Sociological Factors Affecting Agricultural Price Risk Management in Australia*

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ABSTRACT   The highly volatile auction system in Australia accounts for 85 percent of ex-farm wool sales, with the remainder sold by forward contract, futures, and other hedging methods. In this article, against the background of an extensive literature on price risk strategies, we investigate the behavioral factors associated with producers' adoption of price risk-management strategies (specifically futures and forward contracts) for selling wool. This research presents a behavioral model based on Diffusion of Innovations, the Theory of Reasoned Action, and the Theory of Planned Behavior. We found that the auction system is used as a price risk-management tool because other selling methods are considered more risky. We also report on a curious relationship between risk and complexity in terms of wool producers' intentions to use forward contracts. We explored sociological factors in conjunction with focus-group data in an attempt to understand this relationship. This exercise yielded some interesting findings on the impact that trust, habit, social cohesion, and networks have on decision making in the rural community. The significance of this article lies in its application of core sociological theory in a new research context: the Australian wool industry.

Introduction

Wool is an important contributor to the Australian economy and has been studied over many years from the perspectives of science, social science, and agricultural production systems. This research is a study of the Australian wool market and examines aspects of behavior experienced in the rural community that are brought about by the volatility and popularity of the wool auction system. We found that there is a behavioral mismatch between how farmers dealt with the increased price volatility of the wool market and the massive popularity of the auction system for selling raw wool. On one hand, the Australian Bureau of Agricultural and Resource Economics (ABARE 2006) confirmed the forecasts of Kingwell (2000) that price volatility would increase in the 2005–2006 financial year, while on the other hand the Merino Company (2006) concluded that after more than 80 years in operation the auction system remained the preferred selling method. This article investigates the factors that limit adoption of price risk-management strategies. We first present an overview of the Australian wool industry, followed by a description of the various selling systems available to wool producers, and then we describe, analyze, and discuss a mixed-method research process that reveals various explanations about the adoption of price risk-management strategies. We undertook a further investigation to explore the anomalous conclusions we drew about the impact that risk and complexity have on farmers' decision making when selling wool.

Industry Overview

Australia is the world's largest supplier of apparel wool (Lowe 2005), sales of which earned the nation approximately $2.5 billion worth of export income in the 2005–2006 financial year (Wood 2006). Despite this competitive position, the economic and production environments of the industry have suffered. Wool prices have fallen since the 1990s, largely due to a decrease in global demand. Substitute products, like cotton and synthetics, have become far more popular than apparel wool because of their competitive price and more flexible manufacturing characteristics (O'Donnell et al. 2005). China is the largest and most regular buyer of Australia's wool (Bolt 2006); however, its domestic demand for the commodity has decreased (O'Donnell et al. 2005; Perry 2005).

In terms of the production environment, medium- to long-term forecasts for wool prices also reflect less than favorable outcomes, with sheep numbers likely to increase as mixed grain/sheep producers

restock their properties after the 2002–2003 drought (Perry 2005). While the national flock is forecast to swell, the extra wool produced will enter a global market of falling demand, and hence falling prices. The slowdown in the global economy and difficult economic conditions in Europe, the United States and Japan (Perry 2005; Woolmark Company 2005) will exacerbate the situation.

While forecasts are for a bleak future with increasing supply and decreasing demand, occasional "price spikes" offer producers hope for improved market conditions (Bolt 2006, 2007). Within this context, our research aims to understand why the auction system is so dominant and why price risk-management strategies, which are popular with other Australian commodities for managing price fluctuations, have not increased in popularity in the wool market. It is reasonable to infer that in times of economic turbulence producers would favor price risk-management strategies that provide future price security. Furthermore, wool buyers have a vested interest in securing future wool supply in an ever-changing market as more specialized, high-volume wool processors dominate the international market. Essentially, the literature argues that, given current market conditions, the entire wool supply chain could benefit from increased use of forward contracts. With this in mind, we will describe the main methods of selling wool available to farmers in Australia.

Selling Systems

Auction, forward contracts, and futures are the three most popular methods of selling wool in Australia; all are described in this section.

Most Australian farm wool is sold via an open-cry auction system with an adoption rate of 85 percent (Bolt 2004). The wool auction system, commonly referred to as the "spot market," has operated in Western Australia since December 1920 ("Flashback" 2004). Lubulwa et al. (1997) contend that the popularity of the auction system arises from the competitive bidding and efficient price formation associated with price information that is transparent and readily available to industry users. Research by the Merino Company (2006:39) lists eight positive factors identified by farmers about the auction system: best alternative, best possible "price," "competition/price discovery," "simplicity/understanding," "tradition," "broker relationship," "no other options," and "maximize profit."

Forward contracts account for approximately 11 percent of wool sold annually in Australia (Coad 2000) and, according to anecdotal evidence from long-serving wool brokers, have been available for Australian wool

producers to mitigate price risk for about the past 20 years. The Wool Industry Review Committee (1993:76) defines a forward contract as "A binding contract specifying the price (or price formula), quality and quantity of a product to be delivered at some specified date. The quantity may be expressed in units of output or as the production from a specified area. The contract usually specifies penalties to be exacted from each party for particular kinds of non-fulfillment." A set price and set delivery date for a specified commodity are the key characteristics of forward contracts. The principal benefits of forward contracts are that they are able to reduce price risk uncertainty and improve income stabilization (Barnard and Nix 1979; Champion and Fearne 2001).

