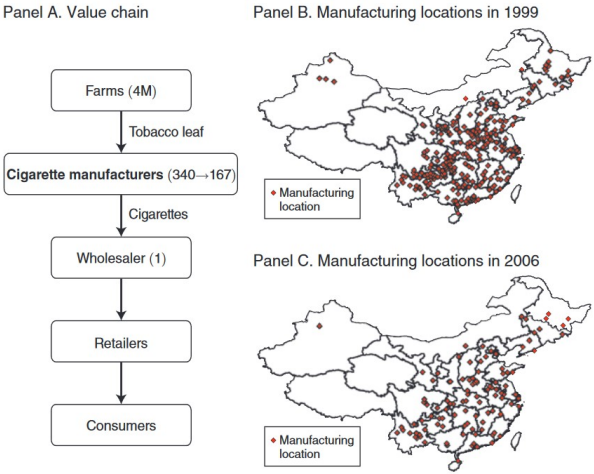
Market Structure, Oligopsony Power, and Productivity

Rubens (2023), AER

Environmental Reading Group session 24

Mar 10, 2024

Tobacco Market Structure



Background

Chinese tabacco industry ownership consolidation (State Tobacco Monopoly Administration, STMA, 2002)

- small cigarette manufacturers ($Q < 100000$ cases) were forced to exit the market.
- median ones ($Q < 300000$ cases) were encouraged to merge with others.
- The number of cigarette manufacturers decreased from 340 in 1999 to 167 in 2006.

Research Question

- Does the regulation result in oligopsony power of cigarette manufacturers?
- Does the oligopsony power explain the Urban-rural income gap between tobacco farmers and industry workers in China?

Data

- ASIF production and cost data on cigarette manufacrurers, 1999-2006
- 2000 country-level demographic information from 2000 census of population.
- brand-level cigarette characteristics (robustness check)
- agricultural price data from the food and agriculture organization.
- aggregate trade flows from the UN comtrade database.
- country-level weather data from the Chinese Meteorological Agency.

Factor share change

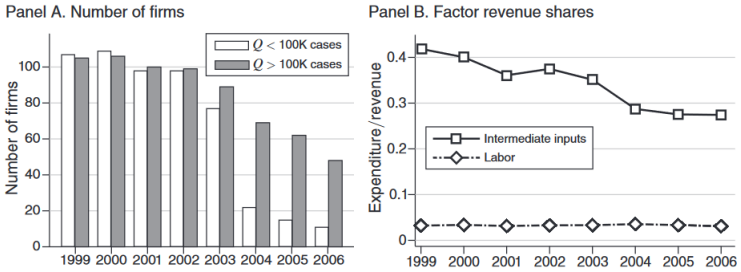


FIGURE 2. MARKET STRUCTURE

Reduced form DID

$$y_{ft} = \theta_0 + \theta_1 \mathbf{1}\{t \geq 2002\} + \theta_2 Z_f \mathbf{1}\{t \geq 2002\} + \theta_3 t + \theta_f + \varepsilon_{ft} \quad (1)$$

where

$$Z_f = \mathbf{1}\{N_{i,2001} > 0\}$$

$$y \in \left\{ log(\frac{LeafCost}{Cigarette}), log(\frac{LaborCost}{Cigarette}), log(\frac{Revenue}{Cigarette}) \right\}$$

firm: f, market: i, year: t

Result

TABLE 1—CONSOLIDATION, UNIT COSTS, AND PRICES

	log(*Labor cost*/*output*)		log(*Leaf cost*/*output*)		log(*Revenue*/*output*)	
	Est.	SE	Est.	SE	Est.	SE
Panel A. Treatment effects						
Treatment × $\mathbf{1}\{Year \geq 2002\}$	−0.075	0.109	−0.686	0.148	−0.364	0.116
R^2	0.83		0.85		0.86	
Observations	1,132		1,132		1,132	
Panel B. Pre-2002 trends						
Treatment × *Year*	0.089	0.069	0.074	0.076	0.007	0.070
R^2	0.17		0.11		0.07	
Observations	586		586		586	

