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Price Effects from an Anticipated Meatpacking Plant Opening and Unexpected Plant Closing

Clement E. Ward and Jonathan T. Hornung

Livestock producers primarily, but policy makers also, have an interest in market effects from meatpacking plant closings and openings. This article presents results from a study to determine price impacts from an anticipated hog slaughtering plant opening and an unexpected fed cattle slaughtering plant closing. The estimated price effects for each plant event were modeled with price difference and partial adjustment models. The plant opening resulted in higher absolute and relative hog prices in the Provincial market where the plant was located. However, adverse price impacts from the fed cattle plant closing were less evident.

Key words: buyer competition, fed cattle, hogs, livestock prices, market dynamics, meatpacking

Introduction

Market concentration in the meatpacking industry and its associated impacts have long been of interest to agricultural economists (Azzam and Anderson, 1996; Ward, 2002). One solution to increased concentration and questions of market access generated by the consolidation trend is to create investment incentives via tax policies, government guaranteed or low interest loans, or government grant programs to attract new packing plants to the industry. Livestock producers often welcome a new packing plant opening, viewing it as having a likely positive effect on livestock procurement prices in the geographic region surrounding the plant.

More frequently, the trend toward concentration and consolidation results in announcements of plant closures. Livestock producers typically react with skepticism at news of a packing plant closing, viewing it as having probable adverse impacts on livestock procurement prices.

Do plant openings lead to higher livestock prices? and if so, for what duration? Conversely, do plant closings lead to lower livestock prices? and if so, for what duration? Should local or federal government policies foster competition by providing incentives to attract new plants to a market or by providing incentives to remodel and retain marginally competitive, existing plants? Whether or not expected or unexpected plant openings and closings lead to their anticipated price impacts is an empirical question. Other existing market factors may mitigate the hypothesized effect, thus raising questions about the efficacy of government policies to increase or preserve competition via incentives for new or existing plants.

Clement E. Ward is professor and extension economist, and Jonathan T. Hornung is a former graduate research assistant, both in the Department of Agricultural Economics, Oklahoma State University.

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Past research on price impacts from meatpacking plant openings and closings have focused on the relationship between prices in the market where the plant event occurred relative to selected comparison markets (Love and Shuffett, 1965; Ward, 1983; Hayenga, Deiter, and Montoya, 1986). Similar studies have estimated price impacts from alternative marketing methods which increase the potential number of buyers bidding on livestock, e.g., various types of electronic markets (Ward, 2002).

The primary objective of the research reported here was to determine procurement price effects from an anticipated plant opening in the porkpacking industry and an unexpected plant closing in the beefpacking industry. Market structure characteristics in the two industries differed significantly at the time the plant events occurred. Two approaches are taken to estimate price impacts from the two opposite and independent packing plant events. The first approach addresses the question of whether or not the expected price effect occurred commensurate with the plant event relative to comparison markets. Models estimated are based on previous research regarding price effects from plant closings and openings. The second approach addresses the question of an absolute price increase and how long it lasted (if one was found) in the market where the plant event occurred. Models estimated draw from the application of partial adjustment models to other market events.

Relative to previous studies estimating price effects associated with packing plant openings and closings, this research takes a dual approach, applying them to two opposite and independent plant events. Both events, one anticipated by market participants and one unanticipated, occurred in an era of and in geographic areas of concentrated livestock procurement, contrary to conditions existing at the time of previous meatpacking plant event studies.

Two Plant Events and Market Structure Conditions

Maple Leaf Foods opened a new, 9,000 head/day hog slaughtering and processing plant built in Brandon, Manitoba, in August 1999. The plant opened in response to several economic conditions: (*a*) a period of hog industry expansion in Manitoba and much of Canada; (*b*) extensive slaughter hog exports from Manitoba and elsewhere in Canada to the United States; (*c*) no large, cost-competitive packing plants capitalizing on size economies in Manitoba or in nearby Canadian markets; and (*d*) little excess capacity in the U.S. hog slaughter industry (Luby, 1999; Parcell, Mintert, and Plain, 2004).