Both the futures market and forward contracts provide similar opportunities for traders to reduce the price volatility of the auction system by setting a future price and delivery date (Mitchell 2003; Teasdale 1991). The essential defining element of futures contracts that separates them from forward contracts is that they are standardized to operate through the Sydney Futures Exchange, so are more complex than an agreement between a farmer and wool buyer. This standardization allows for reductions in the costs of negotiating futures contracts as the terms and quality limits are set by the Exchange (Lubulwa et al. 1997). Trading wool futures has been available since the early 1960s (Mitchell 2003); however, this selling system, including options, only accounts for 3 to 5 percent of the national clip (Cuming 2004). The poor adoption of wool futures has been historically attributed to the popularity of the price floor system that existed in Australia until 1991 (Mitchell 2003; Teasdale 1991).

Both futures and forward contracts incur costs. Producers cannot expect to be paid the premiums offered at the auction as forward contracts required buyers to carry a degree of risk and therefore offer lower prices (Lubulwa et al. 1997; Seale 1996; Teasdale 1991). This also holds true for futures contracts. In fact, Cuming (2004) reports that futures price can be as much as 200 ¢/kg[1] lower than the price at auction.

Previous research has not yet produced an adoption model to explain the behaviors associated with the use of price risk-management strategies (Kingwell 2000; McLeay and Zwart 1998; Patrick, Musser, and Eckman 1998). The mixed-method research in this article explores the ideas, attitudes, and knowledge of Western Australian wool producers concerning the current methods available for selling raw wool. We chose to focus on forward contracts since this method is more

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[1] Equivalent to approximately US190 ¢/kg

widely used than futures. This research has two key objectives. First, we present a proposed model that aims to provide an insight into the behaviors surrounding the adoption of forward contracts by Western Australian wool producers. In analyzing this model, we found some relationships associated with risk and complexity that require further investigation. Second, we explored the perceptions and experiences of primary producers to better understand the factors that underlie farmer decision making in relation to the wool market. The findings and discussions from this research are grounded in these data. Thus, the article reports on a proposed model we developed using a qualitative-quantitative methodology. Because the findings were not as expected, we revisited the qualitative data and used the data to help us understand the seemingly anomalous findings in the behavioral model. The next section illustrates the model and describes the theoretical background.

The Proposed Behavioral Model

Figure 1 is an illustration of the model we propose for understanding the behaviors surrounding the adoption of forward contracts by Western Australian wool producers. The model is based on Ajzen and Fishbein's Thoery of Reasoned Action (1980) and Ajzen's Theory of Planned Behavior (1991) with the elements for measuring perceived usefulness of forward contracts (relative advantage, complexity, compatibility, application, and risk) adapted from Rogers's Diffusion of Innovations (1995).

Our model posits that two factors influence wool producers' perceptions of using forward contracts: factors external to the farm business (Willock et al. 1999) and factors internal to the farm business (Fliegel 1993). Factors external to the farm business relate to the structure and nature of the Australian wool industry while factors internal to the farm business are concerned with farmer-specific details (such as experience, knowledge, and dependence on wool as an income generator) and farm-specific details (such as location, size, and enterprise mix). We hypothesized that factors external and internal to the farm business determine the "perceived usefulness," "perceived subjective norms," and "perceived behavioral controls" that influence wool producers' intentions to adopt the use of forward contracts to sell their wool. The model measured "perceived usefulness" by the relative advantage, compatibility, complexity, application, and risk of using forward contracts. It measured "perceived subjective norms" by the subjective norms farmers associate with using forward contracts and available advisory services, and "perceived behavioral control" by self-
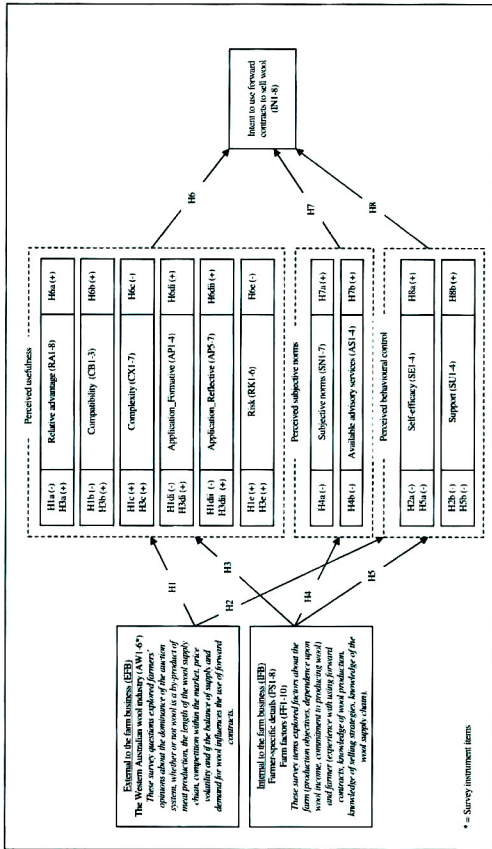
Figure 1. The Proposed Behavioral Model

efficacy and the support available to wool producers in their decision making.

The eight hypotheses (H1 > H8) depicted in Figure 1 were tested using the partial least squares (PLS) approach to structural equation modeling; we discuss results of testing the model in the section "The Quantitative Phase." The following section provides details on the method and design of this research.

Constructing the Model

We developed the behavioral model from a mixed-method research approach that combined qualitative and quantitative methodologies. This section explains the processes undertaken to construct a model for understanding the behavioral determinants that surround the adoption of forward contracts. While we made generalizations in the previous section about the Australian wool industry, for the purposes of our argument, we assume that the Western Australian wool industry is typical of Australia's entire mixed sheep/grain production systems and farmers' selling preferences (as typically stratified by the Australian Bureau of Agricultural and Resource Economics; for examples of these groupings see Ashton [2003] or Shafron, Martin, and Ashton [2002]).