Structure Model

Tobacco farmers are price-takers, the manufacturers' profit maximization problem is:

$$\max_{M_{ft}} \{P_{ft} Q_{ft} - W_{ft}^{M} M_{ft} - W_{ft}^{L} L_{ft}\} \tag{2}$$

where $Q_{ft} = Q(M_{ft}, L_{ft}, K_{ft}; \beta^{M}, \beta)$ FOC:

$$\partial(P_{ft} Q_{ft})/\partial M_{ft} - \partial(W_{ft}^{M})/\partial M_{ft} M_{ft} - W_{ft}^{M} - \partial(W_{ft}^{L} L_{ft})/\partial M_{ft} = 0 \tag{3}$$

Hence, oligopsony power is measured by:

$$\frac{\partial(P_{ft} Q_{ft})/\partial M_{ft} - \partial(W_{ft}^{L} L_{ft})/\partial M_{ft}}{W_{ft}^{M}} = 1 + \psi_{ft}^{M} = 1 + \partial(W_{ft}^{M})/\partial M_{ft}/(W_{ft}^{M}/M_{ft}) \tag{4}$$

Markdown parameter

TABLE 2—MODEL ESTIMATES

	Ordinary least squares		Dynamic panel	
	Est.	SE	Est.	SE
Panel A. Production function				
Output elasticity of labor	0.563	0.082	0.532	0.147
Output elasticity of capital	0.569	0.066	0.630	0.105
Scale parameter	1.132	0.044	1.162	0.060
R^2	0.91		0.92	
Observations	1,130		849	
Panel B. Leaf price markdown				
Average	2.934	0.414	2.904	0.442
Median	2.134	0.066	2.126	0.079

Markdown and allocation efficiency

TABLE 3—CONSOLIDATION TREATMENT EFFECTS

	log(*Markdown*)		log(*Productivity*)	
	Est.	SE	Est.	SE
Panel A. Markdown and productivity				
Treatment × **1**{*Year* ≥ 2002}	0.315	0.103	−0.055	0.083
R^2	0.72		0.88	
Observations	1,123		1,132	

	log(*Agg. TFP*)		log(*Avg. TFP*)		Reallocation	
	Est.	SE	Est.	SE	Est.	SE
Panel B. Allocative efficiency						
Treatment × **1**{*Year* ≥ 2002}	−0.544	0.166	−0.084	0.135	−0.460	0.106
R^2	0.65		0.33		0.77	
Observations	221		221		221	

	log(*Agg. output*)		log(*Avg. output*)		Reallocation	
	Est.	SE	Est.	SE	Est.	SE
Panel C. Output						
Treatment × **1**{*Year* ≥ 2002}	−0.485	0.171	0.220	0.154	−0.704	0.090
R^2	0.65		0.48		0.85	
Observations	221		221		221	

Redistribution Effect

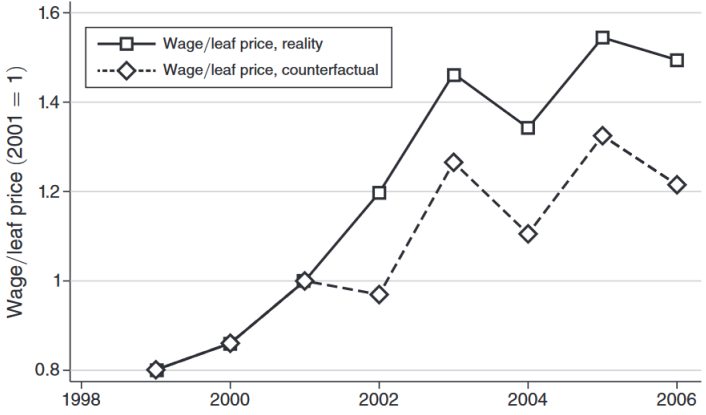


FIGURE 4. CONSOLIDATION AND INCOME INEQUALITY

Conclusion

- Consolidation in Chinese tabocco industry causes markdown increase by 37%.
- explain 56% of urban-rural income gap.

Reference

Rubens, Michael. 2023. "Market Structure, Oligopsony Power, and Productivity." American Economic Review, 113 (9): 2382-2410.