The Effect of Market Concentration on Lamb Marketing Margins

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Abstract

The national four-firm concentration ratio in the lamb slaughtering and processing industry increased from 55 percent in 1980 to 70 percent in 1992. The effect of increasing lamb packer concentration on lamb marketing margins is examined. A relative price spread (RPS) model for farm-to-wholesale and wholesale-to-retail marketing margins was estimated using three-stage least squares (3SLS). The 3SLS results indicate that increased lamb packer concentration has had relatively small, positive effects on lamb marketing margins.

Key Words: lamb industry, market concentration, marketing margins

Introduction

The sale of feeder and slaughter lambs accounts for approximately 70 percent of the revenue generated by sheep production enterprises with the remainder coming from wool sales and government program payments (Langemeier and Delano). Consequently, lamb producers depend on efficient retail, wholesale, and slaughter markets to signal appropriate production decisions. In a properly functioning market, the farm-level derived demand for a raw farm product reflects changes in the retail-level demand for that product. Product value is communicated from consumers to producers through price signals generated by the interaction of supply and demand. Thus, retail price changes should be transmitted by the marketing system back to the farm-level.

Markets may not function perfectly for a number of reasons (e.g., imperfect or asymmetric market information and adjustment costs). Conceptually, a highly concentrated industry may also cause market inefficiencies because supply and demand signals may be distorted. However, the contestable market hypothesis suggests that imperfectly competitive markets may generate a competitive equilibrium provided that a credible threat of entry by other firms exists.

In recent years, the profitability of sheep production has declined primarily because of declining slaughter lamb prices (U.S. House of Representatives). Real slaughter lamb prices have trended downward since 1980 (figure 1). Real retail lamb prices declined between 1980 and 1986, but have since remained relatively constant (figure 1). Consequently, the farm-to-retail price spread has increased since 1986. However, figure 2 shows that the farm-to-wholesale price spread has remained relatively small between 1980 and 1992. In some instances, the margin (which has not been adjusted for by-product values in figure 2) has been negative indicating the importance of by-product values in covering slaughter costs (Brester and Marsh). Thus, most of the price spread increase since 1986 has occurred in the wholesale-to-retail sector of the market (figure 2). In addition, the national four-