The Qualitative Phase

To gather information on wool producer attitudes toward selling wool in Western Australia, we chose focus groups (Krueger 1994; Wilkinson 2004; Zikmund 2003). This data-collection method allowed us to gather the opinions of active sellers of wool in an environment that was flexible and free-flowing for participants, whose responses were thus spontaneous and unstructured (Sekaran 2003). Focus groups also stimulate discussion and create what Berg (2001:112) cites as the "synergistic group effect," where participants draw from one another's ideas, a phenomenon that is not experienced in one-to-one interviews.

We selected participants and locations for focus groups from lists provided by regionally located Department of Agriculture and Food Western Australia (DAFWA) officers (Krueger 1994). We invited individuals to participate via telephone, fax, and e-mail. The principal selection criterion was that participants had experience in selling wool within Australia. We conducted the focus groups in areas of varying wool production in Western Australia (Northampton, Merredin, Kojonup, and Esperance) with a total of 26 participants. Table 1 provides a profile of these participants. All participants contributed to these focus groups voluntarily.

Table 1. Demographic Characteristics of Focus-Group and Survey Participants

	Focus groups		Telephone survey	
	Frequency	Percentage	Frequency	Percentage
Gender				
Male	20	76.9	270	88.5
Female	6	23.1	35	11.5
Age group (years)				
18–25	1	3.8	4	1.3
26–35	2	7.6	18	5.9
36–45	5	19.2	74	24.3
46–55	11	42.3	112	36.7
56–65	6	23.3	75	24.6
> 66	1	3.8	22	7.2
Type of production system				
Livestock/crops mixed	19	73.1	239	78.4
Crops mainly	0	0.0	29	9.5
Sheep (wool mainly)	4	15.4	18	5.9
Sheep (meat mainly)	3	11.5	11	3.6
Sheep/beef mixed	0	0.0	8	2.6
Method of selling wool				
Auction consistently used[a]	26	100	229	75.1
Never use auction	0	0.0	20	6.6
Forward contracts consistently				
always used	5	23.1	4	1.3
Never use forward contracts	19	73.1	244	80.0
Total participants	26	100	305	100

[a] Auction sometimes used in conjunction with other selling methods, such as forward contracts, futures, and options.

Prior to conducting the focus groups, four members of the research team and an external facilitator ran a pilot session. In the actual groups, three fictional, loosely structured scenarios stimulated participants' input to the discussions (see Wilkinson 2004). The objective of these scenarios was to collect information about farmers' knowledge and opinions of existing wool-selling systems. The scenarios were also designed to generate information about the adoption of forward contracts among wool producers.

Curtin University's Mobile Group Support System (MGSS), installed with AnyZing 5.0, collected focus-group data for this research. This novel method of focus-group data collection deviates from that of conventional focus groups. The MGSS was powered by Zing Technology software (www.anyzing.com) that electronically records responses to the facilitator's questions (or scenarios) that participants type into individual laptops. Responses are simultaneously projected onto a

central video screen, which then allows for further comment and discussion among participants and facilitator(s). During this process, the researchers also made notes of comments not recorded by participants.

Accounts of similar computer-aided Group Support Systems appear in Lewis and Shakun (1996), Mandviwalla, Gray, and Olfman (1997), and Shakun (1999). The advantages of such a data-collection system are that data are recorded quickly as there is no data transcribing required, and participants can be actively involved with data analysis during discussion periods. The disadvantages are that participants need to have some computer literacy, the system is expensive (as each participant is provided with a laptop computer), and the quality of data captured is not as rich as in traditional focus groups, as short statements, rather than broad descriptions, are recorded.

At the beginning of each focus group, the facilitator gave participants a demonstration of the MGSS technology and took them through an icebreaker session to familiarize them with the software and MGSS hardware. The scenarios commenced immediately afterwards, as follows:

> Introductory script: Bob Smith, formerly from the north-eastern Wheat-belt, has recently bought a farm next door to you; included in the purchase were a number of sheep that will soon need shearing. While he has extensive farming experience, he has no idea about farming sheep so he asks for your advice.
>
> Scenario 1: What advice would you give Bob with respect to selling his wool?
>
> Scenario 2: What other ways are there to sell wool in Australia?
>
> Gap script: Bob has been talking to a mate from over east who has told him that forward contracting is a good way to sell wool.
>
> Scenario 3a: As far as you are concerned, what are the advantages (of selling wool by forward contract) for Bob?
>
> Scenario 3b: As far as you are concerned, what are the disadvantages (of selling wool by forward contract) for Bob?
>
> Scenario 3c: Given what you have heard so far, how would Bob know if he's better off?

Upon the completion of each scenario, we asked participants to type their ideas into their individual, anonymous "play space" and press F9 to record their input. In contrast to conventional focus groups, we

made no transcripts of conversations during the data-collection process. Only the data entered into AnyZing 5.0 by each participant, in the form of statements, and observation notes made by the researchers were analyzed for this research.

The research team assisted participants who did not feel confident in typing their thoughts. This method proved satisfactory except in cases where participants were not confident in asking for typing assistance. All members of the research team probed for ideas.

Each focus group ran for about two and a half hours. As a record of the activity, participants received a copy of the raw data collected in the form of a printout from the MGSS.

