



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Retail Markets and Buyer Power in Agricultural Procurements

Tian Xia

*Department of Agricultural Economics
Kansas State University
Manhattan, KS 66506
E-mail: tianxia@agecon.ksu.edu*

Brian Sancewich

*Department of Agricultural Economics
Kansas State University
E-mail: briansancewich@agecon.ksu.edu*

Selected Paper prepared for presentation at the Agricultural & Applied Economics Association's 2012 AAEA Annual Meeting, Seattle, Washington, August 12–14, 2012

June 4, 2012

Copyright 2012 by Tian Xia and Brian Sancewich. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Retail Markets and Buyer Power in Agricultural Procurements

Tian Xia and Brian Sancewich

Introduction

Many U.S. agricultural industries, such as livestock, dairy, poultry and seed, have become more and more concentrated in the past several decades. For example, two companies control the majority of raw fluid milk procurement market, the four-firm concentration in beef packing has grown from 36 percent in 1980 to 81 percent in 2009 (Grain Inspection Packers and Stockyards Administration 2011), and four major chains dominate the marketing of fresh vegetables. This increasing concentration has made producers, policy makers, and academic researchers to be concerned about the anticompetitive effects of buyer power in agricultural procurements on farm price and producer welfare. Numerous academic studies and government reports have focused on concentration and buyer power in agricultural markets. Buyer power has been found in the markets of many agricultural and food products including wheat (Stiegert and Hamilton 1998), cocoa (Wilcox and Abbott 2006), tobacco (Raper, Love, and Shumway 2000), tomatoes (Durham and Sexton 1992; Huang and Sexton 1997), hogs (Zheng and Vukina 2009), cattle (Azzam and Anderson 1996; McEowen, Carstensen and Harl 2002; Ward 2002), and milk (Alvarez et al 2000). On the other hand, given the increasing concentration and store differentiation, grocery retailers may be able to use oligopoly power to influence prices charged to consumers (Parker and Connor 1979; Bhuyan and Lopez 1995; Connor 1999; Kaufman 2000; Kaufman et al 2000; Wright 2001; Harris et al 2002; Cooper 2003; Dobson, Waterson, and Davies 2003).

In 2010, the U.S. Department of Justice and U.S. Department of Agriculture held the first-ever joint public workshops on competition issues including buyer power and vertical integration in the agricultural sector. However, one important issue, how retail markets (i.e. consumer demand and retailers' seller power) influence the magnitudes of buyer power's price effects in agricultural procurements, has not been examined in the existing literature and public discussions. We have seen that, when farm prices are lower than usual, which may be partly due to lower retail prices, farmers will press government regulators even harder to investigate buyer power in agricultural procurements. That is exactly what dairy farmers did in 2009 when farm milk price dropped by 36% and retail milk price declined by 10.4% from the price level in 2008. A lower consumer demand, which may be due to the financial crisis starting in 2008, resulted in a lower retail milk price. Some observers claimed that the decline in farm milk price was purely due to a lower retail price, and concentration or buyer power did not play a role in the fall of farm price. However, there is another possibility that a lower (or more elastic) consumer demand may enlarge the magnitude of buyer power's price effect so that the farm milk price was further depressed.

This paper develops a conceptual framework to study how consumer demand and retailers' seller power influence the magnitudes of buyer power's price effects in agricultural procurements, and how farm supply and processors' buyer power affect the magnitude of seller power's price effect in retail markets. This model can link all three stages (farm, wholesale, and retail market) of the market chain of agricultural products together so that it provides a convenient and general way to analyze the effects of factors in one stage on market competition in other stages.

The Model

Consider the market chain of an agricultural product, which consists of three stages: farm markets where farmers sell a raw agricultural material to wholesalers/processors, a wholesale market where wholesalers sell the processed/finished product to food retailers, and retail markets where retailers sell the product to various consumers. In the geographic region under study, there are L_f identical local farm markets, one wholesale market, and L_r identical local retail markets, where subscripts f and r denote farm and retail markets, respectively.

M oligopsony wholesalers procure the raw agricultural material in each local farm market and the value of M measures the degree of buyer power in the farm markets. Smaller values of M represent stronger buyer power. Inverse farm supply in a local market is specified as $P_f = g(q_f)$, where $g' > 0$, P_f is the price farmers receive, and q_f is the quantity supplied in a farm market. In each local retail market, N oligopoly food retailers sell the finished/processed product to consumers. The value of N is a measure of the degree of seller power in the retail markets, and smaller values of N represent stronger seller power. The inverse consumer demand function in a local market is $P_r = h(q_r)$, where $h' < 0$, q_r is the quantity demanded, P_r is the retail price consumers pay in a retail market. Retailers have a constant average and marginal variable selling cost C_r . The region under study has one wholesale market, where wholesalers sell the processed product to food retailers. The wholesale market is assumed to be perfectly competitive. Wholesalers convert the raw agricultural material into the processed product according to a fixed-proportions production function. Through the choice of measurement unit, we can

have $q_w = q_f$, where q_w is the quantity of the processed product, which is from the raw agricultural material of one farm market, and subscript w denotes the wholesale market. The constant average and marginal variable wholesaling/processing cost is C_w .

