Performance Evaluation of the U.S. Hog Slaughter Industry

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ABSTRACT

Conventional wisdom holds that a small and decreasing number of hog slaughter firms are using their "market power" to take advantage of U.S. hog producers. Existing studies have simply calculated industry concentration ratios and assumed/asserted that the performance of such a concentrated industry must be different from the performance of a perfectly competitive industry. These researchers have rejected without testing the hypothesis that: the observed performance of the U.S. hog slaughter industry is not different from the performance that would be generated by a perfectly competitive industry.

This paper derives the theoretical relationships between hog and pork prices, and hence the farm-wholesale price spread, that would exist in a perfectly competitive slaughter hog market. These performance norms are then confronted with observed weekly price/quantity relationships over the 1991-2001 period to compare observed market performance with the ideal performance norms derived from the economic theory of a perfectly competitive market.

Based on the market performance measures derived from economic theory of a perfectly competitive market, ***the hypothesis that the U.S. hog slaughter hog market is a perfectly competitive market cannot be rejected.*** There simply is not any evidence to support allegations of abuse of market power by meat packers.

PERFORMANCE EVALUATION OF THE U.S. HOG SLAUGHTERING INDUSTRY[*]

J. Bruce Bullock[**]

Conventional wisdom holds that a small and decreasing number of hog slaughter firms are using their "market power" to take advantage of U.S. hog producers. This paradigm has provided the "justification" for numerous studies that purport to measure the market distortions supposedly generated by meat packers use of market power. See Barkema, et al., and also Ward for references to a number of these studies.

Existing studies have simply calculated industry concentration ratios and assumed/ asserted that the performance of such a concentrated industry must be different from the performance of a perfectly competitive slaughter industry. These researchers have proceeded to develop a myriad of "measures of market power." These researchers have ***rejected without testing*** the hypothesis that: the observed performance of the U.S. slaughter hog market is not different from the performance that would be generated by a perfectly competitive slaughter market.

The scientific method of research requires that this hypothesis be tested as part of the rejection process. Computation of industry concentration ratios is not a valid test of this hypothesis. Highly concentrated industries may well perform no differently than a perfectly competitive industry.

Bullock (a) has used the economic theory of perfectly competitive markets to develop an analytical framework that challenges the existing conventional wisdom. Moreover, this framework provides the foundation for statistical testing of hypotheses about the ***performance*** of

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the U.S. slaughter hog market. The purpose of this paper is to evaluate the consistency of the analytical framework derived from the theory of perfect markets with observed market clearing weekly prices and quantities in the U.S. hog/pork market over the 1991-2001 period. The parameters of the perfectly competitive model are estimated and hypotheses are tested regarding the ability of the estimated perfect market model to explain observed data relationships.

Background

There are four central conclusions/assertions of the Bullock model.

I. The biological production process of producing slaughter hogs requires 10 months from sow breeding to slaughter of the pigs obtained from the breeding decision. Hence producers – not packers – determine the number of slaughter hogs available for slaughter each week. The supply of slaughter hogs marketed in the third week of month X was determined 10 months previous and is perfectly inelastic with respect to the market price of slaughter hogs that week. (Bullock, b)

II. The short run cost curves of hog slaughter plants are u-shaped as explained by economic theory. (Bullock, b)

III. The U.S. hog slaughter industry is an oligopsony. However, the necessary and sufficient conditions for hog slaughtering firms to possess and exercise "market power" do not exist since packers do not determine the number of slaughter hogs ready for slaughter each week and packers purchase all hogs available each week. Profit seeking packers competing for market share (and hence profits) will establish the price charged for their services (i.e., the farm-wholesale price spread) equal to the marginal cost of slaughtering the number of animals available for slaughter. Consequently the derived demand for hogs by the oligopsonistic

hog slaughter industry is not different from what the derived farm level demand for hogs would be with a much larger number of slaughter firms. (Bullock, c)

