دراسة تحليلية للعلاقة بين القوة الاحتكارية والأداء الصناعي

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ملخص البحث. تهدف هذه الدراسة بشكل أساسي لاكتشاف طبيعة العلاقة بين القوة الاحتكارية والطاقة الإنتاجية الزائدة. ويُتوقع أن تكون هذه العلاقة غير خطية، حيث إن الطاقة الإنتاجية الزائدة تزداد ـ إلى حد معين ـ مع تعاظم القوة الاحتكارية، وبعدها تبدأ في الانخفاض.

وتستخدم الدراسة أسلوب الانحدار المتعدد على بيانات مقطعية للفترة من ١٩٧٦ ـ ١٩٩٠م، وتطبق مقياسين للطاقة الزائدة، أحدهما «متوسط الطاقة الإنتاجية الزائدة» والآخر «الطاقة الإنتاجية الزائدة عند ذروة الطلب».

وقد أكدت النتائج فرضية الدراسة وإن كان هذا التأكيد ضعيفًا إحصائيًّا، إلا أن هذه النتيجة ليست مستغربة نظرًا لطبيعة البيانات المقطعية.

This possible outcome should be weighted against the possible gains in consumer welfare that may result from the dissolution of highly concentrated industries in favor of less concentrated industries.

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We expect the coefficients of the four dummies representing moderate market power-moderate concentration (MCR), moderate barriers to entry (MB), moderate number of firms (MN), and moderate product differentiation (MPD)- to exceed the coefficients of the corresponding high market power dummies - high concentration (HCR), high barriers to entry (HB), low number of firms (LN), and high product differentiation (HPD). This would confirm the nonmonotonic relationship.

Using the average excess capacity rate as the dependent variable, we find results that support all aspects of the theory. The regression coefficients of these market structure variables were not highly significant, which is not surprising using cross-sectional data.

The signs of the regression coefficients of the remaining variables are as expected. Market growth of demand (MGD), imports-sales ratio (IS), and demand variability (DV) are significant at the 10 percent level, and producer-consumer dummy (PCD) is significant at the 5 percent level.

The results from using peak demand excess capacity are almost the same as the results using average excess capacity.

6. Summary

The empirical results discussed in the previous section proved to be sensitive to the measurement of the market structure variables, and to the measure of excess capacity. When we use the trichotomous measure of market structure, we find results that support all aspects of the theory.

With respect to other empirical results using the continuous measures of market structure, we found weak results that provide little support to the basic hypothesis of this study. The multicollinearity of this continuous data probably caused the F- and t-statistics and adjusted R^2 values to be low. The statistics were higher when dummy variables, which are free of multicollinearity, were used. Another factor in the mixed outcome of the empirical testing was, as usual, the simple fact that we used cross-sectional data. Models that are fit to such data will often show the correct signs but will have low statistics.

The results of the study have interesting implications for public policy directed at breaking-up industries enjoying high market power, in order to improve allocative efficiency which would result in increasing excess capacity.

Table 3. Ordinary least squares estimates of specification 2.

	Dependent variable	
	Average Excess capacity	**Peak demand Excess capacity**
Constant	21.051*	20.305*
	(11.461)	(11.791)
HCR	0.890	1.032
	(0.370)	(0.943)
MCR	1.001	1.440
	(1.153)	(0.952)
HB	1.21**	0.321
	(1.745)	(0.031)
MB	3.412**	0.791
	(1.931)	(0.279)
LN	-1.743	-1.941
	(-1.321)	(-1.395)
MN	0.764	-0.727
	(0.427)	(-0.747)
HPD	-1.055	1.020
	(-0.781)	(0.737)
MPD	1.631	1.642
	(1.414)	(1.020)
PCD	-3.061**	-2.904**
	(-1.760)	(-1.733)
MGD	-0.172**	0.305
	(-2.765)	(1.341)
DV	21.301*	0.993
	(3.953)	(1.030)
IS	1.547*	-1.112
	(2.051)	(-0.795)
R^2	0.137	0.056
F(12,269)	3.491*	2.247**

Notes: t-values are in parentheses.

* Indicates significance at 5 percent level or better.

** Indicates significance at 10 percent level or better.

Table 2. Ordinary least squares estimates of specification 1.

	Dependent variable	
	Average Excess capacity	**Peak demand Excess capacity**
Constant	20.567*	33.051*
	(8.331)	(9.546)
CR	0.021	-0.743
	(0.241)	(-0.632)
CRSQ	-0.020	0.071
	(-0.012)	(0.832)
B	21.723*	14.913
	(1.956)	(1.235)
BSQ	30.174	-19.014
	(0.321)	(-1.541)
N	0.007	0.051
	(0.401)	(1.371)
NSQ	-0.003	-0.765**
	(-0.102)	(1.690)
PD	-1.927	-0.921
	(-1.532)	(-1.277)
PDSQ	0.976**	0.910
	(1.861)	(0.517)
PCD	-2.001*	-0.010
	(-2.395)	(-0.573)
MGD	-0.056*	-6.510
	(-2.611)	(-0.321)
DV	15.621*	-2.161
	(3.112)	(-1.541)
IS	-3.218*	-1.214
	(-1.701)	(-0.801)
R^2	0.081	0.045
F(12,269)	3.671*	1.951**

Notes: t-values are in parentheses.