We first find the equilibrium price in the farm markets conditional on the wholesale price P_w . In each farm market, wholesaler m ($m=1, 2, \dots, M$) purchases the optimal $q_{f,m}$ amount of the raw agricultural material to maximize his profit,

$$\pi_m = (P_w - P_f - C_w)q_{f,m}.$$

When the market clears, the market demand $\sum_{m=1}^M q_{f,m}$ is equal to the market supply

$q_f = g^{-1}(P_f)$. We find and solve all M first-order conditions simultaneously, and use the market clearing condition to obtain the equilibrium quantity and price in a local farm market, conditional on the wholesale price P_w :

$$q_f = \Phi_f(M, g', C_w; P_w) \text{ and } P_f = g[\Phi_f(M, g', C_w; P_w)].$$

In a local retail market, given the wholesale price P_w , food retailer n ($n = 1, 2, \dots, N$) chooses the optimal quantity $q_{r,n}$ to maximize her profit,

$$\pi_n = (P_r - P_w - C_r)q_{r,n}.$$

The market clears when the market supply $\sum_{n=1}^N q_{r,n}$ equals the market demand

$q_r = h^{-1}(P_r)$. The first-order conditions of the profit optimization problems of all N retailers are derived, then solved simultaneously for the optimal quantities of all retailers.

Then these results are substituted back into the market-clearing condition to find the

equilibrium quantity and price, conditional on the wholesale price P_w , in a local retail market as

$$q_r = \Phi_r(N, h', C_r; P_w) \text{ and } P_r = h[\Phi_r(N, h', C_r; P_w)].$$

$L_f \times M$ wholesalers and $L_r \times N$ retailers transact in the perfectly competitive wholesale market. The wholesale market clears when $L_f q_w = L_r q_r$. We assume $L_f = L_r$ to facilitate the presentation of results. Then, we find that $q_r = q_w = q_f = q$. By using the equilibrium quantities and prices, conditional on the wholesale price P_w , in all farm and retail markets, and the market-clearing condition in the wholesale market, we obtain the unconditional equilibrium prices and quantities in three stages as follows:

$$q^O = q_f = q_w = q_r = \Omega(M, N, g', h', C_w, C_r),$$

$$P_f^O = V_f(M, N, g', h', C_w, C_r),$$

$$P_w^O = V_w(M, N, g', h', C_w, C_r), \text{ and}$$

$$P_r^O = V_r(M, N, g', h', C_w, C_r),$$

where superscript O denote the scenario of imperfect competition (oligopsony and oligopoly).

Then, by setting $M = \infty$, we find the farm price in perfectly competitive farm markets $P_f^A = \Gamma_f(N, g', h', C_w, C_r)$. Similarly, the retail price in perfectly competitive retail markets is $P_r^A = \Gamma_r(M, g', h', C_w, C_r)$ if we set $N = \infty$.

We examine how the magnitudes of the market margins due to imperfect competition in the farm and retail markets will change in response to changes in the following factors: the degree of buyer power and the farm supply elasticity in farm

markets, the degree of seller power and the consumer demand elasticity in retail markets. By using the analytical results of the model, we show that the market margin, $(P_f^A - P_f^O)/P_f^A$, due to buyer power in farm markets is increasing in $\varepsilon = -(P_r/q_r)/(\partial h/\partial q_r)$ (the magnitude of consumer demand elasticity in the retail markets) and N . It can also be shown that the market margin, $(P_r^O - P_r^A)/P_r^O$, due to seller power in retail markets is increasing in $\delta = (P_f/q_f)/(\partial g/\partial q_f)$ (the magnitude of farm supply elasticity in the farm markets) and M .

Discussion and Conclusions

This paper provides a simple conceptual framework to study how consumer demand and retailers' seller power influence the magnitudes of buyer power's price effects in agricultural procurements, and how farm supply and wholesalers'/processors' buyer power impact the magnitudes of seller power's price effects in retail markets. The competition among processors to procure the raw agricultural material in each farm market and the competition among retailers in each retail market are assumed to be Cournot-Nash.

The analysis yields the following two results. First, a more elastic consumer demand and/or less retailers' seller power in retailer markets can enlarge the magnitude of buyer power's price effect in agricultural procurements, i.e. processors' buyer power causes a larger difference between the farm price under imperfect competition and the competitive farm price. Second, the price effect of retailers' seller power in retail markets is larger when farm supply is more elastic and/or there is less processors' buyer power in

farm markets. The intuition behind these results is that, the total economic profit (the sum of markup and markdown) along the market chain of an agricultural product is shared between processors and retailers. More elastic consumer demand and/or less retailers' seller power will reduce retailers' share in the total economic profit and, consequently, enlarge processors' share in the total economic profit. Thus, more elastic consumer demand and/or less retailers' seller power can enlarge the negative price effect of processors' buyer power in agricultural procurements. Similar logic applies to the impact of farm supply and processors' buyer power on the magnitude of seller power's price effect in retail markets.