IV. The farm level derived demand curve for hogs has an inverted u-shape as a result of subtracting u-shaped slaughter cost curves from a linear or log linear, price dependent wholesale demand curve for pork. Consequently, the absolute value of the farm level demand flexibility coefficient increases exponentially as the daily slaughter rate increases. In contrast, the wholesale level demand price flexibility is only marginally affected by the slaughter rate and may even be constant if the wholesale level demand curve is log linear with respect to the quantity moving through the market. (Bullock, c)

The balance of this paper focuses on developing empirical estimates of parameters defined by the economic model of a perfectly competitive U.S. slaughter hog market. Statistical tests are then developed regarding the consistency of the data relationships specified in the model with observed data relationships (market performance) during the 574 weeks of market clearing prices and quantities observed over the 1991-2001 calendar years.

Estimation of Marginal Cost of Hog Slaughter

Pork packers are margin makers. They are price takers in the wholesale meat market. Packers are price makers at the farm level. Consequently packers determine the magnitude of the farm-wholesale price spread (i.e. the payment for hog slaughtering services).

(1) $S_{f\text{-}w} = P_w - P_f$

where $S_{f\text{-}w}$ = farm-wholesale price spread

P_w = wholesale price of meat

P_f = farm level price of live animals

In a perfectly competitive market, packers would determine the farm level price (P_f), and hence the farm-wholesale price spread, by subtracting their marginal cost of slaughter (C) from the exogenously determined wholesale price of pork meat (P_w). Thus, in a perfectly competitive market the farm level price of hogs would be determined as:

(2) $P_f = P_w - C$

where P_f = farm level value of hogs

P_w = wholesale price of pork meat

C = marginal non-animal cost of slaughtering the animals moving through the market. These are the residual costs after the value of by-products has been credited to the margin calculation.

All prices and marginal costs are expressed on a per pound of wholesale meat basis.

In a perfectly competitive slaughter hog market we would observe the farm-wholesale price spread to be equal to the marginal cost of slaughter.

(3) $P_w - P_c = C$

where: P_w, P_f, and C are as defined above

Economic theory states (and empirical observation confirms) that the short run average cost curve of packing plants will be u-shaped as discussed in economics textbooks and illustrated in Figure 1.

Economic theory defines the "short run" as a time interval that is too short for the firm to alter the size of their fixed facilities. Time intervals of up to one year thus satisfy the definition of short run in the meat packing industry. Thus we would expect the average variable slaughter cost curve for a one week time interval to be a u-shaped cost curve.