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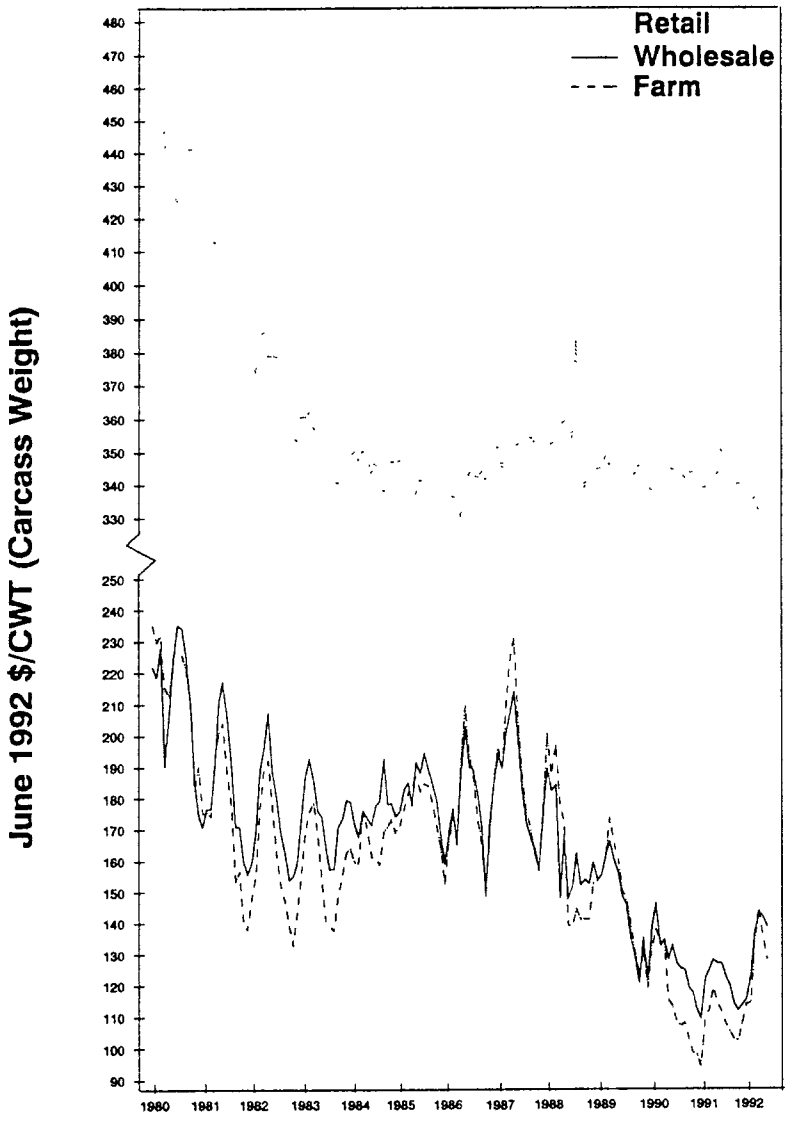
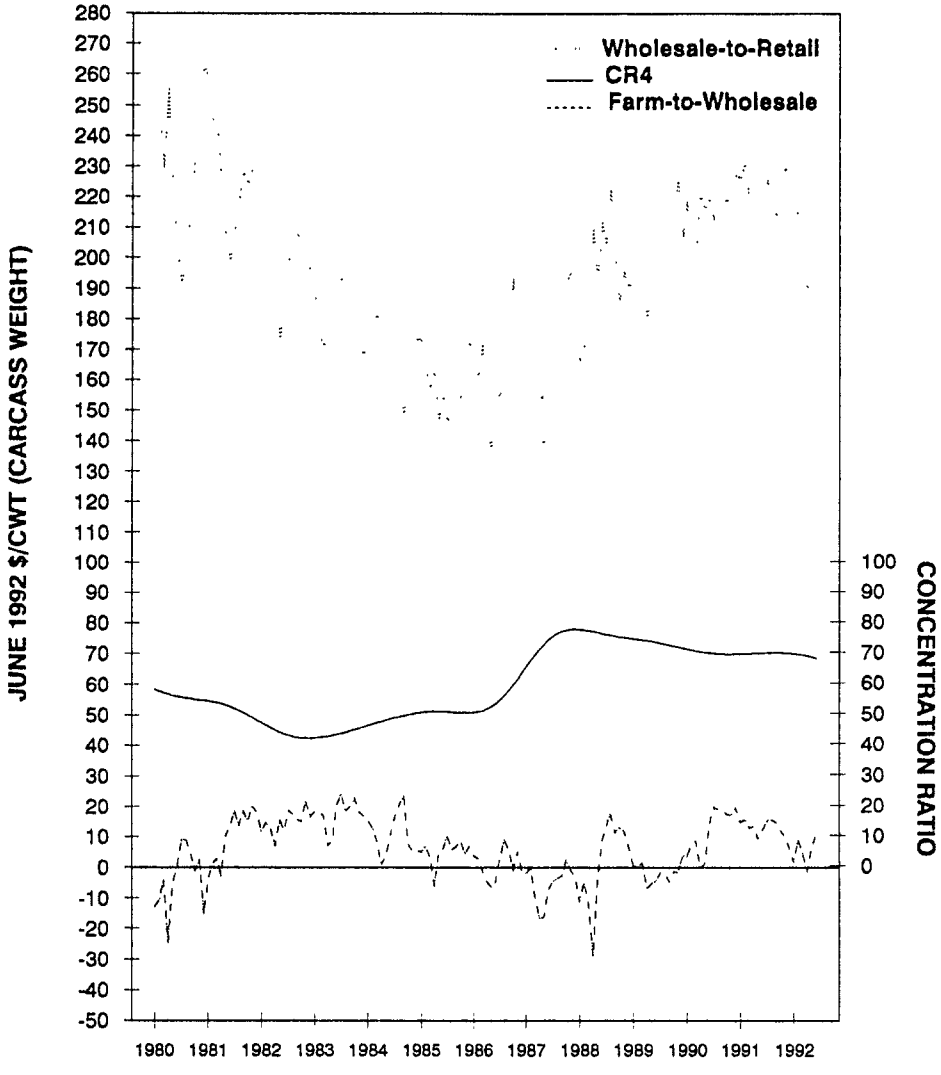
Figure 1. Real Monthly Farm, Wholesale, and Retail Lamb Prices, January 1980-June 1992



