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PRIVATE STRATEGIES, PUBLIC POLICIES & FOOD SYSTEM PERFORMANCE

Countervailing Power and Seller Performance in U.S. Food and Tobacco Manufacturing Industries

by

Sanjib Bhuyan* and Ronald W. Cotterill**

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COUNTERVAILING POWER AND SELLER PERFORMANCE IN U.S. FOOD AND TOBACCO MANUFACTURING INDUSTRIES

Abstracts

An analysis of the impact of buyer structure on the profitability of U.S. food manufacturing industries shows inconclusive evidence in support of the countervailing power hypothesis in these industries. However, findings show that industries that have high sales to other food manufacturing industries, as opposed to sales to the wholesale, retail and other non-industrial buyers have lower profitability.

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1. Introduction

Although the idea of "countervailing power" is a commonly known concept in industrial economics, it is rarely used to analyze industrial market structure and consequent performance. Galbraith (1952) was the first proponent of the idea of buyer power as a potential instrument to discipline sellers in a monopoly/oligopoly market. Stigler (1954) criticized the countervailing power hypothesis as irrational and lacking logical development and thus argued that it is not a theory.

In terms of empirical findings, Lustgarten (1975), LaFrance (1979), Martin (1983), and more recently Schumacher (1991) have argued that countervailing power exists in the U.S. manufacturing industries. In contrast, Ravenscraft (1983) and Cowley (1986) have refuted such conclusions. Such contradicting results have left many confused which was apparent in the comment by Scherer and Ross, "....leaving us perplexed about the conclusion to be drawn from such widely divergent results." (535:1990).

There are numerous studies analyzing seller structure and performance in the U.S. food manufacturing industries; to our knowledge, most of these studies did not make any attempt to analyze the impact of buyer structure on seller performance in those industries. In view of this, the principal objective of this study is to analyze the countervailing power hypothesis in the U.S. food and tobacco manufacturing sector which is considered composed of oligopolistic industries. Using industry level data (four-digit SIC level), the impact of buyer structure on seller profitability is tested.

2. Buyer Structure in U.S. Food and Tobacco Industries

Food and Tobacco industries' output is sold to various types of buyers (Table 1). Among these, the major buyers are other food manufacturers and retailers including grocery chains, mass merchandising chains, food wholesalers and food service etc. Table 1 shows that the intra-industry buyers and retailers together are responsible for almost 80% of total food manufacturing sales of which 60% went to retailers. Although large grocery chains and food wholesalers dominate the procurement of food manufacturers' output it is unlikely that these buyers have significant countervailing power against food manufacturers that sell branded and highly promoted products. Industries that have a high private level component do, however experience significant buyer power. Unfortunately the data on private label penetration by four digit industry are not readily available to analyze such impacts empirically.

Among the industrial buyers those within the food manufacturing sector bought almost 18% of the total food and tobacco manufacturing industries' output (Table 1), and the rest (e.g., textile, paper & wood, leather, chemical and drug manufacturing etc.) purchased less than one percent. In the context of this study, only the principal industrial buyers, i.e., those within the food and tobacco manufacturing sector are considered.

3. Model Specification and Data Sample

Profitability of a firm in an industry is largely based on the ability of the firm to charge price above cost. Market structure on the seller side is known to be an important determinant of such ability. Keeping potential entrants out of an industry is also major task of the established firms if they are to sustain above-normal profits. Some commonly recognized entry barriers are economies of scale, size of capital requirement, comparative levels of cost functions,

shipments in the sample. It is hypothesized that the higher the relative importance of intra-industry sales, lower will be the industry profits provided there is significant countervailing power.

An interaction term between buyer concentration and growth in industry demand is defined as $BCR*GRO_i = BCR_i*GROWTH_i$. It is expected that if demand is weak then stronger buyer power (high degree of buyer concentration ratio) would have negative impact on seller profit margins; the reverse is expected if demand is strong. However, if both demand and buyer power are weak the sign of the coefficient of the interaction term would likely depend on the relative strengths of buyer power and demand growth thus, its sign remains ambiguous.

Based on the above discussion, the aim of the empirical analysis is to test the impact of buyer market structure on seller profitability. The profit function of industry i is defined as

$$\Pi_i = f\,(CR4_i,\ ADSALE_i,\ MES_i,\ GROWTH_i,\ BCR_i,\ ORDSZ_i,\ BDISP_i,\ PERFMT_i,\ BCR*GRO_i). \quad (1)$$

Presence of significant negative relationship between buyer structure variables and Π_i would establish the hypothesis that there is countervailing power in the U.S. food and tobacco manufacturing industries. The four buyer structure variables and the interaction term are expected to have negative signs while the seller structure variables and the growth variable are expected to have positive signs.