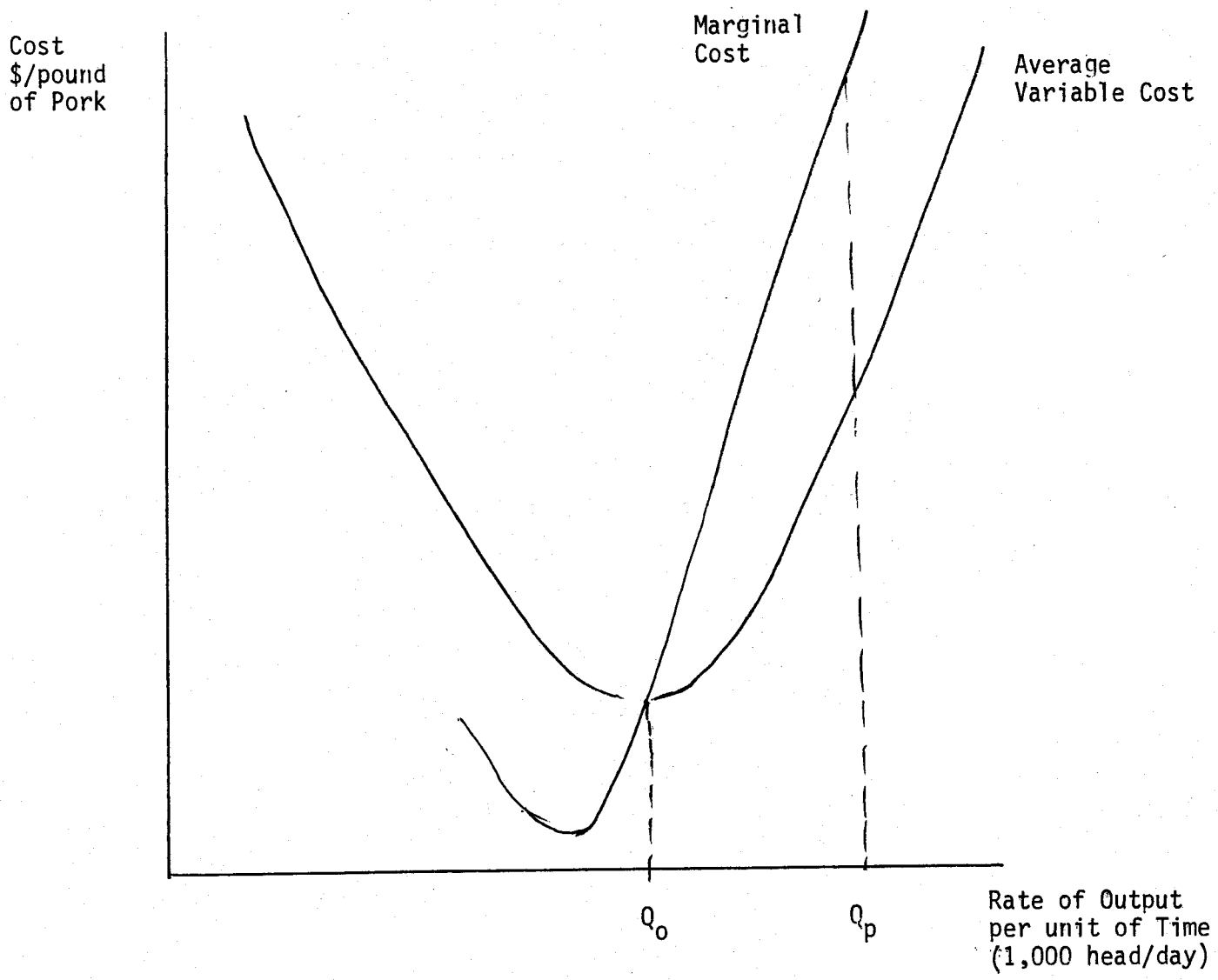

Figure 1. Illustration of Short Run Hog Slaughter Plants

Note that the horizontal axis of Figure 1 is labeled ***rate*** of output per unit of time. Consequently, if one is examining week to week changes in the non-animal cost of slaughtering hogs, the appropriate slaughter rate is the number of animals slaughtered per day. The total output per week or month is by definition the daily slaughter rate multiplied by the number of days in the time interval of interest.[1]

Designed capacity of a slaughter plant is defined as the slaughter rate at which average variable cost is at its minimum. For example, Q_o/day is the designed capacity of the slaughter plant depicted in Figure 1. Note that the designed capacity of the plant is not the maximum slaughter rate at which the plant can physically operate. The physical capacity is higher than the designed capacity of the plant. Let Q_p denote the physical capacity of the plant.

Economic theory clearly indicates that the marginal cost of slaughtering hogs is ***not constant*** as slaughter rates increase from Q_o to Q_p. Indeed, economic theory suggests that the marginal cost of slaughter increases at an increasing rate as the rate of slaughter increases beyond the Q_o slaughter rate. Assumptions of constant marginal cost of meat packers made by Zhang and Sexton and numerous other authors are mathematically convenient, but are economically illogical.

Economic theory indicates that the marginal cost of slaughtering hogs might have the following simple mathematical form.[2]

(4) $$C = a + b_1 Q + b_2 Q^2$$

where: C = marginal cost of slaughter per wholesale pound of pork

Q = slaughter rate (head per day) at which the plant is being operated

[1] See French et al., for discussion of the relationship between average and marginal processing costs and the rate of throughput in processing plants.