firm concentration ratio increased from approximately 55 percent in 1980 (July) to almost 74 percent in 1988 before declining to approximately 70 percent in 1992 (figure 2).

Lamb producers are price-takers with little bargaining power while lamb processors and retailers are best characterized as oligopolies and/or oligopsonies [Texas Agricultural Market Research Center (TAMRC)]. Concurrent increases in the farm-to-retail price spread and marketing channel concentration has created concern among sheep producers and government officials. For example, in testimony before the House of Representatives Subcommittee on Livestock, Dairy, and Poultry, lamb producers and government officials from several States expressed apprehension regarding the relationship between packer concentration and widening lamb marketing margins (U.S. House of Representatives). In addition, a report submitted to the Subcommittee by the Western Organization of Resource Councils Education Project suggests that increasing packer concentration has reduced livestock prices. Finally, testimony by McMillan and Lemon states that "As the concentration has increased, the price spreads have widened, parallel movement of producer and consumer prices has diminished, and producer prices have fallen and

Figure 2. Four Firm Concentration Ratio, Real Farm-to-Wholesale and Wholesale-to-Retail Margins, January 1980-June 1992



remain depressed" (McMillan and Lemon, p. 4). Given these concerns, the current study examines the relationship between market concentration and lamb marketing margins.

Brief History of the Sheep Industry and Review of the Literature

The importance of sheep production in the U.S. agricultural economy has been declining for most of the past 50 years. U.S. sheep inventories peaked in 1942 at 56 million head and have steadily declined to 10.9 million head in 1992. Approximately two-thirds of the U.S. sheep inventory is located in the western States and Texas (Botkin et al.). Although sheep numbers have decreased since 1980, lamb meat production has increased because of increases in slaughter lamb carcass weights and lamb production per ewe (Botkin et al.). In 1980, 310 million pounds of sheep and lamb meat were produced. By 1992, production had increased to 355 million pounds.

The marketing chain for sheep and lamb meat is similar (but on a smaller scale) to that for beef. The marketing chain begins with more than 100,000 producers at the farm-level. These producers typically raise one lamb crop per year although various accelerated production systems are becoming more common. The production of three

lamb crops in two years is the most popular accelerated system. Approximately 73 percent of all lambs are placed in feedyards and, eventually, sold to packers (TAMRC). The remaining 27 percent move directly from producers to packers. Fifteen percent of all lambs are marketed through various auction markets whereas 85 percent are directly marketed to feedyards or packers (Gee and Magleby).

The marketing chain narrows beyond the farm-level. As of 1992, there were 748 federally inspected lamb slaughtering plants. However, a relatively small number of large plants account for the majority of sheep and lamb slaughter. For example, only eight sheep packing plants have annual slaughter capacities of at least 300,000 head. Yet, these eight plants account for 80 percent of all sheep and lamb slaughter (Ward, 1992). Packers sell lamb carcasses and boxed lamb to breakers, wholesalers, and retailers for further processing. Boxed lamb consists of lamb carcasses that have been processed into primals or subprimals. Breakers further process lamb carcasses and distribute the resulting products to wholesalers and retailers.

At the consumer-level, the marketing chain widens as 24 percent of the U.S. population purchase lamb on an annual basis (Walker Research and Analysis). Per capita lamb and mutton consumption in 1992 was 1.0 pound. Lamb consumers typically have an ethnic background (e.g., Jewish, Italian, Greek, Muslim) and are geographically concentrated in the Northeast and along the West Coast (TAMRC).