We used content analysis to analyze the raw data from the focus groups. This technique requires transcripts of raw, qualitative data to be systematically trawled for recurrent themes (Langley 1999; Riffe, Lacy and Fico 1998; Wilkinson 2004). Each theme is then counted throughout the transcripts for its replication within the data, thus introducing a quantitative element to the research.[2] In our research, we later used the themes identified during data analysis as theoretical constructs in the behavioral model, as described in the following section.

Discussion of Results from the Qualitative Phase

Data from the scenarios revealed that participants were aware of a range of selling methods available to them for selling their wool. The most common advice on how to sell wool was to find a broker. All four focus groups concluded that a broker can provide a simple, "whole farm package" service of managing all commercial aspects of the farm business, such as wool sales, fertilizer and chemical purchases, agronomic advice, livestock trading, land sales, and providing general farm supplies. This was an important finding since nearly three-fourths of focus-group participants produce both grain and livestock (Table 1). They have a vested interest in using the services of organizations with a broad range of skills and networks.

The importance of friendliness and trustworthiness in the relationship was a major issue raised when discussing the use of a broker to sell wool. For example, comments included "Get a broker [who] you get along with/is friendly," "It's important to get along with the broker and for him to be friendly," and "Broker needs to be honest."

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[2] The extensive results of this analysis can be found in the lead author's PhD thesis (available from http://espace.library.curtin.edu.au/R?func=dbin_jump_full&object_id=21531).

Not surprisingly, sending raw wool to auction was associated with the issue of finding a broker. In most cases participants assumed that a broker will advise that wool be auctioned. However, another comment was that brokers will provide specialist wool producers with the services of a "portfolio manager," who was more likely to provide advice to sell wool by forward contract or futures.

As suggested in the literature (see "Selling Systems" earlier), participants said that the auction system "is the dominant system" for selling wool in Western Australia and is "a good place to start" when selling wool for the first time. They agreed that the auction price is the principal benchmark used for setting the reserve price when selling or negotiating a forward contract price. None mentioned whether the auction system or the use of a broker yielded superior financial gain over forward contracts. However, they always implied that forward contracts were the less profitable system. The sessions did not explore this issue any further.

Participants described merchants as specialized wool-marketing organizations, such as Primaries or West Coast Wools, providing a slightly more specialized marketing service to their clients. While the groups said they did not offer a "whole farm package" like the brokering agencies, they were somewhat associated with a more intimate knowledge of the industry and often had a historical link with their clients. As with brokers, trustworthiness and friendless were important factors associated with the use of merchants.

Using futures and options to sell wool was mentioned in three out of the four focus groups but it was not recommended as a "user-friendly" selling method ("The futures market isn't producer-friendly"). Only one participant claimed to have used this system. He said he would not use it again. Participants described it as "having to be studied," "unfriendly," complex, and costly (in terms of advice required). It was a waste of time, because once traded the wool reverts to auction, and the futures trade in Australia was too limited to make it a worthwhile selling option.

The groups discussed strategies to bypass the auction system, principally due to the auction's price volatility. Research participants from a particular region of the study area enthusiastically described forming groups of farmers to supply wool in bulk (similar to small cooperatives) directly to mills. Participants of other focus groups said that they were aware of this system being used but were unaware of any associated success. The main objective of adopting a cooperative approach was to bypass the auction system and associated brokering companies due to users' discontent with dominant methods. The

discontent was born from a lack of trust and a sense of frustration with the auction's volatile pricing characteristic.

Two of the four focus groups mentioned selling raw wool on the Internet or electronic selling (via systems such as Wooltrade Australia Pty Ltd and e-wool), and prompting of this issue revealed it to be a very popular system, described as convenient and simple. Participants used the focus groups as an education forum, as many producers were not familiar with electronic selling but were keen to try it upon advice from their peers. This provides an interesting insight into the critical role that information from other producers plays in decision making.

Another selling system discussed during two of the four focus groups was that of forward contracts, sometimes referred to during the focus groups as "private selling," "selling on-farm," or "selling off the sheep's back." In discussion of forward contracts (as per Scenario 3), we found general agreement with the literature that the main advantages of forward contracts were price risk management and improved financial planning. However, the concept of "not locking in a good price" (compared to the auction price on the day of the contract's closure) was the key determinant for this system's lack of use. Participants also feared being unable to fulfill the requirements of the contract in terms of quality or quantity. They saw this consideration as a greater problem with forward contracts for grain sales, but a less significant issue if the wool producer was familiar with the farm's flock and historic wool-quality data. The dominant perception relating to systems other than auction was a lack of familiarity (and associated lack of certainty and trust); the main perception of auction was that it provides reasonable wool prices.

Evidence from the focus groups suggests that farmers' overwhelming preference is the traditional spot market (or auction system) in association with a trusted broker to sell wool. The other significant conclusion is that wool producers use the auction system as their primary method of price risk management. While this behavior may at first seem irrational, our data show that there is so much skepticism and uncertainty related to selling methods, such as forward contracts and futures, that producers perceive the auction system as the least risky alternative. The other issue to be taken into account with this analysis is that 73 percent of focus-group participants are livestock and wool producers and thus may find the use of a broker more attractive when considering the operation of the entire farm.

Table 2 demonstrates how we combined findings from the focus groups within the theoretical frameworks used in Ajzen and Fishbein's (1980) Theory of Planned Behavior and Rogers's (1995) Diffusion of Innovations to construct a behavioral model. The next section describes how we analyzed and interpreted this model.