[2] This is only one of many mathematical expressions that might describe a marginal cost curve that increases at an increasing rate as the utilization rate of the plant increases.

Economic theory suggests that in a well functioning slaughter hog market where packer margins are established at a level that just covers marginal cost of hog slaughter, we would observe the following relationship between farm-wholesale price spreads and the slaughter rate of hogs during the period for which the price spread is calculated and observed.

(5) $S_{f\text{-}w} = (P_w - P_f) = a + b_1Q + b_2Q^2$

Equation 5 provides the economic foundation for estimating the marginal cost of slaughtering hogs using observed weekly average farm-wholesale price spreads and corresponding slaughter rates over an historical period. Estimation of the parameters of equation 5 also provides an empirical basis for evaluating the observed performance of the farm-wholesale price spread relative to a perfectly competitive market performance norm defined by economic theory.

The parameters of equation 5 were estimated using observed weekly farm-wholesale price spreads and daily hog slaughter rates for the 1991-2001 period (574 weeks). Data on the weekly farm-wholesale price spread were obtained from the LMIC data base. The daily hog slaughter rate of hogs for each week was calculated by dividing USDA FI slaughter for the week by the number of slaughter plant work days for the week.[3]

Over the 574 week period during the calendar years 1991-2001, the F-W price spread averaged $11.72/cwt and ranged from $1.64 the week of May 25, 1991, to a high of $47.68 the week of December 19, 1998. During this period the daily slaughter rate during the week averaged 354,860 head. The daily slaughter rate ranged from a low of 279,460 the week of July 6, 1991, to a maximum of 427,289 the week of December 19, 1998.

Parameters of the following equation were estimated using OLS.

(6) $Y = 185.31 - 1.230641Q + .002096Q^2 \qquad R^2 = .628 \qquad F = 483.3$
$\qquad\qquad\qquad\qquad\qquad\quad (-7.09) \qquad (8.54)$

[3] Slaughter work days in week provided by Ron Plain.

where: Y = F-W price spread

Q = daily FI slaughter rate during the week

t values of parameters are shown in parentheses.

Variations in weekly slaughter ***rates*** explain 62.8 percent of the weekly variation in the F-W price spread over the 1991-2001 period. The observed relationship between the F-W price spread and the daily slaughter rate is quite consistent with the relationship defined (predicted) by economic theory of F-W price spread determination in a perfectly competitive market.

Adding a simple linear time trend to the equation to perhaps reflect an increase in slaughter input operating costs over the 11 year period results in the following equation.

(7) $$Y = 209.489 - \underset{(-8.6)}{1.34228Q_1} + \underset{(9.9)}{.002184Q^2} + \underset{(11.9)}{.015101T} \quad R^2 = .703 \quad F=449.4$$

where: T is a time variable defined by the number of the week in the 574 week period.

This simple equation, describing the relationship between observed price spreads and the slaughter rate that would exist in a perfectly competitive market, explains 70.3 percent of the weekly variation in the F-W price spread for hogs over the 574 week period of the calendar years 1991-2001. Moreover, the F value of 449.4 for this simple equation means that, based on 574 weeks of observed data relationships, ***the hypothesis that the short run cost curve of the industry is not u-shaped can be rejected at the 99%+ level of confidence.***

As described above, equations (6) and (7) are estimates of the industry marginal cost curve of the U.S. pork packing industry. This is an estimate of the ***industry*** marginal cost curve. It is not the marginal cost curve of a representative or average firm in the industry. Since it is an industry MC curve, it reflects the MC of the least efficient (highest cost) firms in the industry.

