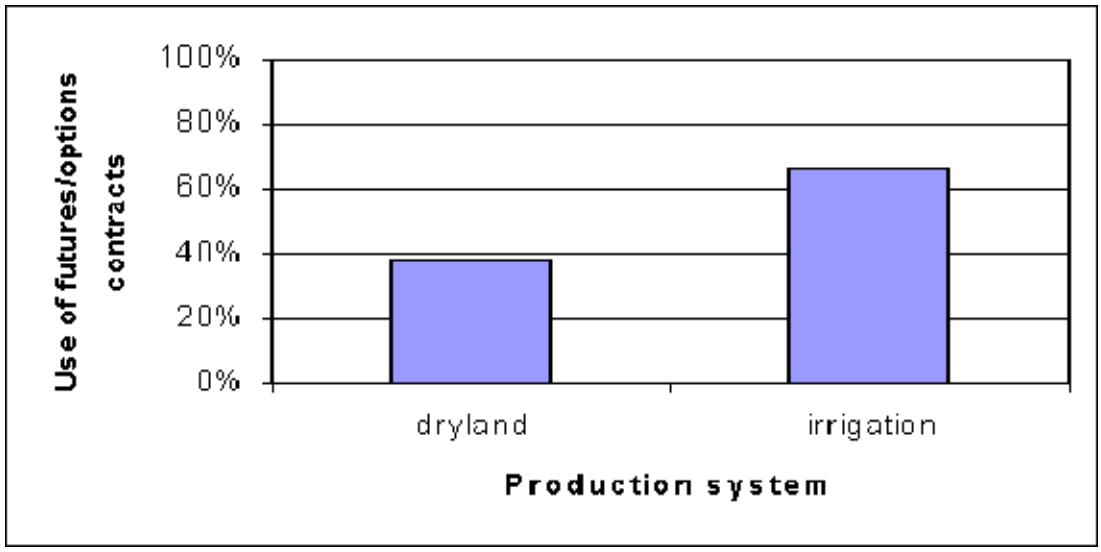

Figure 6. Use of futures/options contracts versus production system.

In Figure 7 it is illustrated that only a minority of the cotton producers had used OTC bank products to date – 12 per cent of irrigated producers and only 4 per cent of dryland producers. However, those producers that use OTC bank products had a greater than average percentage of farm income derived from cotton (76 per cent compared to an average of 64 per cent) suggesting less diversification and therefore a greater need to manage price risk.

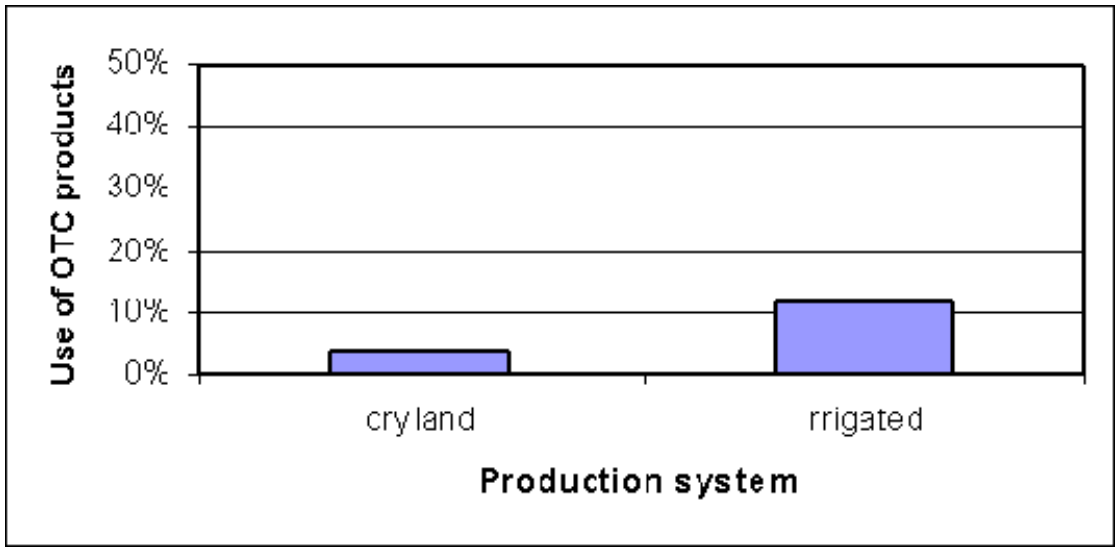

Figure 7. Use of OTC products versus production system.