This paper examines an important issue, which is unnoticed in academic and public discussions on market power in the agricultural sector, and it fills a gap in the literature. The results are important in two ways. The anticompetitive effect of buyer power in agricultural procurements can vary with consumer demand and retailers' seller power so that farmers may indeed need more help from government regulators when certain conditions in retail markets arise. In addition, addressing only one of the two market power issues (processors' buyer power and retailers' seller power) may lead to minimal pro-competition effects in total because the anti-competitive effect of the other unaddressed market power will be enlarged. Thus, dealing with both processors' buyer power and retailers' seller power at the same time is vital to promote competition in the agricultural sector.

References:

- Alvarez, A.M; E.G. Fidalgo, R.J. Sexton, and M. Zhang. 2000. "Oligopsony Power with Uniform Spatial Pricing: Theory and Application to Milk Processing in Spain." *European Review of Agricultural Economics*. 27: 347-364.
- Azzam, A. and D. Anderson. 1996. *Assessing Competition in Meatpacking: Economic History, Theory and Evidence*, U.S. Department of Agriculture, GIPSA-RR 96-6.
- Bhuyan, S. and R. A. Lopez. 1995. "Welfare Losses Under Alternative Oligopoly Regimes: The U.S. Food and Tobacco Manufacturing Industries," *Journal of Agricultural and Applied Economics* 27: 577-587.
- Connor, J. 1999 "Evolving Research on Price Competition in the Grocery Retailing Industry: An Appraisal," *Agricultural and Resource Economics Review* 28: 119-127.
- Cooper, D. 2003. "Findings from the Competition Commission's Inquiry into Supermarkets," *Journal of Agricultural Economics* 54: 127-143.
- Dobson, P. M. Waterson, and S. Davies (2003) "The Patterns and Implications of Increasing Concentration in European Food Retailing," *Journal of Agricultural Economics* 54: 111-125.
- Durham, C.A. and; R.J. Sexton. 1992. "Oligopsony Potential in Agriculture: Residual Supply Estimation in California's Processing Tomato Market." *American Journal of Agricultural Economics* 74: 962-972.
- Grain Inspection Packers and Stockyards Administration. 2011. *2010 Annual Report: Packers and Stockyards Program* United States Department of Agriculture, March.
- Harris, M., P. Kaufman, S. Martinez, and C. Price (2002) "The U.S. Food Marketing System, 2002," U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 811.
- Huang, S. and R.J. Sexton. 1996. "Measuring Returns to an Innovation in an Imperfectly Competitive Market: Application to Mechanical Harvesting of Processing Tomatoes in Taiwan." *American Journal of Agricultural Economics* 78: 558-571.
- Kaufman, P. 2000. "Consolidation in Food Retailing: Prospects for Consumers & Grocery Suppliers," U.S. Department of Agriculture, Economic Research Service, *Agricultural Outlook* August.
- Kaufman, P. C. Handy, E. McLaughlin, K. Park, and G. Green. 2000. "Understanding the Dynamics of Produce Markets: Consumption and Consolidation Grow," U.S. Department of Agriculture, Economic Research Service, Agriculture Information Bulletin No. 758.

- McEowen, R. A., P. C. Carstensen and N.E. Harl. 2002. "The 2002 Senate Farm Bill: The Ban on Packer Ownership of Livestock." *Drake Journal of Agricultural Law* 7: 267-304.
- Parker, R.C. and J.M. Connor. 1979. "Estimates of Consumer Loss Due to Monopoly in the U.S. Food-Manufacturing Industries," *American Journal of Agricultural Economics* 61: 628-639.
- Raper, K.C., A.H. Love, and C.R. Shumway. 2000. "Determining Market Power Exertion Between Buyers and Sellers." *Journal of Applied Econometrics* 15: 225-252.
- Stiegert, K.M. and S.F. Hamilton. 1998. "Backward Implicit Contracts, Pre-Commitment and Market Power in the International Durum Wheat Market." Selected Paper, the American Agricultural Economics Association's Annual Meeting, Salt Lake City, UT, August 2-5.
- Ward, C.E. 2002. "A Review of Causes for and Consequences of Economic Concentration in the U.S. Meatpacking Industry." *Current Agriculture, Food & Resource Issues* 3:1-28.
- Wilcox, M.D., and P.C. Abbott. 2006. "Can Cocoa Farmer Organizations Countervail Buyer Market Power?". Selected Paper, the American Agricultural Economics Association's Annual Meeting, Long Beach, CA, July 23-26.
- Wright, J. 2001. "Von's Grocery and the Concentration-Price Relationship in Grocery Retail," *UCLA Law Review*, 48: 743-779.
- Zheng, X. and T. Vukina. 2009. "Do Alternative Marketing Arrangements Increase Pork Packers' Market Power?" *American Journal of Agricultural Economics* 91: 250-263.