The u-shape of the packer average cost curve is clearly demonstrated by columns 1 and 2 of Table 1. As indicated earlier, the average daily slaughter rate over the 1991-2001 period was 354.86. The marginal cost of slaughtering 300,000 hd/day is 24 percent lower than the marginal cost of slaughtering 350,000 hogs/day. In contrast, the marginal cost increases sharply as the slaughter rate increases. When the industry operates at the slaughter rates of 400,000 and of 425,000 hd/day (levels observed during 1998-1999), the marginal costs are respectively, 93 percent and 165 percent higher than when the industry operates at the average rate of 350,000 hogs/day.

Implications

This analysis demonstrates that a single variable – the daily slaughter rate – explains 62.8 percent in the week-to-week variability in the observed F-W price spread over the 574 week period of calendar years 1991-2001. Adding a simple linear time trend to the equation raises the explanation of weekly variations in the F-W price spread to 70.3 percent.

The observed variation in weekly price spreads are highly consistent with the assumption (assertion) that observed weekly changes (performance) in the F-W price spread were generated by a "perfectly competitive" slaughter industry where the charge for slaughtering services is equal to the marginal cost of slaughtering services. The period of analysis includes the 1998-1999 period when the F-W price spread reached record levels – at the same time that the daily slaughter rate also reached historically high levels. Note also the close temporal connection between the lowest F-W price spread during the week of May 25, 1991, and the lowest weekly slaughter rate in July 1991.

Advocates of the "meat packers were exploiting their **market power**" conspiracy theory as an explanation of the record high margins in 1998-1999, point to the high level of industry

Table 1: Computed Marginal Slaughter Cost, Live Prices, Farm Level Price Flexibilities and Wholesale Prices Using Estimated Equations

1	2	3	4	5	6
Daily Slaughter Rate	Marginal Cost of Slaughter	Farm Level Demand			Wholesale Price[3/]
		Live Price[2/]	Slope of Demand Curve	Price Flexibility[3/]	
1000 hd	$ cwt[1/]	$ cwt[1/]			$ cwt[1/]
275	14.26	91.64	.104	+.312	92.85
300	12.09	79.05	.052	+.198	80.77
325	12.66	69.01	0	0	71.06
350	15.96	57.79	-.052	-.314	63.11
375	21.99	47.80	-.104	-.814	56.51
400	30.75	37.97	-.156	-1.64	50.96
425	42.23	27.74	-.208	-3.18	46.24
450	56.45	17.02	-.260	-6.87	42.20
475	73.40	5.66	-.312	-26.16	36.70

[1/]wholesale weight

[2/]Calculated using equation (10) at T = 574, (last week of December 2001) and using wholesale price shown in column 6.

[3/]Calculated using equation (16) with wholesale price of beef at its 10 year average of $111.41 and the retail price of pork at its average value of $226.48.

profits during this period as evidence supporting their position. To the contrary. In a perfectly competitive market where (a) marginal costs increase exponentially with ***rate*** of plant utilization and (b) the payment extracted for slaughtering services (F-W price spread) is exactly equal the marginal cost of processing (which would occur in a perfectly competitive market), producer surplus (short run operating profits) increase rapidly as marginal cost increases. Economic theory of a perfectly competitive market clearly states that record levels of profit per unit of time will be achieved as a result of marginal cost pricing of slaughter services when the capacity of the slaughter system is stressed. Economic theory of a perfectly competitive packing industry clearly explains/predicts the observed behavior of the U.S. meat packing industry as the utilization rate of fixed plant facilities increases. The predictions/explanations of the economic theory of a perfectly competitive slaughter market are totally consistent with observed changes in weekly price spreads and industry profit levels over the 1991-2001 period.

Clearly the CR-4 for the U.S. pork slaughter industry increased over the 1991-2001 period. ***However, there certainly were not weekly increases and decreases in the concentration ratio and hence weekly changes in "market power" of meat packers over this period.*** The "market power theory" is simply incapable of providing either a theoretical or empirical basis for explaining the observed volatility in weekly average price spreads over the 1991-2001 period.