Another important correlation is the level of uptake of futures and options contracts relative to cotton area and farm income. In Figures 8 and 9 it is shown that as cotton area and proportion of farm income derived from cotton – and therefore exposure to price risk – increases, the uptake of futures and options contracts is greater. The results show a 100 per cent uptake of futures/options contracts by farm businesses that produced more than a 1000 hectares of cotton. In Figure 9 it is shown that as the proportion of farm income derived from cotton increases so did the uptake of futures and options contracts.

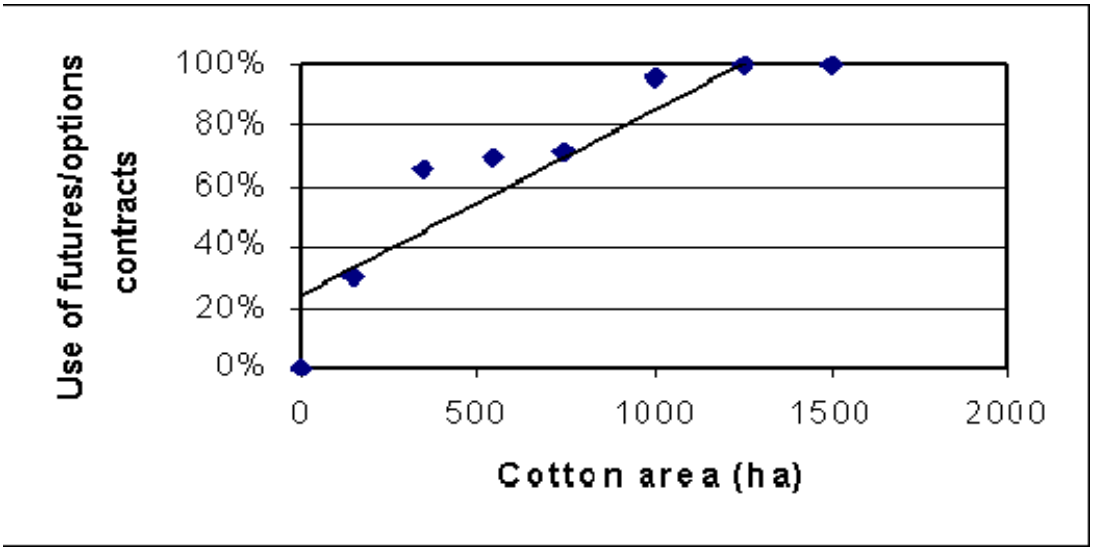

Figure 8. Cotton area versus use of futures/options contracts.