Structural conditions related to the second event were considerably different. ConAgra closed a 4,000 head/day fed cattle slaughtering and fabricating plant in Garden City, Kansas, after fire badly damaged the plant in December 2000. Economic characteristics of the market included: (*a*) the plant was located in a geographically concentrated area of cattle feeding, close to large numbers of fed cattle; (*b*) slaughter capacity and market access were not concerns to cattle feeders in southwestern Kansas as they could market efficiently to at least one large plant owned by each of the four largest beefpacking firms, all located within 100 miles of Garden City; and (*c*) ConAgra owned and operated similar plants in three adjacent states (the closest plant in the Texas panhandle, less than 150 miles from Garden City, and more distant plants in Colorado and Nebraska).

Previous Research

Three previous studies estimated input price impacts from meatpacking plant closings and openings, the most recent of which involved plants that opened or closed over 20 years ago. Love and Shuffett (1965) estimated the price impact from losing the smallest porkpacking firm at the Louisville terminal market in 1960. Local packers merged and one remaining packer purchased 80% of the hogs sold at the Louisville terminal market. Weekly price differences at the Louisville market were compared with terminal markets in Chicago and Indianapolis for 69 weeks prior to and 87 weeks following the plant closing. Findings reveal that the structural change event significantly lowered hog prices in Louisville compared with the Indianapolis and Chicago markets ($0.22/cwt and $0.26/cwt, respectively). The authors concluded that the plant closing caused a decrease in market competitiveness and lower prices at the Louisville market.

Price impacts were estimated from closing the largest hog slaughtering plant near the Oklahoma City terminal market in 1981 (Ward, 1983). Previous to its closing, the plant slaughtered 80% of all hogs slaughtered in Oklahoma during 1978–80. Weekly Oklahoma City terminal market hog prices were compared with reported hog prices at Omaha and Kansas City terminal markets and with Iowa/southern Minnesota direct trades for the year prior to and following the plant closure. Prices in Oklahoma City were found to be significantly lower than in Iowa/southern Minnesota ($0.86/cwt) after the plant closed.

Hayenga, Deiter, and Montoya (1986) estimated slaughter hog price impacts after six slaughtering plants closed in Iowa, Illinois, Wisconsin, Missouri, and Oklahoma from 1978–81; and when two of the plants in Iowa and Illinois reopened in 1981–82. Price differences were estimated between local and comparison markets for 3–12 months prior to and 12–24 months following the plant events. For four of the plant closing cases, there were 1–8, two-week periods of significantly lower prices ranging from $0.57/cwt to $1.28/cwt. However, lower price periods exhibited no regular pattern following a plant closing. When one of the two plants reopened, prices increased $0.27/cwt above the price level prior to the plant closure. No significant increase was found for the other plant opening.

Numerous packing plants have closed and opened since these studies were conducted, but little research attention has been devoted to their subsequent market dynamics and impacts. Reporting on the number of plants exiting the industry in a subsequent period, Anderson et al. (1998) found that plants both in concentrated markets and ones on the outer edge of major production areas were most likely to exit. However, they did not estimate price implications resulting from plants exiting the industry.

Model Development and Data

Two models were estimated for each plant event: one to estimate the price-level effect relative to comparison markets, and one to estimate absolute price changes and duration of the price effect (if found).

Relative Price Impacts

Slaughter livestock prices in a market are directly affected by slaughter volume in the same market. Therefore, price differences between markets can be expected to be affected by slaughter volume differences in the respective comparison markets. Ward

(1983) estimated price differences between markets after adjusting for slaughter-level differences in the comparison markets. In the Hayenga, Deiter, and Montoya (1986) study, no adjustment was made for relative changes in slaughter volume due to data limitations on slaughter in local markets.

As indicated above, price differences between adjacent markets were hypothesized to depend on slaughter volume differences in the respective comparison markets. A zero-one dummy variable was included to measure the longer-term price difference change prior to and following the plant event. A series of six zero-one dummy variables for subsequent two-week periods following the plant event were included to capture immediate or shorter-term market reactions to the plant event independent of the longer-term price difference change. Therefore, the model estimated was a combination of the models in Ward (1983) and Hayenga, Deiter, and Montoya (1986), written as:

$$(1) \qquad PD_{ij,t} = \alpha + \beta_1 SD_{ij,t} + \beta_2 PlantEvent_t + \beta_3 Week_{t=1-2} + \beta_4 Week_{t=3-4} + \beta_5 Week_{t=5-6} + \beta_6 Week_{t=7-8} + \beta_7 Week_{t=9-10} + \beta_8 Week_{t=11-12} + e_{ij,t},$$