Suppose we let the time trend variable in equation (7) represent the economic impacts on weekly changes in price spreads of increased industry concentration. In that case, we observe that weekly variation in the daily slaughter rate explains 62.8 percent of the variation in the F-W price spread (equation 6). If the time trend represents increased industry concentration, then one might argue that increased industry concentration over the 1991-2001 period accounted for (explains) 70.3 – 62.8 = 7.5 percent of the weekly variation in the F-W price spread over this

period. This is hardly a convincing argument that increased industry concentration significantly impacted the **performance** of the pork packing industry over the 1991-2001 period.

The dominant factor affecting weekly variation in F-W price spreads is the daily rate of slaughter which is exactly what the theory of a perfectly competitive slaughter market predicts. Based on market performance measures derived from economic theory of a perfectly competitive market, ***the hypothesis that the U.S. slaughter hog market is a perfectly competitive market cannot be rejected.***

Estimation of Farm Level Derived Demand for Slaughter Hogs

The farm level derived demand for slaughter hogs is defined by equation (2). The farm level derived demand for hogs is the schedule of the maximum price that packers are willing to pay for hogs given the current wholesale price of pork products (P_w) and the current daily slaughter rate of hogs (Q). Thus, the farm level derived demand for slaughter hogs by a perfectly competitive slaughter industry is described by equation (8) which is obtained by substituting equation (5) into equation (2).

(8) $$P_f = \beta_1 P_w - (c + \beta_2 Q + \beta_3 Q^2)$$

The parameters of equation (8) were estimated by OLS using observed weekly prices over the 574 week period of calendar years 1991-2001. The resulting equation is:

(9) $$P_f = -98.201 + 1.101352 P_w + .6266Q - .00106Q^2 \qquad R^2 = .951 \qquad F = 3685$$
$$\qquad\qquad\qquad\qquad (68) \qquad\quad (6.8) \qquad (-8.1)$$

where: P_f = week average price of slaughter hogs in Iowa and Minnesota (USDA)

P_w = wholesale cutout value ($ cwt) of pork carcass (LMIC)

Q = daily slaughter rate as previously described.

t-values of estimated parameters in parentheses

Adding a linear time trend to the equation results in the following:

(10) $P_f = -120.688 + 1.203886P_w + .676085Q - .00104Q^2 - .01172T \qquad R^2 = .9687 \qquad F = 4406$
$\qquad\qquad\qquad\qquad\qquad\quad (85.12) \qquad (9.20) \qquad (-9.99) \qquad (17.97)$

where: all variables are the same as for equation (8)

t-values of estimated parameters are in parentheses

The relationship between the farm price of hogs, the wholesale price of pork, and the daily slaughter rate postulated by the economic theory of a perfectly competitive market (equation 8) fits the observed data like a glove. The F values for estimated equations (9) and (10) mean that ***the hypothesis that observed weekly relationships between farm prices of hogs and the wholesale prices of pork over the 1991-2001 period reflects the performance of a "non-competitive" market can be rejected at the 99%+ level of confidence.***

The structure of the U.S. hog slaughter industry clearly is oligopsonistic. A small number of firms slaughter a large share of total hog slaughter. However, the results of the above analyses clearly demonstrate that ***we cannot reject either of the following null hypotheses derived from the economic theory of a perfectly competitive market.***

1) The derived demand for hogs by the structurally oligopsonistic U.S. hog slaughter industry is ***not different*** from what the derived farm level demand for hogs would be with a much larger number of slaughter firms.
2) The observed performance of the oligopsonistic slaughter industry is ***not different*** from the performance of a perfectly competitive slaughter industry.