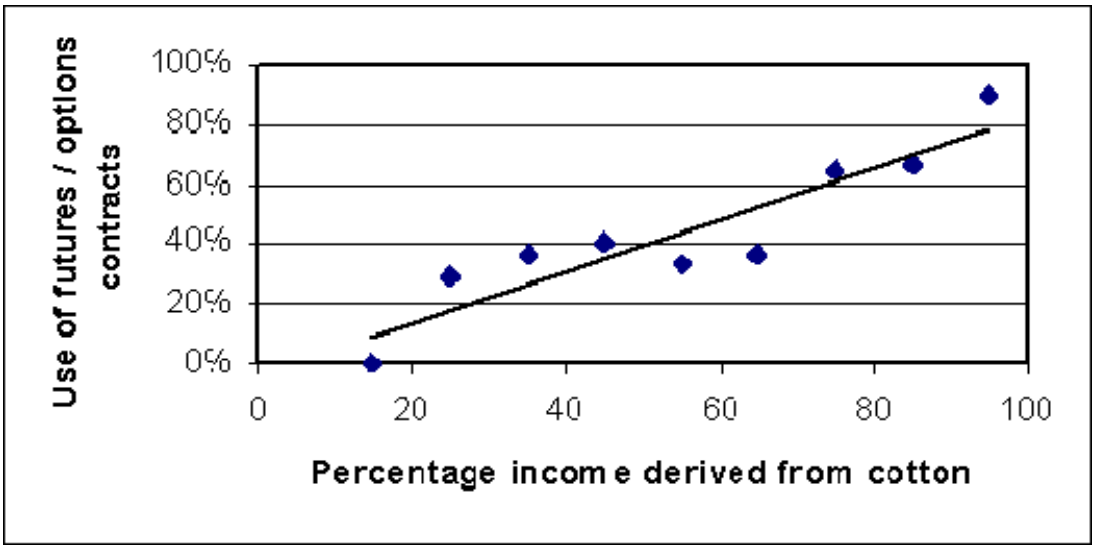

Figure 9. Income derived from cotton versus use of futures/options contracts.

Similar relationships existed for the uptake of forward contracts, Call-Pool Contracts and OTC bank products, however the relationships were not as definitive as those that existed for futures

and options contracts. This finding suggests that futures and options contracts – in terms of providing a valuable hedging mechanism – are more important and effective price risk management tools for large producers and those with significant price risk exposure.

Over three-quarters of the cotton producers that regularly used forward contracts, implemented their own management decisions in regard to contract quantity, timing and pricing. The remainder of the producers (approximately 25 per cent) sought external management advice and expertise from merchants, farm management consultants and/or financial advisers.

In comparison, less than half of the cotton producers surveyed, who regularly used futures and/or options contracts, implemented their own contract management decisions. The majority of these producers sought external advice and expertise from farm management consultants, bank representatives and licensed futures advisers (see Figure 10).

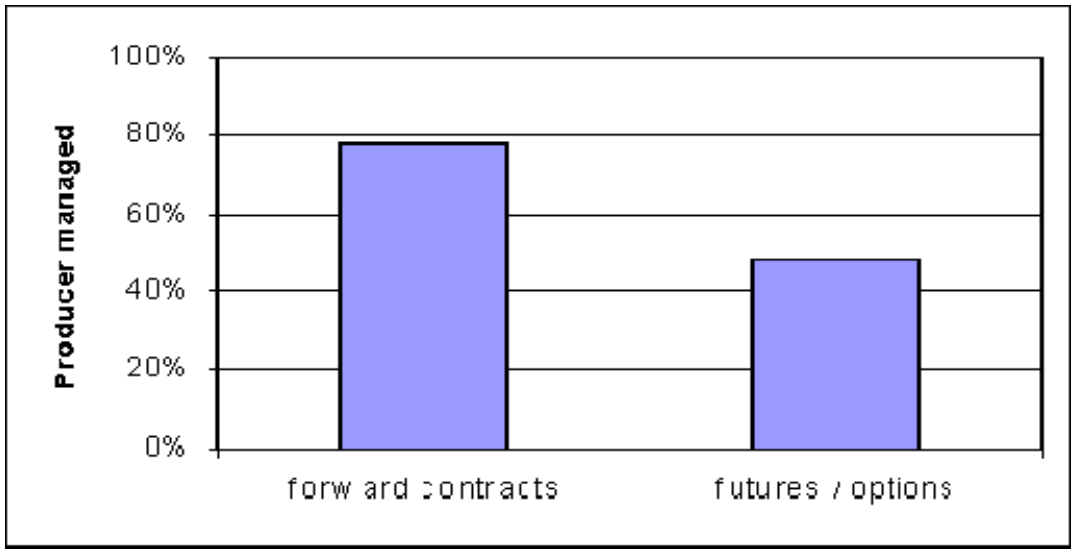

Figure 10. Producer management of forward and futures/ options contracts.

This difference in regard to producer management and external management of strategies suggests that many cotton producers have a reasonable understanding and confidence in using forward (and fixed price) contracts; while some lack confidence and understanding of the workings of futures and options contracts. Several producers stated that they do not fully understand the mechanics of futures and derivative markets.

Many of the producers who managed their own forward and futures contracts stated that they actively seek market (pricing) and climate information. Many opted to discuss strategies with peers. Very few producers (less than 5 per cent) stated that they had undertaken any form of formal training or education in regards to contract and price risk management.