Table 2. Incorporation of Raw Variables with Theoretical Independent Variables

TPB/Diffusion Independent Variable	Factors and Variables from Focus Groups
Perceived usefulness of using forward contracts	
Relative advantage	Provides a known and secure income
	Helps with budgeting
	Risk management
	Ability to set/negotiate price
	No guess work after the contract is taken out
	Means of getting a premium price
	Ability to assess wool
	Peace of mind
	Positive experience
	Provides ready cash flow
	Split between auction and forward contract to minimize price risk
Compatibility	Obligation to contract more wool than desired
Complexity	Paperwork
	Fine print
	Unfamiliarity
	Contract rules
Application	Only available for specific grades of wool
	Unfamiliarity
	Risk management versus making money
Risk	Uncertainty of wool value
	Uncertainty (missing higher prices)
	Uncertainties (weather, supply, demand)
	No economic gain
	Uncertainty of market conditions
	Uncertainty (insecure buyer)
	Uncertainty (not meeting delivery schedule)
	Lack of volatility
	Unable to secure a profitable price
Perceived behavioral control surrounding use of forward contracts	
Self efficacy	Experience and confidence
Support	No one pushing it
Subjective norms as a way of using forward contracts	
	Dominance of auction system
	Dominance of auction price
	Creates family problems
	Benchmark with other farmers

The Quantitative Phase

We used a telephone survey to generate data to test the empirical behavioral model, randomly selecting participants for the survey from a private database of Western Australian wool producers held by DAFWA.

Table 3. Operationalization of the "Subjective Norm" Construct Using a Seven-Point Likert Scale

Item	Variable	Measure	Mean	Standard Deviation
SN1	Family friction	Using forward contracts creates family disagreements	2.62	1.61
SN2	Price equity	The price other people get for their wool is important to me	3.12	1.96
SN3	Dominance of auction system	I use the auction system because it is the normal way to sell wool	4.91	1.74
SN4	Diversification of selling method	Other people think that diversifying the methods by which I sell wool is a smart thing to do	3.87	1.68
SN5	Broker intervention	I would be more inclined to use forward contracts if advised by a broker	4.58	1.70
SN6	Influence of commercial wool industry	There is strong pressure from the commercial world to only sell by auction	3.78	1.62
SN7	Influence of immediate family	My immediate family think that selling wool by forward contract is a good idea	3.11	1.59

The database contained the names and contact details of approximately 11,000 residents of regional Western Australia from which the sample was drawn (it should be noted that the database did not solely represent the target population as it included the contact details of people who were not necessarily primary producers). The people targeted to respond to the survey were required to have more than 700 adult sheep, be actively involved in primary production, and be active wool producers. The survey used stratified random sampling (Hair, Bush, and Ortinau 2006) with proportional allocation to various strata[3] to reflect the various geographic concentrations of wool production in Western Australia.

Each telephone survey took 20 to 25 minutes to complete. The 13 constructs illustrated in Figure 1 were measured with a total of 89 survey questions that all used a seven-point Likert scale. Table 3 presents an example of the empirical operationalization of the "subjective norms" construct and its results.[4]

We entered responses from 310 questionnaires into SPSS 14 for subsequent analysis; we omitted five incomplete responses. Our final sample contained 305 responses (see Table 1 for sample demographic

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[3] For strata illustrated, see http://www.agric.wa.gov.au/content/AAP/SL/WOOL/WOOLREPORT05.PDF, p. 8.

[4] Due to the large number of survey questions, we invite requests for interested parties to view the complete survey and associated results.

Table 4. *R*-Square Values That Assess the Predictive Power of the Model

Construct	*R*-square value
Relative advantage (RA)	0.253
Compatibility (CB)	0.152
Complexity (CX)	0.113
Application_Reflective (AP_Refl)	0.091
Risk (RK)	0.020
Self-efficacy (SE)	0.144
Support (SU)	0.183
Subjective norms (SN)	0.098
Intention (IN)	0.510

Note: Only values for reflective constructs are shown.

data). We analyzed survey data using the PLS approach to structural equation modeling (SEM) (see www.plsgraph.com). See Barclay, Higgins, and Thompson (1995) for a detailed description of conducting the conventional two-step approach to PLS data analysis.

The results of the PLS data analysis showed a significant relationship between most of the behavioral factors tested within the model. The exception lies in hypotheses related to risk (H1e and H3e) and application of forward contracts to the farm business (H3dii);[5] we discuss the importance of this finding at the end of the next section.

Unlike many other approaches to SEM, PLS does not report common measures to determine goodness of fit (such as RMSEA, CFI, and NNFI do). Instead, it presents *R*-squares to assess the predictive power of the model (Table 4), for which Santosa, Wei, and Chan (2005) recommend a minimum limit of 0.10. Most of the constructs meet this minimum criterion, which suggests that the model supports these hypotheses. For example, the strongest *R*-square value is that of "intention," thereby indicating that more than half of producers' intention to adopt the use of forward contracts can be explained by the constructs used within the model. While most of the *R*-squares are greater than 0.10, there are three constructs that fail to meet this criterion: "risk," "application," and "subjective norms." We explore only "risk" here as it provides the most interesting insight into sociological concepts and the impetus for the further research expanded upon in the section on "Economic Behaviors Embedded in Social Behaviors."

[5] The lead author's PhD, available at http://espace.library.curtin.edu.au/R?func= dbin_jump_full&object_id=21531, presents and discusses these results.
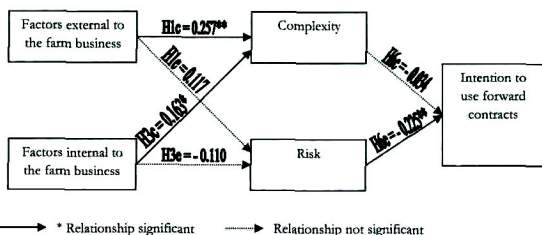
Figure 2. Illustration of Hypothesized Relationships with Standardized Path Coefficients and Levels

Discussion of Results from the Quantitative Phase

The results of testing the behavioral model that are relevant here (summarized in Figure 2) are associated with complexity (H1c, H3c, and H6c) and risk (H1e, H3e, and H6e).