3.2 Data sample

The principal data used in this study comes from the 1987 Census of Manufacturers and the 1982 Benchmark Input-Output Accounts of the United States. Two other sources are: the

BAR/LNA Multimedia Service data on food manufacturing industry advertising expenditure in 1987, and Connor *et al.* (154-156:1985) for economies of scale (MES) data. The food industries assets data for 1985 were provided by Prof R. Lopez.

The analysis is focused at the 4-digit level of SIC 20 and 21. However, due to lack of advertising data, SIC 2048 (prepared feeds) and SIC 2099 (miscellaneous foods) are excluded from the analysis. Moreover, as all outputs of the cigarette and cigar manufacturing industries (SIC 2111 and SIC 2121, respectively) go directly to non-industrial buyers making the buyer concentration ratio variable (***BCR***) mathematically undefined, both industries are excluded from the analysis. Thus the total number of sample of food manufacturing industries was 40 for the study.

4. Results and Discussion

Descriptive statistics of the variables used in this analysis is presented in Table 2. It shows the distribution of both dependent and explanatory variables. A correlation matrix among the independent and dependent variables is presented in Table 3 to obtain a pre-regression understanding of the relations among variables. The results show that most of the buyer structure variables are negatively correlated to seller profitability, advertising intensity, and industry growth. On the other hand, seller concentration, advertising intensity, minimum efficient scale, and industry growth are positively correlated to the Lerner index as expected.

Regression results of the seller profitability model (eq. 1) is presented in Table 4. Four regression equations were estimated using the SHAZAM program. The squared error term from an OLS regression exhibited strong correlation with advertising intensity (***ADSALE***), therefore, that variable was used to correct the model for heteroscadasticity (see Gujarati, 339:1988, for relevant econometric theory). Four versions of the seller profitability model were estimated and

results are presented in Table 4. Only model (i) contains the entire set of variables of the profitability equation. The impact of seller structure, market growth, and buyer structure on seller profitability was tested through the model (ii), while models (ii) and (iii) show the separate effects of a relative sales variable and an interaction term.

The results consistently show that seller concentration significantly increases seller profitability. There is abundant literature on the impact of seller concentration on profitability. Demsetz critique notwithstanding, it has been generally agreed that high sellers' concentration increases sellers' profits and this study further substantiates that. Although it lacks consistent statistical significance, advertising intensity shows positive impact on seller profitability in concert with the findings of available literature (Connor and Peterson, 1992). One surprising finding here is that the economies of scale variable (***MES***) is not significantly different from zero. Although a non-significant scale effect is not uncommon (e.g., Rogers and Petraglia, 1991), ***MES*** is often correlated with seller concentration, and has a significant positive impact on profits. This result is cited as evidence for the hypothesis that more concentrated markets have higher profits because larger firms, at or above ***MES*** have lower costs than their smaller counterparts. This efficiency argument does not seem to hold for the selected industries in the current study.

The results relating to the main task of this study, i.e., testing the impact of buyer structure on seller profitability, are inconclusive. Although ***BCR*** shows the expected negative sign in models (i) and (iii), ***ORDSZ*** shows negative coefficient in models (ii) and (iv), and ***BDISP*** has negative coefficient in model (ii), all these results lack statistical significance. However, at a lower level of significance (0.20), both ***ORDSZ*** and ***BDISP*** show countervailing impact on seller profitability respectively in models (iv) and (ii). At the same low level of significance, ***BCR*** is positive showing lack of stronger buyer power. Similarly, all these buyer structure variables

also show evidence of non-significant positive coefficients among the four models. Keeping only the buyer concentration variable in the model (i) to determine whether high positive correlation among these three buyer structure variables have reduced the explanatory power of the buyer concentration variable, it was found that the ***BCR*** coefficient was negative and significant at 0.10 level of significance.

The variable ***PERFMT*** is statistically significant at both acceptable level (model (i)) and a lower level of significance (0.20 in model (iii)). It shows that if a food manufacturing industry increases its sale to other food manufacturing industries, it will likely to reduce the industry profitability. Such findings may warn food manufacturers against emphasizing industry sales instead of consumer packaged goods that can be differentiated.

Seller profitability is also influenced by growth in industry sales; the results show that increased growth rate will increase industry profitability. If countervailing power is prevalent and stronger when demand is weak (Schumacher, 1991), the expected sign of the interaction term (***GROWTH***) would be negative. However, the current results show the opposite (models (i) and (iv)) meaning a weaker buyer power relative to stronger growth in the U.S. food and tobacco manufacturing industries (almost 15%, from Table 2).

