



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.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Estimating Market Power Exertion under Bilateral Imperfect Competition

Seongjin Park, Chanjin Chung, Sungill Han

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

Copyright 2012 by authors. 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.

Estimating Market Power Exertion under Bilateral Imperfect Competition

Seongjin Park, Chanjin Chung, Sungill Han

Oklahoma State University

Background

- Food processing and retailing industries increasingly concentrated .
- Empirical models have not been flexible enough to consider the full range of bilateral relationship between buyers and sellers.

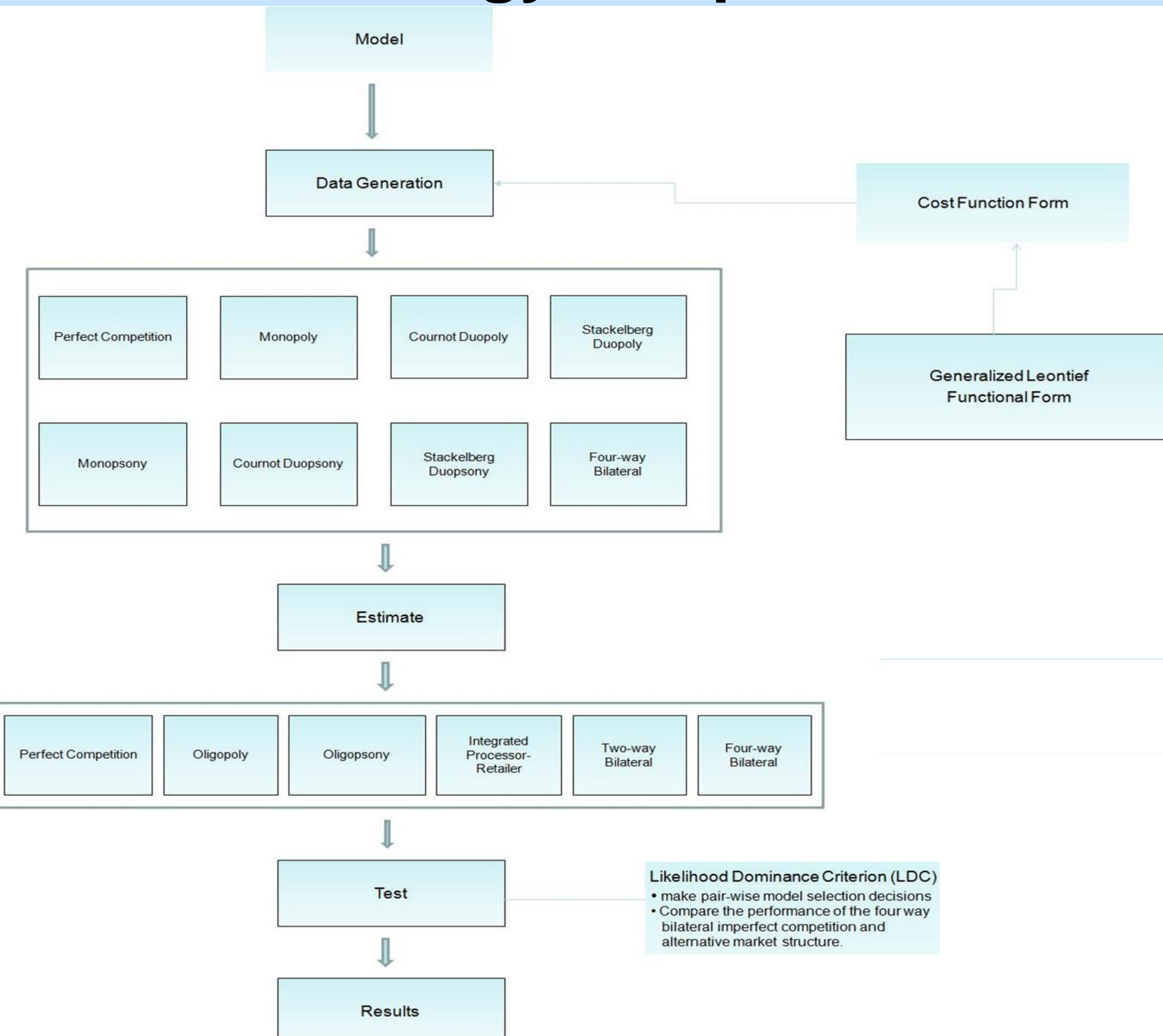
Objective

- Develop a market power estimation procedure for bilateral imperfect competition between retailers and processors.
- Test true market power estimation model against alternative model.