Other researches have concentrated on the importance of risk for farmers' decision making. Our results show support for the work of Abadi Ghadim, Pannell, and Burton (2005) and Batz, Peters, and Janssen (1999), who found that risk has a highly significant, negative influence over intention to adopt the use of forward contracts (H6e). However, as specified in the previous section, our research has shown that neither attitudinal variables (i.e., factors external [H1e]) nor factors internal to the farm business (H3e) can account for this notion. Conversely, the complexity associated with using forward contracts is positively influenced by factors internal and external (H1c and H3c) to the farm business but, contrary to the findings of Fliegel and Kivlin (1962) and Rogers (1995), does not significantly affect farmers' intentions to use forward contracts (H6c).

These results show that the attitudinal factors tested in this behavioral model account for the root causes of why farmers perceive the use of forward contracts to be complex. However, the same cannot be said for the root causes of risk. It is well documented that farmers' perceptions related to risk and uncertainty (Abadi Ghadim et al. 2005), and their perceptions and attitudes in general (Kingwell and Cook 2007; Pannell, Malcolm, and Kingwell 2000), are key influencing factors on adoption decisions. Further explanation is therefore required regarding the sources of these risks and the subsequent adoption, or nonadoption, of forward contracts. These findings might indicate that

these economic behaviors are embedded in the social behaviors associated with the wool market and its network of human capital. We now look to sociological theory to help with this issue.

Economic Behaviors Embedded in Social Behaviors

Granovetter (1985) argues that economic behaviors within markets are embedded in social behaviors. We recognized some common themes between our findings and those of Granovetter's argument so aimed to determine if our behavioral model has any relationship to the social networks that operate within the Australian wool industry. By revisiting the qualitative data (focus-group statements and observations), we hoped to find some justification as to why risk and complexity have such a seemingly curious relationship to wool producers' intentions to use forward contracts. In returning to the focus-group data, we found that these questions could be understood by considering some contextual factors: habit, trust, social cohesion, and networks.

Habit

From an extensive review of the qualitative data we believe that habitual behavior accounts for popularity of the auction system and the poor adoption of forward contracting. We think that auctions essentially overshadow alternative selling systems, not because they constitute a superior market mechanism but because industry actors are so deeply entrenched in their use.

While this section is titled ''Habit,'' it also includes the importance of tradition in farmer decision making. Salamon et al. (1997) argue the importance of traditions and family influences on decision making (also see Albrecht and Albrecht (1996), Gasson (1973), Pennings and Leuthold (2000) for examples). Similarly, McLeay and Zwart (1998) highlighted the importance of tradition in their study of agribusiness. These authors found that ''traditional commodities'' in farm business systems were associated with high production levels and high familiarity with marketing systems. As a consequence, ''traditional commodities'' required less investment of time and effort so producers showed highly significant tendencies to use the spot market or engage in cash sales.

Hodgson (1997:664) defines habit as ''a more or less self-actualizing disposition or tendency to engage in a previously adopted or acquired form of action'' and explains that habits ''may become engrained even if they are disadvantageous'' (665). Hodgson also lists seven instances believed to call for the establishment of a habitual behavior: optimization, extensiveness, complexity, uncertainty, cognition, learning, and communication.

While our findings covered all seven of Hodgson's factors, two factors were of particular interest to this research: complexity and uncertainty. Both factors arose in the focus-group data. Complexity, according to Hodgson, is "where there is a gap between the complexity of the decision environment and the analytical and computational capacity of the agent" (665). A major disadvantage of using forward contracts and futures to sell wool identified by the participants was the amount of paper work and fine print involved. In comparison, they regarded the auction system as much more simple.

Hodgson defines uncertainty as a condition "where crucial information and probabilities in regard to future events are essentially unobtainable" (665). Both forward contracts and auctions involve price certainty, as we noted, although farmers were concerned about being locked into an unfavorable price through forward contracts. Other aspects of uncertainty participants discussed included the value of their wool, finding a "spike" in the market, weather conditions and the associated effects on production levels, being unable to lock in a profitable price, and not being able to supply the contracted quality or quantity.

Economists and scholars of organizational learning may argue that habits, or doing without thinking, create economic efficiencies known as unconscious competence (Stockport 2000). However, the literature on habitual behavior and resistance to change argues that humans develop habits in order to cope with the complexities of daily life (Munson 1962; Robbins, Millett, and Waters-Marsh 2004). The threat of changing a habit exposes us to uncertainties, which in turn become a source of resistance. When it comes to wool producers, the familiarity and simplicity of the auction system offers comfortable protection from the complexities of forward contracts and futures.

Trust

Murray-Prior and Wright (2004:63) researched the use of strategies and decision rules by Australian wool producers to manage uncertainty. They found that wool producers perceived that selling methods alternative to auction were more risky due to "the risk of being taken advantage of, or not being paid." While the focus groups discussed this concept (see "Discussion of Results from the Qualitative Phase"), nonfinancial issues also emerged from the data that are well worth investigating.