where PD is the difference between hog or fed cattle prices in the ith market where the plant event occurred (i.e., Manitoba and Kansas, respectively) less prices in each jth adjacent, comparison market; SD is the difference between hog (fed cattle) slaughter in the market where the plant event occurred less slaughter in each comparison market; $PlantEvent$ is a zero-one dummy variable associated with the plant opening or closing date; and $Week_{t=1-2,\ldots,11-12}$ represents a set of six zero-one dummy variables for two-week periods following the plant opening or closing. The number of two-week periods chosen to measure the dynamics of prices following the plant event was somewhat arbitrary, though it was assumed transient market adjustments to the plant event would likely occur in three months or less. The focus of the model was on the plant event variable, i.e., whether or not there was a significant price change associated with the hog plant opening or fed cattle plant closing.

Price difference models were corrected for first-order autocorrelation by the Cochrane-Orcutt procedure (SAS Institute, Inc., 2002–03). Models were estimated by feasible generalized least squares regression. Marginal specification problems were noted for selected models from Ramsey's reset test but functional form adjustments were not deemed necessary, thus preserving the consistency of model comparisons across markets.

Price Impact Duration

To measure the absolute price effect in the market where the plant event occurred and to estimate the duration of the price effect, a partial adjustment model was specified. Distributed lag models have been applied to numerous economic problems since being developed by Nerlove (1958) to measure demand and supply elasticities. Two recent applications relevant to this study were measuring demand adjustments to adverse information (Dahlgran and Fairchild, 2002) and estimating price discovery dynamics (Carlberg and Ward, 2003).

Prices in each market where the plant event occurred were assumed to be dependent on wholesale meat and by-products prices and current production levels, including both slaughter volume and weight of livestock slaughtered. This specification assumes

exogenous market forces determine wholesale meat and by-products prices. Characteristic of partial adjustment models, a lagged dependent variable was included in the model to account for the inertia of prices between periods and the nature of prices adjusting only partially in one period to previous-period information. A zero-one dummy variable was included to account for a price change when the plant event occurred. Recognizing the seasonal nature of livestock prices, a series of zero-one dummy variables to capture quarterly seasonality was included. The following model was estimated:

$$(2) \qquad Price_t = \alpha + \beta_1 MeatValue_t + \beta_2 SlVolume_t + \beta_3 Weight_t + \beta_4 LagPrice_{t-1} + \beta_5 ByProdValu_t + \beta_6 PlantEvent_t + \beta_7 Season2_t + \beta_8 Season3_t + \beta_9 Season4_t + e_t,$$

where *Price* is slaughter hog (fed cattle) prices in week *t*, *MeatValue* is weekly average boxed pork (boxed beef) cutout values, *SlVolume* is weekly number of slaughter hogs (fed cattle) processed in the market where the plant event occurred, *Weight* is weekly average weight for slaughter hogs (fed cattle), *ByProdValu* is weekly average hog (cattle) by-product values, *LagPrice* is the lagged dependent variable, *PlantEvent* is a zero-one dummy variable for the week the plant opened or closed, and *Season*2, *Season*3, and *Season*4 are zero-one seasonal dummy variables. The focus of the model was on the plant event and partial adjustment coefficients which indicate price adjustments to the plant events. The partial adjustment coefficient (if significant) is used to estimate the length of adjustment to the plant event.

Partial adjustment models were corrected for first-order autocorrelation and estimated by feasible generalized least squares (SAS Institute, Inc., 2002–03). Specification tests revealed marginal specification problems for selected models, but no functional form adjustments were made.

Data were compiled for 52 weeks prior to and 52 weeks following each plant event. Thus, for the Maple Leaf plant opening, this time frame was from August 29, 1998 to August 19, 2000, and for the ConAgra plant closing, from January 1, 2000 to December 22, 2001. Prices for U.S. hogs, by-product values, and pork cutout values were converted to Canadian dollars per 100 kg, and slaughter hog weights were converted to kgs. Market areas analyzed for the hog plant opening included Manitoba, Ontario, Saskatchewan, and Iowa/southern Minnesota; for the fed cattle plant closing, market areas were Kansas, Colorado, Nebraska, and Texas. Table 1 summarizes the data and their respective sources.