5. Conclusions

An analysis of the profitability of U.S. food manufacturing industries shows that such profitability depends on the market structure on the seller side and on a limited basis on the buyer side. It was found that the buyer structure variables failed to establish conclusively that buyers have significant countervailing power and can discipline sellers in a monopoly/oligopoly market. However, findings show that industry that sell more output to other food

manufacturers have lower seller profitability. In conclusion, the countervailing power hypothesis could not be proved conclusively and the question of the ability of buyers to discipline sellers from making above-normal profits still remains indeterminate. It is fairly clear, however that commodity oriented businesses are less profitable than consumer oriented businesses in the food sector.

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Table 1: Principal Buyers of Food and Tobacco Manufacturing Industry Output (N=44)

Buyers		Total purchases ($ million)	Percent of total sales
Principal Non-industrial buyers	Eating establishments	38,825.65	12.93
	Amusement establishments	406.40	0.14
	Institutional buyers	10,127.14	3.37
	Retail buyers	179,650.50	59.84
Sub-total		229,009.70	76.29
Principal industrial buyers	Food manufac. buyers	53,745.30	17.90
	Non-food manufac. buyers	1,720.40	0.57
Sub-total		55,465.70	18.48
Total *		300,197.80	100.00

Source: *The 1982 Benchmark Input-Output Accounts of the United States*, Dept. of Commerce, Bureau of Economic Analysis, 1991.
Note: * = sub-totals do not add up to the total because only principal buyers are shown here.

Table 2: Descriptive Statistics of Regression Variables (N=40)

Variable name	Mean	St. deviation	Minimum	Maximum
PCM	0.392	0.184	0.070	0.727
CR4	0.499	0.209	0.180	0.960
ADSALE	0.034	0.024	0.000	0.112
MES	2.95	4.251	0.140	19.77
GROWTH	14.99	37.87	-56.065	113.99
BCR	0.016	0.027	0.0002	0.154
ORDSZ	-4.234	4.678	-12.475	4.755
BDISP	0.038	0.067	0.86-07	0.309
PERFMT	21.896	26.69	0.029	92.634
BCR*GRO	-0.049	1.623	-8.6359	4.434

Table 3: Correlation Matrix of Regression Variables (N=40)

	PCM	CR4	ADSALE	MES	GROWTH	BCR	ORDSZ	BDISP	PERFMT	BCR*GRO
PCM	1.00									
CR4	0.333	1.00								
ADSALE	0.319	0.056	1.00							
MES	0.187	0.638	0.147	1.00						
GROWTH	0.370	0.205	0.328	0.363	1.00					
BCR	-0.222	0.306	-0.252	0.401	-0.269	1.00				
ORDSZ	-0.464	0.035	-0.310	0.111	-0.366	0.553	1.00			
BDISP	-0.378	0.278	-0.238	0.229	-0.289	0.741	0.620	1.00		
PERFMT	-0.453	0.243	-0.209	0.281	-0.229	0.522	0.748	0.864	1.00	
BCR*GRO	0.259	0.044	0.241	0.343	0.546	0.582	-0.196	-0.522	-0.211	1.00

Table 4: Regression results of the Countervailing Power Test (N=40)

	Models / Equations			
	(i)	(ii)	(iii)	(iv)
CONSTANT	0.2339*** (3.01)	0.1930*** (3.72)	0.2811*** (3.59)	0.1339** (2.22)
CR4	0.2844** (2.54)	0.2949** (2.50)	0.2956** (2.58)	0.2820** (2.41)
ADSALE	1.4564* (1.84)	0.9277 (1.16)	0.8401 (1.08)	1.5008* (1.81)
MES	-0.3429 (0.49)	-0.3131 (0.50)	0.1794 (0.26)	-0.8674 (1.29)
GROWTH	0.1215 (1.42)	0.1972** (2.30)	0.1833* (2.18)	0.1502* (1.71)
BCR	-0.4429 (0.25)	1.2758 (0.94)	-0.6783 (0.36)	1.9373 (1.42)
ORDSZ	0.0005 (0.06)	-0.0035 (0.62)	0.0055 (0.66)	-0.0097 (1.46)
BDISP	1.5201* (1.70)	-0.5436 (1.39)	0.4077 (0.54)	0.1666 (0.29)
PERFMT	-0.4137* (1.92)	\\	-0.3273 (1.47)	\\
BCR*GRO	10.763** (2.10)	\\	\\	8.8784* (1.70)
R^2	0.54	0.44	0.46	0.52

Note: *** = significant at 0.01; ** = significant at 0.05; * = significant at 0.10. The reported R^2 is the squared correlation coefficient between the observed and the predicted variable. The results are corrected for heteroscadasticity. Values in parenthesis are the absolute values of t-ratio.

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