Barney and Hansen define "trust" as "the mutual confidence that no party to an exchange will exploit another's vulnerabilities" (1994:176). They argue that trustworthiness is a characteristic of an individual exchange partner. However, that trust is considered here only from the

perspective of the wool producer, rather than as the mutual relationship between a wool producer and a wool broker. The complexity of trust in commercial relationships cannot be underestimated (Fritz and Hausen 2006). In terms of agriculture, Hardaker et al. (2004:6) go so far as to list "relationship risk" ("risks inherent in the dealings between business partners and other trading organizations") with matters as important as production risks and market risks. Of particular relevance to this research, the concept of trust is closely related to that of social networks that operate within rural communities (Murdoch 2000).

As we noted, participants from all four focus groups said that a broker was the best place to start, and brokers were by far the most preferred option. Upon further questioning about the services provided by brokers, participants revealed interesting views on the importance of the relationship with this type of service provider. The auction is so dominant not only because it is the most simple selling method to understand but because "there's a lot of infrastructure tied up with the auction system that's been there for years." This perception of the wool-market structure is visibly impacting on producers' social perceptions. While we found that wool producers prefer selling their wool through a broker, there is mixed evidence about the trust that producers have in their brokers. Some focus-group participants said, "Local brokers don't have the sort of knowledge about … the market to give good advice," "Not even brokers have enough knowledge of the systems available," "Really [no alternatives were] left after all the brokers went broke after offering prices too high for forward contracts," and "Don't trust anyone." On one hand there is evidence to suggest that wool producers attempt to create their own supply chains simply to bypass the auction system and using a broker (as discussed in "Discussion of Results from the Qualitative Phase"). On the other hand, participants made comments about wool brokers being trusted to facilitate the entire price-discovery process of the wool market and that they provided a marketing plan for a whole wool clip. Trust appears to be a major contributing factor when producers discuss how to sell wool. Whether the concept of trust has a positive or negative influence on relationships developed with brokers is inconclusive but provides fertile grounds for further research.

While the service that brokers offer is widely accepted, there are some underlying issues that inhibit the adoption of selling systems other than auction.

The concept of trust is a widely researched issue in the field of marketing, particularly when it comes to the establishment of relationships (see Selnes [1998] for an extensive list of citations). Trust is even considered an economic asset by Wilson and Kennedy

(1999). The most relevant finding from Selnes's study (1998:319), supported by Batt (2001), was the importance of sellers and service providers "communicating all relevant information without disguising potential unfavorable data." This closely supports the comments of the focus-group participants that trust is lacking in brokers' ability to provide a complete range of information about selling systems other than auction.

Lorenz (1999) has pointed out that neoclassic economic theory is based on the assumption that people are all rational decision makers so it largely omits the social aspects of trust, friendliness, and loyalty. Lorenz concludes that where there is mistrust, it is highly unlikely that the actor will be willing to undertake any sort of long-term contractual relationship with the agent. Friendliness and loyalty were also topics of discussion in the focus groups. Two participants directly commented that it was important to find a wool broker who was friendly while another commented about the importance of longevity of relationships between a wool producer and broker. The work of Zak and Knack (2001) supports these beliefs; they found that commercial establishments that operate at low levels of trust are likely to have reduced rates of investment.

Lorenz (1999) suggested that a way to resolve reluctance to trust is for agents to encourage trust by first offering contracts of low risk (being small quantities of wool in this case), then subsequently offer larger contracts as trust and confidence develop in the relationship. Focus-group participants confirmed Lorenz's suggestion by saying that anyone entering the wool industry should "go into [the] process slowly and conservatively" and anyone attempting to use forward contracts should not "forward contract any more than 50 percent of his [wool] clip." Two more conservative participants suggested that no more than 10 percent of a producer's wool clip should be forward sold.

The conclusion that can be drawn is that the use of brokers is the dominant method for selling raw wool, and trust is a fundamental component of the relationship between a wool producer and a broker. Revisiting the focus-group data showed an interesting "can't live with them, can't live without them" anomaly when it comes to farmers' perception of brokers. There is an element of mistrust when wool producers are seeking advice about selling strategies. The literature has shown this to be a valid concern. We also provide evidence, though, to suggest that brokers are the most trusted and most necessary link between producing and selling wool. Most importantly, researchers have overlooked "trust" in the context of this significant component of the national Australian economy.

Social Cohesion and Social Networks

Increasingly difficult economic conditions in the national wool industry (discussed in the first section) have tightened stakeholders' grips on the institution of the auction system. Peterson and Hughy (2004:533) define social cohesion as "a construct that considers participation in the context of relational notions such as trust, shared emotional commitment and reciprocity among community members." While this is very similar to the "social participation" attribute discussed by Fliegel (1993), from which we sought input for our proposed model (Figure 1), a review of literature on social cohesion showed that it can also be described as the solidarity felt by societies under various social or economic pressures. For example, Kawachi and Kennedy (1997) cite literature that showed improvements in social solidarity, social cohesion, and life expectancy as results of narrowed income differentials in wartime Britain. Another example is the work of Vinson (2004), who cites research that addresses the question of the influence of social cohesion between Australian suburbs with high and low crime levels.

This finding relates to this article in that as earning conditions become more difficult for wool producers (that is, prices decrease and become more volatile), it is likely that producers, brokers, and merchants will draw together and stick to what they know best – a system that is simple and trusted: the auction system. As shown in "Discussion of Results from the Qualitative Phase," the dominance of the auction system has a shared emotional commitment among wool producers because of its familiarity and its provision of social order and social connectedness, which are important criteria outlined by Turok et al. (2004). The auction system also provides community members with a form of a common language for buyers and sellers, as the auction price is perceived as a benchmark or yardstick among the community and an important flow of information—an additional example of social order and social connectedness. Clear evidence of this argument can be found in the focus-group data: "Auction price is the benchmark for knowing when you've had a win," "Auction price/system is the benchmark for everything that goes on," "Forward contract prices are based on auction prices so you may as well just use the auction system to save paperwork and being ripped off," "There are no other ways to sell wool outside the auction system," "It's a matter of counting the dollars over the day's auction price," "the daily auction price is a fairly good indicator or what's happening on the day in terms of price," "Compare [forward contract prices] with the auction."