Table 2 presents summary statistics of prices and price differences before and after the Maple Leaf Foods Manitoba hog slaughter plant opening. Prices, price differences, slaughter, and slaughter differences changed significantly after the plant opened in all markets. Slaughter differences provide support for ensuring changes in slaughter are considered when estimating price differences across markets and between time periods.

All prices and two of three price differences changed significantly after the Kansas ConAgra fed cattle slaughter plant closed (table 3). Slaughter differences changed significantly in all areas, but absolute slaughter only changed in Kansas, where slaughter declined as expected.

Table 1. Data Description and Sources

Variable	Description	Units	Source
CATTLE:			
Prices–Kans., Tex., Colo., Omaha	FOB live, 1,100–1,300 lb. fed steers, 35%–65% Choice grade	$/cwt	AMS[a]
Slaughter–Kans., Tex., Colo., Nebr.	Federally inspected steer and heifer slaughter	1,000 head	NASS[b]
Boxed beef cutout value	Reported value for 600–700 lb. carcasses	$/cwt	AMS[a]
Weight	Average weight for 35%–65% Choice steers from Tex./Okla., Kans., Colo., Nebr.	Lbs.	AMS[a]
By-product value	Average total steer by-product value	$/cwt	AMS[a]
HOGS:			
Price–Manitoba	Dressed barrow and gilts	$CAN/100 kg	Manitoba gov't
Price–Ontario	Dressed barrow and gilts	$CAN/100 kg	AgriCanada
Price–Saskatchewan	Dressed barrow and gilts	$CAN/100 kg	Saskatchewan gov't
Price–Iowa/so. Minn.	Live, 240–280 lbs., 49%–52% lean direct trades	$/cwt	AMS[a]
Slaughter–Iowa, Minn.	Federally inspected barrow and gilt slaughter	1,000 head	NASS[b]
Slaughter–Manitoba, Ontario, Saskatchewan	Federally inspected barrow and gilt slaughter	1,000 head	AgriCanada
Pork cutout value	Average value for pork cutout	$/cwt	AMS[a]
Weight	Average live weight for negotiated hog trades	Lbs.	AMS[a]
By-product value	Average total hog by-product value	$/cwt	AMS[a]

[a] Data gathered and compiled by the Livestock Marketing Information Center (LMIC) from the Agricultural Marketing Service (AMS), U.S. Department of Agriculture (USDA).
[b] National Agricultural Statistics Service (NASS), U.S. Department of Agriculture (USDA).

Results and Discussion

Selected summary results from each model are presented here, but further detail can be found in Hornung (2004). Explanatory power of price difference models both for plant opening and plant closing was expectedly low, whereas the explanatory power of both partial adjustment models was expectedly high.

Plant Opening Impacts

Tables 4 and 5 report coefficients from price difference and partial adjustment models for all markets. Both models generally confirmed hog prices increased after the Manitoba hog slaughter plant opened. The price difference model indicated a significant price difference increase of $CAN 6.87/100 kg to $CAN 10.62/100 kg in two of the three market comparisons (Manitoba-Ontario and Manitoba-Iowa/southern Minnesota) (table 4). The increase in the Manitoba-Saskatchewan price difference was not statistically significant.

Table 2. Variable Means Before and After the Brandon, Manitoba (Maple Leaf Foods) Hog Slaughtering Plant Opening (August 29, 1998–August 19, 2000)

Variable	Mean Before Opening	Mean After Opening	Mean Over 104 Weeks
Manitoba-Saskatchewan price difference	8.000	10.520*	9.260
Manitoba-Ontario price difference	-1.040	4.310***	1.640
Manitoba-Iowa/Minnesota price difference	19.370	28.570***	23.920
Manitoba-Saskatchewan slaughter difference	36.700	52.573***	44.713
Manitoba-Ontario slaughter difference	-19.200	-8.967***	-14.036
Manitoba-Iowa/Minnesota slaughter difference	-502.700	-462.700***	-482.539
Manitoba price	109.630	159.440***	134.530
Ontario price	110.670	155.130***	132.900
Saskatchewan price	101.630	148.930***	125.280
Iowa/Minnesota price	90.680	131.780***	111.280
Manitoba slaughter	55.741	69.895***	62.886
Ontario slaughter	74.946	78.862**	76.923
Saskatchewan slaughter	19.041	17.322***	18.172
Iowa/Minnesota slaughter	716.210	688.780**	702.495
Pork cutout value	163.807	203.260***	183.810
Slaughter hog weight (kg)	117.200	118.380***	117.790
By-product value	33.360	34.770***	34.080