The average 'experience' of cotton producers (defined by years in the industry) was approximately 18 years. The average industry experience of those producers who had undertaken relevant tertiary qualifications was also 18 years, suggesting no bias towards a greater level of tertiary qualifications amongst the less experienced (or younger) producers.

In Figure 11 is shown the adoption of both forward contracts and futures and options contracts only slightly increases with years in the industry. It does however suggest that understanding and

confidence in using both forms of contracts does increase with experience, but only marginally. There was 100 per cent adoption of forward contracts by producers with over 35 years industry experience.

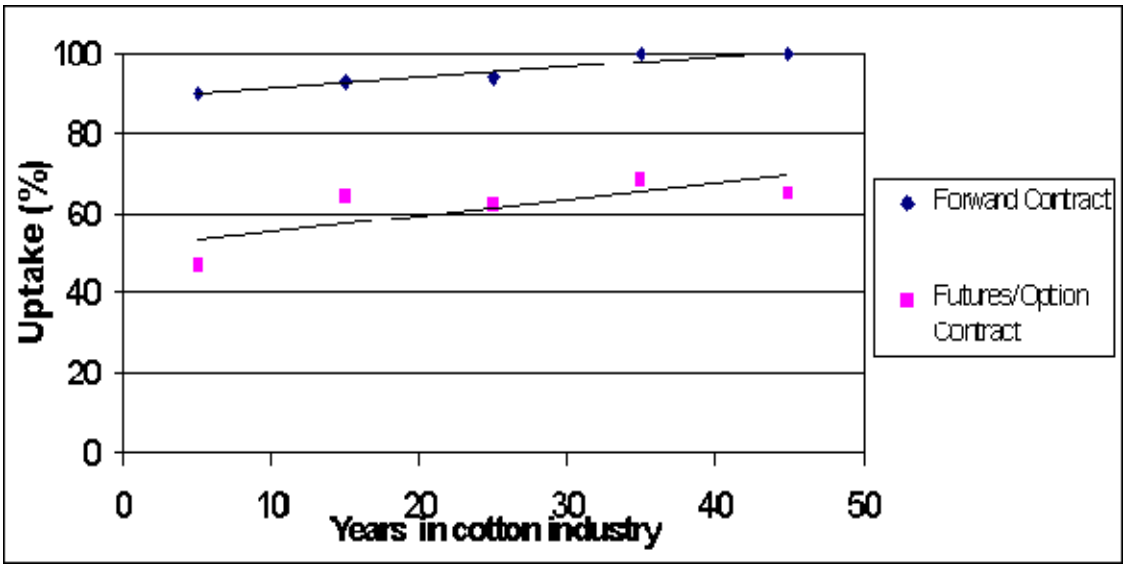

Figure 11. Uptake of price risk management versus years in industry.

The average number of years of experience (in the cotton industry) of the cotton producers was 18 years. If years in the industry were to be taken as a measure of age (where 22 years of age equals 1 year of experience), the average age of Australian cotton producers are approximately 40. If this assumption is nearly right, the industry average age of cotton growers is lower than other agricultural industries.

In Figure 12 is demonstrated one of the most significant findings of the study – that price risk management had a positive effect for over 56 per cent of the cotton producers studied. Of the remainder, 22 per cent of producers registered no change to their business as a result of employing price risk management strategies, while 21 per cent of the cotton producers studied noted that price risk management negatively affected their business.

Of the 21 per cent that had been adversely effected, a significant proportion cited poor advice, a lack of understanding, and significant currency exchange losses (due to fixed currency contracts without fixed price contracts or physical cotton hedging positions) as the primary cause of their losses. Nearly all of the producers that cited 'no change' to their business stated that price risk management yielded both profitable and negative results, however no net change to the farm business had been observed.

Many producers identified the relationship between better business management and increased farm profitability. Many of the producers that claimed a positive effect from price risk management cited better business and budget planning, income stabilisation and a greater awareness of and response to market signals as some of the key benefits.