From this description, we see that in the wool industry, the existing market, grossly dominated by the auction system, has established itself as

a social point of familiarity and stability within the farming community. The market is equipping the community with a common language for articulating market conditions among users, and it is also providing an emotional efficacy about individual producers' business competence.

The discussions on trust and social cohesion lead to the observation that networks are an important component of the wool industry and its actors within the Western Australian rural community. One focus-group participant explained how important it is to develop a trusting relationship with a wool broker as consistent quality and quantity of production will contribute to improved selling at auction. In this one statement there is evidence of how the market structure of the wool industry and the power held by the wool brokers is perceived to impact on the earning ability and operational processes of the wool producer.

The connection that we have demonstrated between farmers, brokers, and the market reflects some firmly established sociological concepts. The struggle that professional rural actors, such as brokers, face between being well-respected, trustworthy, members of a community, as opposed to goal-orientated employees of national organizations, reflects Tönnies's (2001) principles of "Gemeinschaft" versus "Gesellschaft." We have shown that at one extreme, brokers are perceived to exhibit elements of Gemeinschaft in that they are trusted and develop long-standing, loyal relationships with farmers. At the other extreme, we have also shown that brokers are perceived as being uncaring about the environment in which they work and are less interested in their clients than farmers would expect, a state more reflective of Gesellschaft-type attitudes. We acknowledge that we have not deeply explored the relationship that brokers have with the rural community; however, we have shown that brokers play a significant role in farmers' decision making. Therefore the question of brokers' Gemeinschaft versus Gesellschaft would be worth examining in more detail.

The concept of social networks also needs consideration. Granovetter (1973) discussed the "strength of weak ties" in his seminal article on social-network analysis: the study of processes bound up in interpersonal networks that enable the explanation of micro (here, farmer behaviors) and macro (the wool market) relationships. He said that "it is through these networks that small-scale interaction becomes translated into large-scale patterns, and that these, in turn, feed back into small groups" (1360). This quotation from Granovetter sheds theoretical light on the economic behaviors observed in relation to wool-selling systems. We believe that it is the numerous small networks of farmers and their brokers that are perpetuating the popularity of the auction system. We found that the auction system provides market actors with familiarity,

stability, and a common language in the macro environment of the wool industry, an industry facing an uncertain future, as noted earlier, due to global demand and local supply. As a consequence, the auction system remains popular despite its inability to service the contemporary demands of actors further up the supply chain, such as processors, who require more sophisticated knowledge about wool supply.

It is clear that established sociological concepts, such as Tönnies's (2001) principles of Gemeinschaft and Gesellschaft, as well as social-networks analysis, need further research in the context of the Australian wool industry. Findings from additional confirmatory research will verify our ideas that the economic behaviors exhibited in the Australian wool industry are deeply embedded in social behaviors.

Concluding Remarks and Implications

Our aim is to apply sociological theory to a situation within a segment of the Australian wool industry; this led us to question the sources of risk and complexity that wool producers associate with using forward contracts. Upon modeling the behavioral determinants of wool producers on their intention to use forward contracts, we found that neither factors external nor internal to the farm business significantly contribute to the risk that producers associate with forward contracts. However, there was a highly significant relationship between risk and intention to adopt the use of forward contracts. This article shows that trust and risk are closely linked in the literature and in the context of our research environment; as are habit and risk. We acknowledge that wool producers perceive that forward contracts are risky based on the current perception of the wool industry. However, we believe that it is the habitual, safe, familiar use of the auction system that is stopping them from taking the "leap of faith" to using forward contracts to secure wool prices.

Concepts of trust and habit can rationally give insight into our findings about complexity and its relationship to factors internal and external to the farm business. While these findings are far from conclusive, we suggest that social-network analysis would provide a sound place to start in an attempt to map the complexities of the wool industry and the impact it has on the development of future international wool-supply chains.

There are some important sociological implications of this research. From a methodological perspective, it contributes to the limited exploratory, qualitative diffusion literature. Furthermore, the MGSS (described in "The Qualitative Phase" earlier) is a novel, unique

approach for collecting data. This approach has been used in the information technology and education arenas but is new to the rural sociology research domain. In terms of the pure sociological implications of this research, we have revealed that there are some cultural processes at work in the economic exchanges of the Australian rural community. Further research based on the Gemeinschaft and Gesellschaft principles would clarify this hypothesis. There is no doubt that these processes are working in tandem with economic and political processes, but it is the importance of trust, habit, and social cohesion, among others in Australian rural communities, that this research has highlighted. In the context of Australian farming communities, these factors have received little empirical attention, but we have demonstrated that they are major drivers of decision making, and this research thus merits further sociological attention.

There are also implications from this research that are of benefit to the agribusiness community. Marketing firms that desire a structured approach to communicating commodity quality and quantity specifications up and down the supply chain often suffer from a lack of knowledge due to the "just-in-time" nature of spot markets. With an improved understanding of the social behaviors that operate within the Australian wool industry, these marketing firms may be able to increase the adoption of price risk-management strategies and look forward to providing their customers with more complete knowledge of future commodity parcels.

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