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Estimating Market Power Exertion under Bilateral Imperfect Competition

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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.

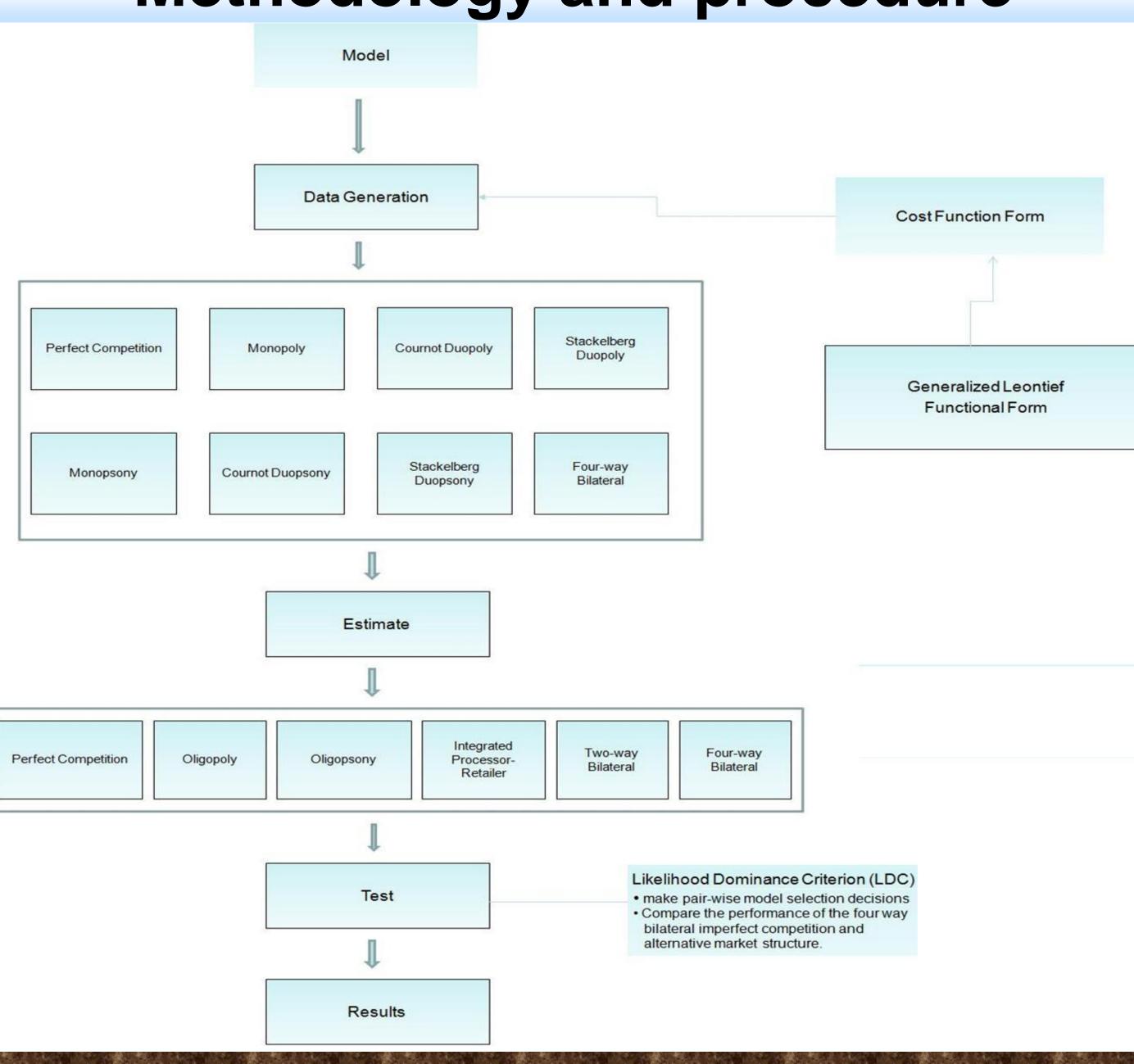
Objective

- 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

	L Golden Grantiers
59	Equations
Perfect competition	$\begin{split} P^p &= P^f + a_{11}w + a_{22}v + 2a_{12}(wv)^{\frac{1}{2}} + 2y^p(b_1w + b_2v) + t(c_1w \\ &+ c_2v) \\ L &= a_{11} + a_{12}(v/w)^{\frac{1}{2}} + y^pb_1 + tc_1 \\ K &= a_{22} + a_{12}(w/v)^{\frac{1}{2}} + y^pb_2 + tc_2 \\ P^r &= P^p + r_{11}w_1 + r_{22}v + 2r_{12}(w_1v)^{\frac{1}{2}} + 2y^r(d_1w_1 + d_2v) + t(g_1w_1 \\ &+ gv) \\ L_1 &= r_{11} + r_{12}(v/w_1)^{\frac{1}{2}} + y^rd_1 + tg_1 \\ K &= r_{22} + r_{12} * (w_1/v)^{\frac{1}{2}} + y^rd_2 + tg_2 \end{split}$
Four way bilateral imperfect competition	$\begin{split} P^p &= P^f + a_{11}w + a_{22}v + 2a_{12}(wv)^{\frac{1}{2}} + 2y^p HP(b_1w + b_2v) + \\ t(c_1w + c_2v) - \frac{(1+\phi_1)HP}{\varepsilon_d^p} + \frac{(1+\phi_2)HP}{\varepsilon_s^f} \\ L &= a_{11} + a_{12}(v/w)^{\frac{1}{2}} + y^p HPb_1 + tc_1 \\ K &= a_{22} + a_{12}(w/v)^{\frac{1}{2}} + y^p HPb_2 + tc_2 \\ P^r &= P^p + r_{11}w_1 + r_{22}v + 2r_{12}(w_1v)^{\frac{1}{2}} + 2y^r HR(d_1w_1 + d_2v) + \\ t(g_1w_1 + g_2v) - \frac{(1+\phi_3)HR}{\varepsilon_d^r} + \frac{(1+\phi_4)HR}{\varepsilon_s^p} \\ L_1 &= r_{11} + r_{12}(v/w_1)^{\frac{1}{2}} + y^r HRd_1 + tg_1 \\ K &= r_{22} + r_{12}(w_1/v)^{\frac{1}{2}} + y^r HRd_2 + tg_2 \end{split}$

Results

Simulated (true) market structure	Perfect competition			Monopolistic			Monopsonistic		Integrated processor- retailer			Two way bilateral imperfect competition			Four way bilateral imperfect competition			
	N	Α	1	N	Α	1	N	Α	1	N	Α	1	N	Α	1	N	Α	1
Perfect competition*	53	25	53	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Monopoly	1000	0	0		=	•	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Cournot duopoly®	1000	0	0	957535	2	9.70	1000	0	0	1000	0	0	1000	0	0	1000	0	0
Stackelberg duopoly ^a	1000	0	0	127	2	27	1000	0	0	1000	0	0	1000	0	0	1000	0	C
Monopsony	1000	0	0	1000	0	0	្	24	2	1000	0	0	1000	0	0	1000	0	0
Cournot duopsony ^c	1000	0	0	1000	0	0	-	23	-	1000	0	0	1000	0	0	1000	0	0
Stackelberg duopsony ^c	1000	0	0	1000	0	0	9	21	2	1000	0	0	1000	0	0	1000	0	C