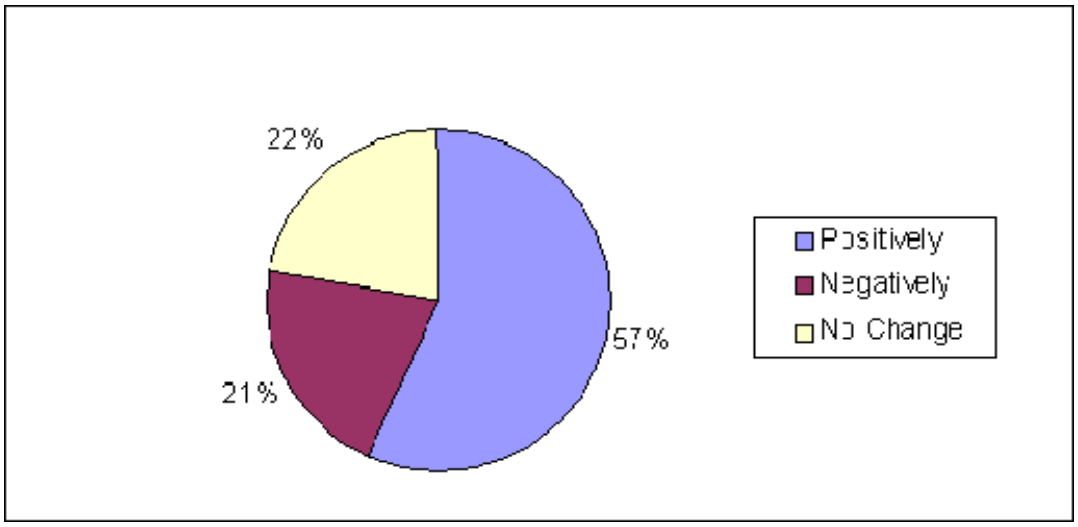

Figure 12. Effect of price risk management on farm business.

It is important to recognise that two significant occurrences (during the study period) may have influenced the results of the study. These were:

- Low world cotton prices and drought conditions in eastern Australia – that significantly reduced Australia's cotton planting area in 02/03
- Currency movements (AUD against the $US) over the period 1998 – 2003

During 2001/02, falling world cotton prices disadvantaged those producers without any price risk management strategies in place, while falling AUD currency movements seriously affected cotton producers who did not combine price and currency hedging together. In 2002/03, rising currency affected those growers (including those with price hedging strategies) who did not hedge currency. As a result, the issue of price risk management was foremost in the minds of many cotton producers and therefore probably contributed to the relatively high response rate to the questionnaire.

A significant number of producers noted that price risk management – by the very nature of locking in a target forward price – facilitated a better understanding of the cost of production. By doing so, they established a benchmark of what is a profitable margin for their cotton (based on their business objectives) and they had a greater capacity to identify inefficiencies. An industry representative suggested *"that the high level of benchmarking of operating costs across the industry has helped cotton producers to identify cost-savings".* A significant benefit of price risk management is from increasing focus on costs.

Furthermore, an understanding of forward prices better enables producers to budget and plan capital expenditure (e.g. new machinery or land development). As a consequence of this effective planning tool, many banks have a greater level of comfort in lending to cotton producers who can demonstrate effective price risk management. In fact, some producers noted that price risk management was a prerequisite for securing loans in some instances.

The results of the producer questionnaire confirm that cotton is a high-value crop. On average, cotton income contributes two-thirds (64 per cent) of total farm income, yet accounts for only 20 per cent of total farm production (by area). This relatively high importance (value) of cotton to the

average farm business is one factor underpinning the significant adoption of price risk management in the industry.

One of the most significant findings of the research is the demonstrated need for irrigated and dryland cotton producers to adopt different price risk management strategies. Dryland producers face inherently greater production risk and therefore have a preference for Call-Pool Contracts (which usually facilitate roll-overs or cash-out provisions when specified production is not achieved) in preference to forward and or futures and options contracts. Production-risk aside, if water availability and market signals suggest variable production and marginal viability, a sensible business decision might suggest that cotton should not even be sown (for both dryland and irrigated production systems). As one cotton producer stated *"regardless of the cotton production system, price risk management must be closely linked to the ability to produce".*

Call-Pool Contracts are a preferred tool for some cotton producers due in part to their default clauses and (in some instances) tax-efficiency. Over 80 per cent of dryland producers had used Call-Pool Contracts whereas only approximately 40 per cent of irrigated cotton producers (who carry less production risk and are therefore less likely to make use of default clauses) had used Call-Pool Contracts. Many of the irrigated producers surveyed preferred the use of other price risk management strategies.