The lamb marketing chain is continually changing. Traditionally, packers shipped only hanging carcasses. However, the shipment of boxed carcass equivalents has become prevalent and, more recently, the shipment of boxed primals and subprimals has increased (TAMRC). Additional packer processing adds value to the packers' product and reduces the need for breakers and wholesalers.

Several previous studies have addressed various price discovery issues in the sheep and lamb industry. Menkhaus et al. attempted to identify the impact of structural changes in the lamb slaughtering industry on prices received by lamb producers. Their primary objective was to identify the point at which market concentration (in terms of number of firms) allows firms to exert market power. They found that lamb prices in regions served by only one buyer averaged $5.03/cwt less than lamb prices in regions served by more than one buyer. In addition, lamb prices approached a competitive equilibrium in regions served by even relatively small numbers of buyers.

A study by Ward (1984) had two objectives: (1) to measure the importance of buyer competition (as measured by the number of buyers bidding at various teleauctions) in determining the price of lamb, and (2) to determine if the size of buyers (measured by market share) affected either prices paid by packers or buyer gross margins. Results showed that as the number of bidders increased, Oklahoma lamb sale prices increased relative to prices at San Angelo, Texas (which is the largest U.S. market). However, increased buyer competition was not shown to reduce buyers' gross margins. As noted by Ward, this result may have been caused by the close proximity of the two largest buyers to the auction assembly site. However, it is also possible that increasing packer market shares contribute to lower lamb prices and, thus, increase buyer gross margins.

A TAMRC report analyzed price margin behavior of the lamb industry. Relative price spread (RPS) models were developed for the slaughter-to-wholesale, wholesale-to-retail, and slaughter-to-retail margins. Variables representing trend, seasonality, and the four-firm concentration ratio of the lamb packing industry were used as explanatory variables for the margins. Bimonthly data from 1978 to 1990 were used in the analysis. Elasticities of price transmission were calculated from the models to determine the extent of price transmission between market levels in the lamb industry. The authors concluded that packer concentration had relatively little effect on changes in marketing margins.

The present study builds on this earlier research but differs in several important aspects. First, monthly data are used to examine marketing margin behavior. Previous studies have used either bi-monthly, quarterly, or annual data. Lyon and Thompson report that monthly data may be more capable of detecting market anomalies than temporally aggregated data. Second, previous

research has ignored the impacts of by-products on marketing margin behavior. We incorporate a variable representing by-products into the margin equations because by-products often represent an important source of revenue to meat packers (Brester and Marsh). Third, following Holt, Brorsen et al., and Faminow and Laubscher, we incorporate a risk variable into the margin specifications. Fourth, this study uses a more recent time period that better reflects recent events in the packing industry.

A Relative Price Spread Model of Lamb Marketing Margins

In a properly functioning competitive market, a fully specified supply-demand model can be used to examine the economic factors that affect price spreads (Arzac and Wilkinson). However, it is not always possible to estimate a fully specified supply-demand model for imperfectly competitive markets. A common alternative is to use a reduced form price spread model. Three such models — the markup model, the price of marketing services model, and the relative price spread (RPS) model — are commonly used to empirically analyze margins.

Faminow and Laubscher compared the three reduced form models. Their results using monthly time-series data indicated that the RPS model is the most consistent of the three. An earlier study by Wohlgenant and Mullen compared the RPS model to the markup model and concluded that the RPS model is preferred. Lyon and Thompson concluded that the RPS model was more appropriate when using spatially aggregated, monthly data. The RPS model differs from a markup pricing model in that the former assumes no fixed relationship between price spreads and retail prices. In addition, it assumes that firms maximize profits by providing marketing services to the point where the marginal value of these services equals marginal costs. Gardner reports that markup pricing rules do not accurately represent the relationship between farm and retail prices. The RPS model is consistent with this view in that the model allows the relationship between prices to vary with changes in output prices and marketing input prices. Thus, shifts in retail demand and farm supply influence the price spread by changing the quantity of output and/or by changing retail prices. According to neoclassical theory, increases in farm-level output (which reduces farm prices) and relative marketing costs (which may reduce farm prices, increase retail prices, or both) will reduce the farm-to-retail price spread. Consequently, increases in either output or relative marketing costs would lead to increases in the marketing margin.