Notes: Single, double, and triple asterisks (*) denote statistically different means before and after the plant opening based on *t*-test, at the 0.10, 0.05, and 0.01 significance levels, respectively. All prices are in $CAN/100 kg; slaughter is in 1,000 head.

Table 3. Variable Means Before and After the Garden City, Kansas (ConAgra) Fed Cattle Slaughtering Plant Closing (January 1, 2000–December 22, 2001)

Variable	Mean Before Closing	Mean After Closing	Mean Over 104 Weeks
Kansas-Colorado price difference	0.100	0.010	0.070
Kansas-Nebraska price difference	0.170	-0.230***	-0.020
Kansas-Texas price difference	-0.080	0.140***	0.030
Kansas-Colorado slaughter difference	106.510	88.935***	97.722
Kansas-Nebraska slaughter difference	24.883	7.258***	16.070
Kansas-Texas slaughter difference	46.704	31.446***	39.075
Kansas price	69.500	72.540***	70.990
Texas price	69.700	72.240***	70.970
Nebraska price	69.330	72.620***	70.960
Colorado price	69.400	73.470***	71.170
Kansas slaughter	156.810	138.780***	147.792
Texas slaughter	110.100	107.330	108.717
Nebraska slaughter	131.920	131.520	131.722
Colorado slaughter	50.296	49.844	50.070
Beef cutout value	107.470	112.610***	111.770
Slaughter steer weight (lbs.)	1,265.100	1,255.600*	1,260.300
By-product value	7.960	8.560***	8.260

Notes: Single, double, and triple asterisks (*) denote statistically different means before and after the plant closing based on *t*-test, at the 0.10, 0.05, and 0.01 significance levels, respectively. All prices are in $/cwt; slaughter is in 1,000 head.

Table 4. Price Difference Model Results for Plant Opening and Closing Events

	PLANT OPENING (Maple Leaf Foods, Brandon, Manitoba)			PLANT CLOSING (ConAgra, Garden City, Kansas)		
Independent Variable	Manitoba-Saskatchewan	Manitoba-Ontario	Manitoba-Iowa/Minn.	Kansas-Colorado	Kansas-Nebraska	Kansas-Texas
Intercept	6.890	-0.743	29.270***	0.590	-0.071	-0.422***
	(1.31)	(0.26)	(3.25)	(0.80)	(0.34)	(2.83)
SD	0.021	0.028	0.020	-0.004	0.010	0.007**
	(0.15)	(0.28)	(1.15)	(0.66)	(1.28)	(2.39)
PlantEvent	3.824	6.869**	10.619***	-0.224	-0.332	0.315***
	(1.30)	(2.08)	(3.54)	(1.40)	(1.64)	(4.91)
$Week_{1-2}$	-10.035*	-12.592*	-16.821**	0.068	0.463	0.388**
	(1.72)	(1.74)	(2.50)	(0.21)	(1.10)	(2.32)
$Week_{3-4}$	-3.627	-8.321	-11.546	0.235	0.626	-0.054
	(0.61)	(1.08)	(1.65)	(0.74)	(1.48)	(0.31)
$Week_{5-6}$	-2.065	-0.863	-6.844	0.312	0.618	-0.051
	(0.37)	(0.11)	(0.96)	(1.00)	(1.46)	(0.30)
$Week_{7-8}$	-6.121	-8.052	-7.778	-0.219	0.091	-0.047
	(1.10)	(1.06)	(1.08)	(0.70)	(0.22)	(0.28)
$Week_{9-10}$	-9.885*	-12.126	-17.313**	0.193	0.470	-0.035
	(1.78)	(1.61)	(2.14)	(0.62)	(1.09)	(0.21)
$Week_{11-12}$	-6.460	-11.847	-11.968	0.161	0.076	0.087
	(0.90)	(1.56)	(1.66)	(0.52)	(0.18)	(0.51)
No. of Observations	103	103	100	90	101	97
Regression R^2	0.101	0.097	0.208	0.053	0.159	0.290

Notes: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively. Numbers in parentheses are absolute values of calculated t-statistics. Coefficients for the plant opening are in $CAN/100kg, and for the plant closing $/cwt.