Farm Level Price Flexibility of Demand

The farm level derived demand for slaughter hogs is a quadratic function of the daily slaughter rate (equation 10). Hence, the slope of the price-dependent farm level derived demand equation is a linear function of the daily slaughter rate (Q).

$$(11) \qquad \frac{\partial P_f}{\partial Q} = .676085 - .00208Q$$

Consequently, the farm level price flexibility of demand coefficient is a quadratic function of Q.

$$(12) \qquad F_{P_f} = \frac{\partial P_f}{\partial Q} \cdot \frac{Q}{P_f}$$

$$= (.676085 - .00208Q)(\frac{Q}{P_f})$$

$$= (\frac{.67608Q - .00208Q^2}{P_f})$$

The impact of increases in the daily slaughter rate on the farm price is shown in columns 3-5 of Table 1. An increase in the daily slaughter rate from 300-325 (an 8.3% increase) results in a 12.7% reduction in the price of hogs. However, an increase in the slaughter rate from 400-425 (a 6.25% increase) generates a 26.9% reduction in the price of hogs. The doubling of the sensitivity of the hog prices when the slaughter rate increases from 400 to 425 compared to the price reduction when the slaughter rate increases from 300 to 325 reflects the mathematical properties of the farm level price flexibility coefficient rather than exercise of market power as often suggested by observers.

Wholesale Derived Demand for Pork

The amount of wholesale pork injected into the wholesale market as a result of slaughtering Q_t animals is defined by equation (13).

$$(13) \qquad Q_t^w = k(Q_t \cdot D_t)$$

where: Q_t^w = amount of wholesale pork products injected to the wholesale market in week t

k = the number of pounds of wholesale meat injected into the market in week t

Q_t = daily slaughter rate during week t

D_t = number of days the slaughter plants operated during week t

It is physically impossible to move Q_t^w through the wholesale market during the same week the animals are slaughtered. Moreover, significant portions of the wholesale pork products require additional time (at least two weeks) for processing/curing before the meat is ready for sale to retailers. Consequently, the quantity of pork supplied to (moving through) the wholesale market in week t (W_t) is a mix of meat obtained from animals slaughtered over the previous three (or more) weeks. (Bullock,d)

(14) $$W_t = \alpha_1 Q^w_{(t-1)} + \alpha_2 Q^w_{(t-2)} + \alpha_3 Q^w_{(t-3)}$$

where: $\alpha_1 + \alpha_2 + \alpha_3 = 1.0$

The wholesale demand schedule for pork is the schedule of the maximum prices that retailers are willing to pay for the amount of pork moving through the market in the current time period. The wholesale demand for pork meat products is determined by the amount of pork products moving through the wholesale market in week t (W_t), the retail price of pork (P_{pr}), and the wholesale prices of beef (P_{bw}) and chicken (P_{wc}).

(15) $P_{pw} = f(W, P_{pr}, P_{wb}, P_{wc})$

where: P_{pw} = wholesale price of pork

W = amount of pork products moving through the market[4]

P_{pr} = retail price of pork

P_{wb} = wholesale price of beef

P_{wc} = wholesale price of chicken

[4] For this analysis the following arbitrary values were assigned $\alpha_1 = 50$, $\alpha_2 = 30$, and $\alpha_3 = 20$. Other values are likely more appropriate. These values are selected only to illustrate the point.

Weekly prices of chicken are not available and are not included in the analysis. Weekly average retail prices of pork are also not available. The reported monthly average price is held constant at the monthly average price for all weeks in each month. Hence, retail pork prices change monthly while all other variables change weekly.[5]

The estimated parameters of the price dependent wholesale demand for pork are shown in equation (16).

$$(16) \qquad P_{pw} = 21{,}290.15 P_{bw}^{.205832} W^{-1.6012} P_{pt}^{.477334} \qquad R^2 = .607 \qquad F = 292.76$$

Equation (7) and equation (16) illustrate the disconnection between and the relative magnitudes of the price flexibility of demand for live hogs and the price flexibility for wholesale pork. The existence of a u-shaped variable cost curve of producing slaughter services means that the magnitude farm level price flexibility coefficient is an exponential function of the slaughter rate. In contrast, the wholesale level price flexibility is not a quadratic function of Q and may quite logically be constant across all values of Q as estimated in equation (16) and illustrated in Table 1.