Extension from previous studies

- Previous NEIO methods assume only on one-side of market transactions.
- Consider bilateral relationship between sellers and buyers for potential oligopoly/oligopsony market power exertion.
- Monte Carlo simulation to test for estimation bias from inappropriately modeling market structures.

Methodology and procedure



Data generating equation

	Equations
Perfect competition	$PP = Pf + a_{11}w + a_{22}v + 2a_{12}(wv)^{\frac{1}{2}} + 2y^p(b_1w + b_2v) + t(c_1w + c_2v)$ $L = a_{11} + a_{12}(v/w)^{\frac{1}{2}} + y^p b_1 + t c_1$ $K = a_{22} + a_{12}(w/v)^{\frac{1}{2}} + y^p b_2 + t c_2$ $P^r = PP + r_{11}w_1 + r_{22}v + 2r_{12}(w_1v)^{\frac{1}{2}} + 2y^r(d_1w_1 + d_2v) + t(g_1w_1 + gv)$ $L_1 = r_{11} + r_{12}(v/w_1)^{\frac{1}{2}} + y^r d_1 + t g_1$ $K = r_{22} + r_{12}(w_1/v)^{\frac{1}{2}} + y^r d_2 + t g_2$
Four way bilateral imperfect competition	$PP = Pf + a_{11}w + a_{22}v + 2a_{12}(wv)^{\frac{1}{2}} + 2y^p HP(b_1w + b_2v) + t(c_1w + c_2v) - \frac{(1+\phi_1)HP}{s_d^2} + \frac{(1+\phi_2)HP}{s_p^2}$ $L = a_{11} + a_{12}(v/w)^{\frac{1}{2}} + y^p HP b_1 + t c_1$ $K = a_{22} + a_{12}(w/v)^{\frac{1}{2}} + y^p HP b_2 + t c_2$ $P^r = PP + r_{11}w_1 + r_{22}v + 2r_{12}(w_1v)^{\frac{1}{2}} + 2y^r HR(d_1w_1 + d_2v) + t(g_1w_1 + g_2v) - \frac{(1+\phi_3)HR}{s_d^2} + \frac{(1+\phi_4)HR}{s_p^2}$ $L_1 = r_{11} + r_{12}(v/w_1)^{\frac{1}{2}} + y^r HR d_1 + t g_1$ $K = r_{22} + r_{12}(w_1/v)^{\frac{1}{2}} + y^r HR d_2 + t g_2$

Results

Simulated (true) market structure	Econometric specification																				
	Perfect competition			Monopolistic power			Monopsonistic power			Integrated processor-retailer			Two way bilateral imperfect competition			Four way bilateral imperfect competition					
	N	A	I	N	A	I	N	A	I	N	A	I	N	A	I	N	A	I			
Perfect competition ^a	-	-	-	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Monopoly ^a	1000	0	0	-	-	-	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Cournot duopoly ^a	1000	0	0	-	-	-	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Stackelberg duopoly ^a	1000	0	0	-	-	-	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Monopsony ^a	1000	0	0	1000	0	0	-	-	-	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Cournot duopsony ^a	1000	0	0	1000	0	0	-	-	-	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Stackelberg duopsony ^a	1000	0	0	1000	0	0	-	-	-	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Four way bilateral imperfect competition ^a	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0	-	-	-

N-choose null model over alternative model, A-choose alternative model over null model, I-indecisive
^aH₀ is the perfect competition specification
^bH₀ is the monopolistic power specification
^cH₀ is the monopsonistic power specification
^dH₀ is the four way bilateral imperfect competition specification