The finding that nearly two-thirds of a representative sample of Australian cotton producers have used futures (and/or options) hedging contracts is consistent with Simmons' (2002) observation that the uptake of futures contracts in the Australian cotton industry is significantly more widespread than the uptake of futures contracts in the Australian wheat (4 per cent) and wool industries (2-3 per cent) (Lubulwa et al. 1997).

Some producers suggested that while the range of over-the-counter (OTC) products currently being offered by financial institutions provides for flexible alternatives, they are *'relatively costly to implement and more difficult to monitor'.* These sentiments may have limited the current uptake of OTC products, and are reflected by the questionnaire findings that only 12 per cent of cotton producers had used OTC products. Given that more flexible OTC products have only recently been introduced, a more detailed study is required to determine their effectiveness, understanding and uptake.

It is important to note that the adoption of isolated price risk management strategies will not always ensure a positive and risk free outcome. For example, many cotton producers who fixed currency in 2000/1 (predicting AUD to rise against the US$) without also hedging price incurred significant loses when both currency and prices fell. The problem was compounded when production was affected by floods (November 2000 and February 2001) and then drought (2001/02 and 2002/03). Examples like this raise the issue of and need for overall risk management strategies, as opposed to just adoption of isolated strategies.

Those producers who locked in both price and currency in 2000/01 and were subsequently affected by both floods and drought did well provided that there was sufficient flexibility in contract roll-overs for 1-2 years. The producers who did nothing were inadvertently hedged on the downside in 2000/01 by the currency gains partially offsetting physical price losses, and then on the upside in 2002/03 by physical price gains partially offsetting currency losses.

The results of the producer questionnaire showed that over 97 per cent of the representative sample of cotton producers had used at least one pro-active price risk management strategy in addition to enterprise diversification. In fact, 72 per cent of the producers had used more than two pro-active strategies, while approximately 25 per cent of producers had used three or more pro-active price risk management strategies. In addition, over three-quarters of the cotton producers (78 per cent) altered their price risk management strategies each year, indicating that

the majority of cotton producers may tailor their strategies to changing (market, climatic and business) circumstances. Some producers took contract positions out 2-3 years in some cases.

Another finding is the trend for many cotton producers to forward sell approximately 30 per cent of the predicted crop during the months prior to planting (when cotton prices are traditionally at their highest – before the majority of cotton is picked in the Northern Hemisphere), with another 30 per cent of the crop being forward-sold following crop establishment when yield estimates were more accurate. This approach, while relying on only one tactic, provides another example of a strategic approach to price risk management, whereby price risk is assessed in-line with production risk and managed accordingly. A similar hedging approach could be adopted using futures and options contracts, taken out to align with production risk as the season progresses.

One industry adviser stated that, similar to any industry, the top 5 per cent of cotton producers do 'everything right' in regards to farm and business management and therefore are profitable in most years. However, much of the industry (as much as 75 per cent according to another industry observer) is 'asset rich and cash poor' due to high gearing (low equity, high debt) from continued investment in land, plant and equipment. Therefore, debt servicing in good years is manageable, yet some producers encounter significant problems in consecutive poor years.

Good business and money management in terms of adequate equity and contingency planning is required before price risk management can be truly effective. Price risk management alone, will not ensure viability for highly geared and 'cash poor' producers.

Producers would seem to be well paid to invest time to monitor price risk management contracts and positions. There is often a requirement to review contracts and potentially change positions as the season progresses. *"Contract positions and strategies will change depending on the anticipated yield and quality of the cotton, just as market and price movements effect strategies,"* said one industry representative. Many contract positions require timely reaction to market signals and if information is not available or forthcoming then profitable opportunities are often foregone. Merchants and advisers cannot be provide the high level advice that is required if the producer lacks adequate yield and quality information.