Hence, the sharp divergence between wholesale prices and live hog prices during 1998-1999 simply reflects the different economic realities of the farm level and wholesale levels of the market. The last column of Table 1 illustrates the wholesale level prices of pork corresponding with equation (16). These price changes as Q increases above 350 are much smaller than corresponding price changes at the farm level that would be generated by a perfectly competitive slaughter hog market.

[5] The same procedure was tried for chicken prices. However, the coefficient on this variable was not significant. Hence, the wholesale price of chicken is not included in the equation reported here.

Conclusions

The market outcomes (market clearing prices and quantities) of a perfectly competitive market are recognized by economists as defining the socially optimal market outcomes. Perfect market outcomes therefore are the performance norms by which observed market outcomes are measured in order to evaluate the performance of a market.

These performance norms of a perfectly competitive market are quite simple. In the form dimension, the price difference between two forms of the product (e.g., live hogs and wholesale meat) should be less than or equal to the marginal cost of transformation (e.g., marginal cost of slaughter).

This paper derived the theoretical relationships between hog prices and wholesale pork price, and hence the F-W price spread that would exist in a perfectly competitive slaughter hog market. These performance norms were then confronted with observed weekly price/quantity relationships over the 1991-2001 period to compare observed market performance with the ideal performance norms derived from the economic theory of a perfectly competitive market.

These results demonstrate a high degree of consistency between the performance norms defined by the economic theory of a perfectly competitive market and the observed relationship between live and wholesale prices (and hence the F-W price spread) observed in the U.S. hog/pork market over the 574 weeks of calendar years 1991-2001.

These statistical analyses enable us to ***reject at the 99%+ level of confidence*** two important hypotheses.

(1.) The short run marginal cost of pork packing plants is not u-shaped.

(2.) The observed performance of the U.S. slaughter hog market over the 1991-2001 period is not consistent with the performance norms defined by the operation of a perfectly competitive market.

The first hypothesis is important because it clearly shows the inappropriateness of assuming that packer marginal costs are constant that is often used by market power hunters to develop measures of market power. These researchers have assumed away any economic explanation of changes in the F-W price spread based on changes in slaughter cost caused by variation in slaughter rate. The observed fluctuations in price spreads (which are totally explained/justified by the existence of a u-shaped short run packer cost curve) have incorrectly been claimed by these researchers as evidence of the exercise of market power.

Rejection of the second hypothesis clearly demonstrates that structure does not matter in the U.S. hog market. Concentration ratios are at best an interesting statistic describing the structure of the industry. Concentration ratios provide no information (or basis for testing hypothesis) regarding the ***performance*** of the U.S. hog slaughter market. Concentration ratios certainly provide neither a theoretical nor an empirical basis for rejecting without testing the null hypothesis that observed market performance is no different from the performance of a perfectly competitive market. Conjured up measures of market power based upon concentration ratios and economically invalid measurement techniques is simply junk science. The Agricultural Economics literature contains numerous examples of such efforts.

Contrary to widely held conventional wisdom, in spite of high levels of meat packer concentration, the performance of the U.S. slaughter market over the 1991-2001 period was not different from the "ideal performance" that would have been observed in a perfectly competitive market. There simply is not any evidence to support allegations of abuse of market power by

meat packers. Indeed, observed rates of return to the meat packing industry over the 1991-2001 period were rather dismal. Observed relationships between live and wholesale prices (and hence the F-W spread) and also packer short run profits are totally consistent with (explained by) an economic model of a perfectly competitive meat packing industry operating with a u-shaped short run variable cost curve.

The bottom line of the analysis reported here is that ***market performance is what matters***. Industry structure is irrelevant if market performance is ideal. Concern about, and policy proposals to alter, industry structure are not justified based on observed performance of the packing industry over the 1991-2001 period.

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