This study considers lamb marketing margins by disaggregating the farm-to-retail margin into two components: the farm-to-wholesale margin and the wholesale-to-retail margin.

The Farm-to-Wholesale Lamb Marketing Margin

The RPS model for the farm-to-wholesale margin is specified as:

$$M_{fw} = \alpha_1 P_w + \alpha_2 P_w Q + \alpha_3 MC_{fw} + \alpha_4 PPLT + \quad (1)$$

$$\alpha_5 RISK_{fw} + \alpha_6 CR4 + \sum_{J=1}^{11} \delta_J D_J .$$

where M_{fw} is the real farm-to-wholesale price spread between farm-level, slaughter lamb prices (on a carcass weight basis) and the East Coast wholesale price of lamb carcasses (in dollars/cwt), P_w is the real East Coast wholesale price of lamb (in dollars/cwt), Q is the quantity of lamb produced (in million lbs), MC_{fw} represents real marketing costs incurred by lamb slaughtering plants, $PPLT$ is the real price of No. 1 lamb pelts (in dollars/pelt), $RISK_{fw}$ represents output price risk faced by packers, $CR4$ is the national four-firm concentration ratio for the lamb packing industry (measured by market share), and D_J are monthly dummy variables.

Two variables not usually included in RPS models are used in equation 1 to account for factors relevant to the lamb industry. The value of sheep and lamb by-products are represented by the price of lamb pelts ($PPLT$). The sign of the $PPLT$ coefficient is expected to be negative. Increases in pelt prices represent increased income to packers who may then be willing to accept reduced farm-to-wholesale margins. The effects of lamb packer concentration are analyzed by including the four-firm lamb packing concentration ratio ($CR4$) in the farm-to-wholesale relationship. The sign of the coefficient associated with concentration could be

either positive or negative. If dominant firms exercise market power, the coefficient would be positive.[1] However, an alternative view of market concentration is provided by Demsetz. That is, if market concentration increases slaughtering efficiency and if sufficient competition exists, efficiency gains may be passed back to producers through increased lamb prices or forward to wholesalers through reduced meat prices. In either case, the coefficient on *CR4* would be negative.

Multicollinearity problems are often encountered when more than one marketing input cost variable is included as regressors in margin equations. Thus, wages of employees in meat packing plants are used to represent marketing costs in the farm-to-wholesale model. Labor costs are the largest marketing cost expense incurred by packers. The signs on the marketing cost and wholesale price variables are expected to be positive. The sign on the risk variable is also expected to be positive (Brorsen et al.). Monthly dummy variables are included in the specification to account for seasonality.

The Wholesale-to-Retail Lamb Marketing Margin

The RPS model for the wholesale-to-retail margin is specified as:

$$M_{wr} = \beta_1 P_r + \beta_2 P_r Q + \beta_3 MC_w + \beta_4 RISK_w + \beta_5 CR4 + \sum_{j=1}^{11} \gamma_j D_j , \quad (2)$$

where M_{wr} is the real wholesale-to-retail price spread between the East Coast wholesale price of lamb carcasses and the retail price of lamb (on a carcass weight basis in dollars/per cwt), P_r is the real retail price of lamb (in dollars/cwt), MC_w represents real marketing costs incurred by wholesalers and retailers, and $RISK_{wr}$ represents output price risk faced by processors and retailers. A price index representing energy prices is used to represent marketing costs in the wholesale-to-retail model.