Most hog producers in southwestern Manitoba likely shipped slaughter hogs within a 500-mile radius of their hog operation, which extends to cost-competitive plants in Iowa and southern Minnesota. The estimated price increase exceeded estimated transportation costs of $CAN 6.57/100 kg for a 500-mile haul to potential plant destinations in Ontario and Iowa-Minnesota. Slaughter differences were not statistically significant for any of the three comparison markets. The set of two-week dummy variables failed to detect any consistent pattern either in terms of significance or evidence market prices reacted immediately to the plant opening.

Variables in the partial adjustment models (table 5) showed mixed results relative to expectations. Lagged hog prices and boxed pork values were positive and significant as expected in all markets. Slaughter volume was not significant in three of four markets; and in the sole market where it was significant, the sign was unexpectedly positive. By-product values had an unexpected negative sign and were significant in three of four markets. Seasonal dummy variables showed a consistent pattern across the four markets but with varying degrees of significance.

The partial adjustment models for the plant opening found prices increased in three of the four markets after the plant opened: $CAN 7.77/100 kg in Saskatchewan, $CAN 10.94/100 kg in Manitoba, and $CAN 14.05/100 kg in Iowa/southern Minnesota (table 5). The price increase in Ontario was not statistically significant. Using the lagged

Table 5. Partial Adjustment Model Results for Plant Opening and Closing Events

	PLANT OPENING (Maple Leaf Foods, Brandon, Manitoba)				PLANT CLOSING (ConAgra, Garden City, Kansas)			
Independent Variable	Manitoba Coefficient	Saskatchewan Coefficient	Ontario Coefficient	Iowa/Minn. Coefficient	Kansas Coefficient	Texas Coefficient	Colorado Coefficient	Nebraska Coefficient
Intercept	153.069	85.270	100.156	282.640	-1.924	0.677	25.310*	12.142
	(1.14)	(0.83)	(1.17)	(0.83)	(0.13)	(0.04)	(1.77)	(0.80)
MeatValue	0.226*	0.642***	0.623***	2.319***	0.106**	0.228***	0.113**	0.226***
	(1.93)	(11.39)	(12.20)	(12.10)	(2.13)	(3.64)	(2.15)	(3.72)
SlVolume	0.200	0.461*	0.010	-0.008	-0.014	-0.033*	-0.040	-0.008
	(1.66)	(1.91)	(0.16)	(0.28)	(0.73)	(1.90)	(1.40)	(0.55)
Weight	-0.360	-0.242	-0.395	-1.674	0.003	0.003	-0.011	-0.006
	(0.71)	(0.64)	(1.19)	(1.29)	(0.35)	(0.26)	(1.14)	(0.57)
LagPrice	0.611***	0.376***	0.437***	0.187***	0.771***	0.538***	0.599***	0.468***
	(5.62)	(7.12)	(9.10)	(2.93)	(9.14)	(5.22)	(6.11)	(4.58)
ByProdValue	-1.894**	-2.109***	-1.094*	0.533	0.582**	0.878**	0.880***	1.045***
	(2.28)	(3.17)	(1.87)	(0.23)	(2.28)	(2.61)	(3.17)	(2.25)
PlantEvent	10.943***	7.771***	2.577	14.046*	-0.900**	-1.124**	0.037	-0.399
	(3.31)	(3.08)	(1.29)	(1.71)	(2.20)	(2.60)	(0.10)	(0.89)
Season2	4.842**	1.137	1.393	22.160***	0.243	0.615	0.573	0.804
	(2.00)	(0.60)	(0.85)	(3.29)	(0.51)	(1.08)	(1.25)	(1.41)
Season3	-4.402	-6.269**	-5.922***	-6.473	-0.405	0.325	-1.188**	0.152
	(1.37)	(2.52)	(2.88)	(0.79)	(0.81)	(0.53)	(2.29)	(0.26)
Season4	-8.089***	-4.592**	-3.615**	-8.182	-0.608	-0.638	-1.399***	-0.686
	(3.11)	(2.26)	(2.10)	(1.22)	(1.56)	(1.29)	(2.99)	(1.28)
No. of Observations	102	102	102	97	99	92	89	101
Regression R^2	0.953	0.963	0.976	0.944	0.947	0.894	0.931	0.855