Econometric specification

Simulated (true) market structure	True market power parameter (ϕ)	95% Confidence Interval (CI)			
		Monopoly		Monopsony	
		Bias	CI	Bias	CI
Perfect competition	$\phi_1 = 0$	0.2857	(0.2315, 0.3552)	0.36948	(0.0378, 0.7773)
Stackelberg duopoly	$\phi_1 = 0.4$	0.6214	(0.4243, 1.0645)	-0.2631	(-0.3766, 0.3943)
Monopsony	$\phi_3 = 1$	0.3732	(0.1637, 0.4285)	-	-
Four way bilateral imperfect competition	$\phi_1 = \phi_2 = \phi_3 = \phi_4 = 0.2$	0.4243	(0.3511, 0.6843)	0.7409	(0.6310, 0.8531)

ϕ_1 : Processor oligopoly market power parameter, ϕ_2 : Processor oligopsony market power parameter
 ϕ_3 : Retailer oligopoly market power parameter, ϕ_4 : Retailer oligopsony market power parameter
 Stackelberg duopoly is industrial level market power parameter

Econometric specification

Simulated (true) market structure	True market power parameter (ϕ)	95% Confidence Interval (CI)			
		Two way bilateral imperfect competition		Four way bilateral imperfect competition	
		Bias	CI	Bias	CI
Perfect competition	$\phi_1 = 0$	0.1415	(0.0191, 0.1687)	0.2440	(0.1660, 0.3753)
	$\phi_2 = 0$			0.3337	(0.2742, 0.4173)
	$\phi_3 = 0$	0.0349	(0.0002, 0.1329)	0.0525	(0.0082, 0.0752)
	$\phi_4 = 0$			0.0291	(0.0152, 0.0453)
Stackelberg duopoly	$\phi_1 = 0.4$	0.0122	(0.0033, 0.4234)	0.2354	(0.1622, 0.1643)
	$\phi_2 = 0.4$			-0.0114	(-0.4073, 0.4104)
	$\phi_3 = 0.4$	0.3872	(0.0135, 0.4013)	-0.3673	(-0.0262, 0.0356)
	$\phi_4 = 0.4$			-0.3836	(-0.0133, 0.0171)
Monopsony	$\phi_1 = 1$	0.8096	(0.0724, 0.8253)	0.7311	(0.2648, 0.8174)
	$\phi_2 = 1$			-0.5592	(-0.2401, 0.5929)
	$\phi_3 = 1$	0.1721	(-0.2048, 0.3054)	0.4827	(0.4135, 0.5493)
	$\phi_4 = 1$			-0.5055	(-0.4093, 0.5580)
Four way bilateral imperfect competition	$\phi_1 = 0.2$	0.4448	(0.2173, 0.6595)	-	-
	$\phi_2 = 0.2$			-	-
	$\phi_3 = 0.2$	0.0598	(-0.1388, 0.1414)	-	-
	$\phi_4 = 0.2$			-	-

ϕ_1 : Processor oligopoly market power parameter, ϕ_2 : Processor oligopsony market power parameter
 ϕ_3 : Retailer oligopoly market power parameter, ϕ_4 : Retailer oligopsony market power parameter
 Stackelberg duopoly is industrial level market power parameter

Conclusions

- Likelihood Dominance Criterion (LDC) reject the alternative in favor of the null model specification 100% of the time.
- Results show that in most cases erroneous market structure modeling results in biased market power parameter estimates.
- A few exceptions were found when true Stackelberg duopoly, monopsony, and four way bilateral data were tested against alternative market structure models.

References

- Chung, C and E. Tostao. 2012. "Effects of horizontal consolidation under bilateral imperfect competition between processors and retailers." *Journal of Applied Economics* 44:3379-3389.
- Paul, C. J. M. 2001. "Market and cost structure in the US beef packing industry: a plant-level analysis." *American Journal of Agricultural Economics* 83:64-76.
- Pollak, R. A., and T. J. Wales. 1991. "The likelihood dominance criterion." *Journal of Econometrics* 47:227-242.
- Raper, K. C., H. A. Love, and C. R. Shumway. 2000. "Determining market power exertion between buyers and sellers." *Journal of Applied Econometrics* 15(3):225-252.
- Tostao, E. and C. Chung. 2005. "Horizontal consolidation in the US food processing industry: Boon or Bane?" *Southern Agricultural Economics Association Annual Meetings in Little Rock, Arkansas, February 5-9.*