Description of the Data

Monthly data from January 1980 through June 1992 are used in this study. Farm-level lamb prices (i.e., slaughter lambs) are calculated using a weighted average of the monthly prices reported at three major lamb markets – San Angelo, Texas; St. Paul, Minnesota; and Sioux Falls, Iowa. Prices for the three markets are obtained from *Livestock and Poultry Situation and Outlook Reports* [U.S. Department of Agriculture (USDA)]. Following the weighted averaging procedure reported in *Livestock and Meat Statistics* (USDA), market share weights of 0.70, 0.16, and 0.14 are used for the three markets. Farm-level prices are converted to a carcass weight basis using the average dressing yield for sheep and lambs over the sample period (0.50) as the conversion factor (*Livestock and Meat Statistics*).

East Coast wholesale lamb prices and average lamb dressing weights are obtained from *Livestock and Poultry Situation and Outlook Reports*. Commercial sheep and lamb slaughter data are obtained from the Livestock Marketing Information Center. Average hourly wages of meat packing plant employees are reported in *Employment and Earnings of the United States* [U.S. Department of Labor (USDL)] and represent marketing costs in the farm-to-wholesale margin equation. Each price and wage variable is deflated by the Consumer Price Index (June 1992=100) reported in the *Survey of Current Business* (U.S. Department of Commerce). Four-firm lamb packing plant concentration ratios and pelt prices were obtained from personal communication with Ron Boyd of the American Sheep Industry Council.[2] The concentration ratio data closely matched that reported by Ward (1992) but were only available on an annual basis. Therefore, monthly data were obtained by a cubic spline interpolation of the annual data using the EXPAND procedure in SAS.

A complete price series for retail prices was not available. Therefore, retail lamb prices were calculated using the consumer price index for lamb and organ meat reported in *CPI Detailed Report* (USDL). The index was adjusted so that the July 1983 observation equaled 1.0. The index was then converted to a dollar metric by multiplying each observation by $2.85 (i.e., the retail price of

lamb in July 1983). Retail prices were adjusted to carcass weight equivalent units by using the carcass-to-retail conversion factor (0.88) employed by the *Livestock and Poultry Situation and Outlook Reports*.

The Index of Finished Energy Goods reported in *Producer Price Indexes* (USDL) was chosen to represent marketing costs in the wholesale-to-retail model. The coefficient of variation (multiplied by 100) for 12-month moving averages of real wholesale lamb carcass prices was used as a relative measure of price risk in the farm-to-wholesale margin equation (Brorsen et al.; Faminow and Laubscher). Consequently, data for the wholesale price of lamb carcasses for 1979 were used in calculating the risk variable for the first year of the sample (i.e., 1980). Likewise, the coefficient of variation for 12-month moving averages of real retail lamb prices was used as a relative measure of price risk in the wholesale-to-retail margin equation. Again, data from 1979 were used to calculate the risk variable for 1980.

3SLS Results for the Farm-to-Wholesale and Wholesale-to-Retail Models

In many cases, lamb slaughtering plants are also involved in processing lamb carcasses into a consumer product. Thus, an individual firm may be involved in the determination of both the farm-to-wholesale and wholesale-to-retail margins. Therefore, the errors of the margin models specified in equations 1 and 2 may be contemporaneously correlated. Given that the exogenous variables are not the same in each equation, gains in estimation efficiency are obtained by using a systems approach.

Wu-Hausman tests for the exogeneity of wholesale lamb prices in the farm-to-wholesale margin equation and for retail lamb prices in the wholesale-to-retail margin were performed. The test statistic for the farm-to-wholesale margin was 2.33 which is smaller than the χ^2 critical value of 5.99 for 2 degrees of freedom at the 0.05 level. Therefore, we cannot reject the null hypothesis that wholesale prices are exogenous in equation 1. However, the test statistic in the wholesale-to-retail margin equation was 57.69 which clearly rejects the null hypothesis of the exogeneity of retail prices in equation 2. Thus, equations 1 and 2 are estimated using three-stage least squares (3SLS) to account for endogenous retail prices and contemporaneously correlated errors between the equations. Equations 1 and 2 are identified by both the rank and order conditions. The exogenous variables in equations 1 and 2 are used as instruments for retail price in equation 2.