Notes: Single, double, and triple asterisks (*) denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively. Numbers in parentheses are absolute values of calculated t-statistics. Coefficients for the plant opening are in $CAN/100 kg, and for the plant closing $/cwt.

dependent variable coefficient, the duration of market adjustments was estimated (Dahlgran and Fairchild, 2002). Ninety-five percent of the price increase in the three markets (Manitoba, Saskatchewan, and Iowa/southern Minnesota) lasted between three and fourteen weeks.

Plant Closing Impacts

For the Kansas plant closing, adverse price effects were not evident. The price difference model indicated an unexpected significant price difference increase of $0.32/cwt for one market comparison (Kansas-Texas) and no significant differences for the other two comparisons (table 4). Slaughter differences were significant only in the Texas comparison, and were positive as expected. Only a single coefficient on the set of two-week dummy variables was significant, thus indicating no apparent short-run adjustment to the unexpected plant closing.

Variables in the partial adjustment model (table 5) behave generally as expected. Lagged fed cattle prices, boxed beef values, and by-product values were positive and significant in all markets as expected. Slaughter was negative as expected in all markets, but significant only in the Texas model. Little consistent seasonality was indicated across markets.

For the partial adjustment model, fed cattle prices in just one market (Texas) were significantly lower ($1.12/cwt) after the Kansas plant closed (table 5). The reason for this unexpected finding is not clear. Perhaps the slaughter difference following the plant closing failed to capture all of the price difference effect, leaving a further decline in fed cattle prices in Texas. Estimating the duration of the price change suggested 95% of the lower prices in Texas lasted four weeks.

Summary and Concluding Discussion

Despite numerous meatpacking plant closings and a few openings in the past two decades, little research has estimated their price impacts. Some livestock producers, policy makers, and economists tend to believe opening a plant has a nearly automatic positive effect on prices, and closing a plant is believed to have the opposite effect. This research was conducted to measure the price effects from an anticipated plant opening and an unexpected plant closing. Price difference models were estimated to determine effects relative to comparison markets, while partial adjustment models were estimated to determine absolute price effects and the duration of those effects.

Models estimated showed relatively consistently that the anticipated hog slaughter plant opening in Brandon, Manitoba, positively affected prices both relative to comparison markets and absolutely in Manitoba. Results for the Garden City, Kansas, fed cattle plant closing showed no consistent adverse effects on fed cattle prices in Kansas after the plant closed.

Results confirm other market structure characteristics need to be considered when assessing potential price changes and market dynamics following significant plant events. For example, in Manitoba, there was insufficient slaughter capacity for the increasing hog production in Manitoba. Producers had few nearby alternatives at which to market hogs to large, efficient packers. The combined result was significant hog imports to the United States. The new plant in Manitoba represented considerable

increased local and regional slaughter capacity in a cost-efficient plant, resulting in increased local demand for slaughter hogs and commensurate price increases.

The situation in Kansas was markedly different. Slaughter capacity in the southwest Kansas area had not been an apparent problem or issue. Cattle feeders had several alternative, cost-efficient plants in the region owned by the four largest beefpacking firms. Moreover, ConAgra, owner of the plant that closed, owned cost-competitive plants in Texas, Colorado, and Nebraska. Although the plant closing lessened excess capacity locally, sufficient capacity existed in the region to absorb the lost capacity without adversely affecting fed cattle prices. In fact, the lost capacity in effect allowed other plants in the region to operate at higher plant utilization, thereby potentially helping to support prices.

The two plant events examined here suggest economists, producers, and others consider a broad set of market factors when anticipating market reactions to meatpacking plant openings and closings. What may appear to be obvious market reactions and impacts may be only cursory expectations when viewed from a broader perspective. This research in no way suggests abandonment of policy efforts to attract new plants to an industry or to retain and revitalize existing plants. Such efforts should be considered in the light of more comprehensive market structure characteristics in projecting realistic expected impacts.

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