Four way bilateral imperfect competition ^d	1000	0	0	1000	0	0	1000	0	0	1000	0	0	1000	0	0	æ	-	-

22	# DATASA 10 10 10 10 10 10 10 1	95% Confidence Interval (CI)							
			Monopoly	Monopsony					
Simulated (true) market structure	True market power parameter (φ)	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)				

Econometric specification

 ϕ_1 : Processor oligopoly market power parameter, ϕ_2 : Processor oligopsony market power parameter

 ϕ_3 : Retailer oligopoly market power parameter, ϕ_4 : Retailer oligopoly market power parameter

Stackelberg duopoly is industrial level market power parameter

Ho is the monopolistic power specification

Ho is the monopsonistic powers pecification

Ho is the four way bilateral imperfect competition specification

	Econometric specificati	on							
		95% Confidence Interval (CI)							
Simulated (true) market structure			way bilateral ect competition		r way bilateral fect competition				
Simulated (true) market structure	True market power parameter (φ)	Bias	CI	Bias	CI				
	$\phi_1 = 0$	0.1415	(0.0191, 0.1687)	0.2440	(0.1660, 0.3753)				
Derfect competition	$\phi_2 = 0$			0.3337	(0.2742,0.4173)				
Perfect competition	$\phi_3=0$	0.0349	(0.0002, 0.1329)	0.0525	(0.0082,0.0752)				
	$\phi_4 = 0$			0.0291	(0.0152,0.0453)				
	$\phi_1 = 0.4$	0.0122	(0.0033, 0.4234)	0.2354	(0.1622, 0.1643)				
Cts ekelbeer duesely	$\phi_2 = 0.4$			-0.0114	(-0.4073,0.4104)				
Stackelberg duopoly	$\phi_3 = 0.4$	0.3872	(0.0135, 0.4013)	-0.3673	(-0.0262,0.0356)				
	$\phi_4 = 0.4$			-0.3836	(-0.0133,0.0171)				
	$\phi_1 = 1$	0.8096	(0.0724,0.8253)	0.7311	(0.2648,0.8174)				
NA	$\phi_2=1$			-0.5592	(-0.2401,0.5929)				
Monopsony	$\phi_3=1$	0.1721	(-0.2048,0.3054)	0.4827	(0.4135,0.5493)				
	$\phi_4=1$			-0.5055	(-0.4093 ,0.5580)				
	$\phi_1 = 0.2$	0.4448	(0.2173, 0.6595)	S 3 88	20				
Four way bilateral	$\phi_2 = 0.2$			853	72				
Imperfect competition	$\phi_3 = 0.2$	0.0598	(-0.1388,0.1414)	323	21				
	$\phi_4 = 0.2$			356	81				

Conclusions

 ϕ_1 : Processor oligopoly market power parameter, ϕ_2 : Processor oligopsony market power parameter

 ϕ_3 : Retailer oligopoly market power parameter, ϕ_4 : Retailer oligopoly market power parameter

- 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.

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