Initial 3SLS results indicated the presence of positive autocorrelation. Thus, the models were corrected for first-order serial correlation using the Newey-West correction in LIMDEP. The first column of table 1 presents the 3SLS estimates for the farm-to-wholesale margin (equation 1). The coefficients on MC_{fw}, *PPLT*, $RISK_{fw}$, and *CR4* are each statistically significant at the 0.05 level. The coefficient on *CR4* indicates that a 1 unit increase in lamb packer concentration is associated with a \$0.05/cwt increase in the farm-to-wholesale margin. This represents a 0.8 percent increase over the mean level. A real increase of \$1.00/pelt decreases the real farm-to-wholesale margin by \$2.31/cwt. A \$1.00/hour increase in meat packing plant hourly wages increases the farm-to-wholesale margin by \$1.66/cwt.[3] Increases in output price variability ($RISK_{fw}$) also increase the farm-to-wholesale margin.

The second column of table 1 presents 3SLS estimates for the wholesale-to-retail margin (equation 2). The coefficients on P_rQ, MC_{wr}, $RISK_{wr}$, and *CR4* are each statistically significant at the 0.05 level. The coefficient on *CR4* indicates that a 1 unit increase in lamb packer concentration results in a \$1.47/cwt increase in the wholesale-to-retail price margin which represents a 0.7 percent increase over the mean level. A 1 unit increase in the energy price index results in a \$0.35/cwt increase in the wholesale-to-retail margin. Increases in output price variability increase the margin.

Table 2 presents the regression results as elasticities evaluated at the means of the data. The price of wholesale lamb is not significantly different from zero in the farm-to-wholesale margin. However, the margin is quite sensitive to both the marketing cost (wages) and by-product (price of pelts) variables. For example, a 10 percent increase in wages increases the margin by 29 percent while a 10 percent increase in pelt prices reduces the margin by 27 percent. Conversely, the margin has

Table 1. 3SLS Results for the Farm-to-Wholesale and Wholesale-to-Retail Marketing Margins

Independent Variables[a]	Dependent Variables: Farm to-Wholesale Marketing Margin	Dependent Variables: Wholesale-to-Retail Marketing Margin
P_w	0 009 (0 25)	
P_wQ	-0 006 (-0 50)	
MC_{fw}	1 661 (4 69)	
PPLT	-2 310 (-14 14)	
$RISK_{fw}$	0 431 (2 29)	
CR4	0 051 (2 00)	1 474 (4 76)
P_r		-0 040 (-0 41)
P_rQ		0 008 (3 68)
MC_{wr}		0 345 (2 10)
$RISK_{wr}$		6 556 (2 81)
D_1	-1 920 (-1 04)	-5 897 (-0 76)
D_2	-0 011 (-0 01)	-5 395 (-0 69)
D_3	-1 878 (-0 92)	-23 631 (-2 82)
D_4	-9 927 (-5 30)	-13 908 (-1 78)
D_5	-3 824 (-1 99)	-15 629 (-2 00)
D_6	0 741 (0 37)	-5 504 (-0 68)
D_7	4 656 (2 29)	-5 969 (-0 73)
D_8	4 849 (2 48)	-4 391 (-0 55)
D_9	4 739 (2 49)	-6 240 (-0 79)
D_{10}	3 163 (1 65)	-9 387 (-1 17)
D_{11}	2 671 (1 40)	3 968 (0.50)
ρ_{t-1}	0 473	0.827
DF	132	133

[a] ρ_{t-1} is a first-order autoregressive parameter, DF is the degrees of freedom, and numbers in parentheses are *t*-values

a relatively inelastic response to changes in both the concentration ratio and risk. In both cases, the elasticities are 0.48.