Some of those producers who managed their own price risk positions recognised the potential benefit of futures and options contracts as effective hedging tools, but cited a lack of time to effectively use them. This raised an important point - that price risk management is a task that requires time and effort. An industry observer noted that *"the larger, business-orientated producers often build the cost of price risk management into pricing considerations, whereas some smaller producers view the cost of price risk management as prohibitive, even though it may result in greater farm profitability".*

Interestingly, the results of the questionnaire suggest that almost three-quarters of producers had managed their own price risk management strategies at some time. This is despite the low uptake of formal price risk management training and education by growers (Williams 2002). The reasons for the high level of self-management may include the following:

i. Some producers are reluctant to seek advice, in the main due to a lack of trust, and would rather opt for more straightforward (but sometimes less effective) price risk management strategies.
ii. Producers are opting for less complex forward and pool contracts due to a lack of understanding of other (and potentially more effective) strategies.
iii. Producers are reluctant to pay for advice and/or training and education that are often necessary to implement more effective hedging strategies.

Some producers referred to a lack of trust in some particular forms of advice, with some citing bad experiences over the period 2001-2002 (which coincided with record low cotton prices, low AUD/US currency exchange rates and flood and drought). Adverse industry dynamics contributed to the perception of poor price risk management results in many cases. As a result, the finding that many producers administered their own price risk management probably reflects a level of reaction to recent problems, with many producers still likely to require a level of advice regarding appropriate price risk management strategies.

Over one quarter of cotton producers had an agriculture-related tertiary qualification. The analyses showed that these producers were more likely to use forward and futures or options contracts. All the producers who had a tertiary qualification had used forward contracts, a 10 per cent greater uptake than the industry average. This finding suggests that greater uptake of training and education by producers could potentially result in greater adoption and effective use of pro-active price risk management strategies.

Many questionnaire respondents cited a lack of understanding of the principals of effective price risk management, especially in regard to strategy formulation. *"Cotton farmers need better education regarding risk management"* was one producer's observation. Supporting this finding, some industry representatives guessed that as few as five per cent of cotton producers had undertaken formal price risk management training and education – others thought this figure would be somewhat higher.

Some producers were either unaware of training opportunities or were not inclined to undertake training - citing the time and dollar costs as prohibitive. Yet the cost of training and education, potentially as low as $70 per day with Government training subsidisation, could not prevent producers from undertaking training. As one industry professional stated *"some producers just don't regard training as a cost of diligent business management, yet the cost of farm and price risk management mistakes far exceeds the cost of training and education".*

Industry representatives suggested that the proportion of larger cotton producers (corporate or private operations) to smaller family farms will increase, due in part to generational change and more effective business and price risk management. Larger producers have a greater capacity to engage price risk management expertise.

For the 21 per cent of producers that had been negatively effected by price risk management there were a number of contributing factors identified Difficult financial positions, bad luck due to weather and agronomic factors, inadequate advice regarding the analysis of the range of possible outcomes, and untimely decision making, have contributed, but one of the predominant factors is a lack of understanding and commitment to managing price risk.

It is evident from the research that price risk management has had a positive effect for more than 55 per cent of cotton producers. One producer noted that *"the average price received through a fixed price and hedging strategy has been better in 7 of the last 8 years than the spot price offered at picking time".*

Conclusions

Price risk management is an important part of farm business management, but adoption of price risk management practices is influenced by a range of demographic, agronomic, biophysical factors and the individual make-up of the farmer. Over 97 per cent of the surveyed cotton producers had actively managed price risk at some time. Price risk management was reported to have had a positive effect on the farm business of nearly 60 per cent of these cotton producers. The other conclusions are:

i. The decision to adopt price risk management strategies is influenced significantly by production risk;
ii. The financial situation, years of industry experience and level of understanding of price risk management principles and processes were also important influences on decisions to adopt price risk management methods.
iii. Price risk management is one of a suite of business management tools; price risk management implemented in isolation will not guarantee farm viability.
iv. When implemented strategically, price risk management can have a positive effect on farm businesses through increased viability and/or profitability and business management.
v. The current uptake and effectiveness of price risk management is limited by a lack of understanding and confidence by many producers.

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[1] Department of Primary Industry Victoria

[2] School of Agriculture and Food Systems, University of Melbourne

[3] Price Risk Management consultant and educator