The wholesale-to-retail margin has relatively inelastic responses to each of the independent variables. A 10 percent increase in the retail price of lamb (including the interaction with quantity) is associated with a 3.4 percent increase in the margin while a 10 percent increase in marketing costs (energy) increases the margin by 1.9 percent. The margin response to the risk variable is very

Table 2. Elasticity Estimates for the Output Price, Marketing Cost, By-Product, Risk, and Concentration Variables in the Farm-to-Wholesale and Wholesale-to-Retail Marketing Margins

Independent Variables[a]	Dependent Variables: Farm-to-Wholesale Marketing Margin	Dependent Variables: Wholesale-to-Retail Marketing Margin
P_w	-0.21	
MC_{fw}	2.91*	
PPLT	-2.68*	
$RISK_{fw}$	0.48*	
CR4	0.48*	0.46*
P_r		0.34*
MC_{wr}		0.19*
$RISK_{wr}$		0.06*

[a]Elasticities are calculated at the means of the variables and an '*' indicates significance at the 0.05 level.

inelastic as a 10 percent increase in output price variability increases the margin by only 0.6 percent. Finally, the concentration ratio elasticity in the wholesale-to-retail margin is almost identical to that of the farm-to-wholesale margin. A 10 percent increase in the concentration ratio increases the wholesale-to-retail margin by 4.6 percent.

Summary and Conclusions

This study investigated marketing margin behavior in the lamb industry. The objective was to determine the effect, if any, of lamb packer concentration on lamb marketing margins using monthly data. Relative price spread (RPS) marketing margin models for the farm-to-wholesale and the wholesale-to-retail margins were jointly estimated using three-stage least squares (3SLS). The RPS models allow for simultaneous shifts in supply and demand. The farm-to-wholesale margin was specified as a function of wholesale prices, wholesale prices times quantity of lamb produced, wage rates, pelt prices, output price risk, packer concentration, and seasonality. The wholesale-to-retail margin was specified as a function of retail prices, retail prices times quantity of lamb produced, energy prices, output price risk, packer concentration, and seasonality. Both models were corrected for positive serial correlation.

The 3SLS results for both models show that increases in lamb packer concentration apparently have had small, positive effects on marketing margins. Between 1980 and 1992, the concentration ratio increased from 55 percent to 70 percent. Thus, the 15 percentage point increase in market concentration may have caused a $0.77/cwt increase in the farm-to-wholesale margin which represents 12 percent of the mean value. The increase in market concentration may have been responsible for increasing the wholesale-to-retail margin by approximately $22.11/cwt which represents 11 percent of the mean value.

The real farm-to-retail marketing margin for lambs has increased since the mid-1980's. Most of this increase occurred between the wholesale and retail levels. The farm-to-wholesale margin was between five and six times more sensitive to changes in marketing costs and by-product values than to changes in market concentration. The wholesale-to-retail margin has been relatively more sensitive to market concentration than to marketing costs, output prices, or output price variability. Nonetheless, the wholesale-to-retail margin has a relatively inelastic response to changes in each of these variables. Finally, increasing market concentration appears to be associated with relatively small increases in both margins. One explanation for this positive influence could be that packers are able to exert market power to widen both margins by reducing farm prices and increasing retail prices. On the other hand, the positive effect of the concentration variable could also be indicative of increased slaughtering costs as firms switched from shipping hanging carcasses to further processed boxed lamb. Increases in boxed lamb shipments have coincided with increased concentration.

All of these results are predicated on data that are far from perfect. For example, a consistent retail lamb price series is not available. In addition, as more lamb is shipped in a boxed form, the use of carcass prices to represent the wholesale sector is questionable. Perhaps future lamb marketing margin studies could use boxed lamb prices rather than carcass prices to represent the wholesale level provided these data are gathered over a sufficiently lengthy time period.

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Endnotes

1. A reviewer suggested that a positive coefficient on the concentration variable could also be indicative of increases in costs for slaughtering firms as shipments of boxed lamb (a further processed product) have become more prevalent. Increases in boxed lamb shipments have coincided with increased concentration.

2. All data are available from the authors upon request.

3. Several alternative lag structures on the marketing cost variable were considered and provided essentially the same results as using the contemporaneous value. When a contemporaneous value is included with lagged values, only one of the two (or three) were significant. In some cases the contemporaneous value remained significant while the lagged variable did not. In other cases, the results were reversed. More importantly, none of the coefficient estimates were significantly affected by employing the various lagged structures. Therefore, we report the results obtained from simply using the contemporaneous values.