* Indicates significance at 5 percent level or better.

** Indicates significance at 10 percent level or better.

number of firms dummy (LN); and the coefficient of the moderate product differentiation dummy (MPD) should be greater than that of the high product differentiation dummy (HPD).

5. Empirical Results

The model was estimated using two alternative specifications and two alternative measures of excess capacity. The first measure is the average excess capacity rate, and the second is the peak demand excess capacity.

The results from empirically estimating the first specification are contained in Table 2. The results provide some support for the hypothesis concerning the effect of market structure variables on excess capacity.

Using the average excess capacity rate as the dependent variable in estimating specification (1), we find results that do not support the hypothesis concerning the relation between market structure and excess capacity. The signs of the market structure variables are not as expected: the signs are reversed for barriers to entry squared (BSQ), product differentiation (PD), and product differentiation squared (PDSQ). Also, when peak demand excess capacity is used as the dependent variable, the results do not support the hypothesis that excess capacity increases as market power increases up to a certain point, and then decreases as market power increases. The signs are reversed for concentration (CR), concentration squared (CRSQ), product differentiation (PD), and product differentiation squared (PDSQ).

The regression coefficients of the other independent variables-market growth of demand (MGD), demand variability (DV), and producer-consumer dummy (PCD)-have the expected signs when average excess capacity is used as the dependent variable except for the imports/sales ratio (IS). Demand variability (DV) is positive, while the signs for market growth of demand (MGD) and producer-consumer dummy (PCD) were negative. The coefficients were not significant. The highest level of significance is for demand variability (DV), which is significant at the 5 percent level. On the other hand, when peak demand is used as the dependent variable, the signs of the imports/sales ratio (IS) and the demand variability (DV) are not as expected.

Table 3 show the results from empirically estimating the second specification. The results provide better support to the hypothesis in comparison with the results from estimating the first specification.

$$EXC = \beta_0 + \beta_1 HCR + \beta_2 MCR + \beta_3 HB + \beta_4 MB + \beta_5 LN + \beta_6 MN + \beta_7 HPD$$

$$+ \beta_8 MPD + \beta_9 PCD + \beta_{10} MGD + \beta_{11} DV + \beta_{12} IS + \mu \qquad (2)$$

These equations were estimated using cross-sectional data for the period 1976-1990, and two measures of excess capacity (EXC). The data are that collected by the U.S. Bureau of the Census and the Internal Revenue Service.

In Specification 1, the market structure variables are represented by continuous variables, and in specifications 2, the market structure variables are represented by dummies. In the latter case, the assignment of dummies is presented in Table 1.

Under the first specification, the appearance of certain coefficient signs would confirm a nonmonotonic, in particular bell- or dome- shaped, relationship between market structure and excess capacity. The signs of the estimated coefficients of concentration (CR), barriers to entry (B), the number of firms (N), and product differentiation (PD) should be positive; while the signs of the estimated coefficients of concentration squared (CRSQ), barriers to entry squared (BSQ), the number of firms squared (NSQ), and product differentiation squared (PDSQ) should be negative.(3)

Table 1.

	High	Moderate	Low
Concentration	above 68	45-68	below 45
Barriers to Entry	above .09	.06-.09	below .06
Number of Firms	above 1000	201-1000	below 201
Product Differentiation	above 2%	1-2%	below 1%

Under the second specification, a bell- shaped relationship between market structure and excess capacity requires that the estimated coefficient of the moderate concentration dummy (MCR) should be greater than that of the high concentration dummy (HCR); the coefficient of the moderate barriers to entry dummy (MB) should be greater than that of the high barriers to entry dummy (HB); the coefficient of the moderate number of firms dummy (MN) should be greater than that of the low

(3) The traditional view which is that excess capacity is monotonically increasing over the range of legal industries, calls for positive coefficients for the linear terms and non-negative coefficients for the squared terms.

3.5 Product Differentiation

Product differentiation arises from advertising. An innovative advertising campaign can create a new product in the eyes of the consumers, and can alter the shape and position of the consumers demand curve. The advertising/sales ratio is the most important measure of the degree of product differentiation.

3.6 Market Growth of Demand

Different industries experience different rates of growth in demand. In order to account for this, the growth of market demand is included in the estimated equation. Market growth of demand is the percentage change in the industry's real value of shipments between 1976-1990 (1976 = 100).

3.7 Demand Variability

In order to take account of uncertainty with respect to demand, the ratio of the standard deviation of real value of shipments over the period to the mean value of shipments during the same period is entered in the estimated equation.

3.8 Imports

To account for the effect of the foreign sector on the development of excess capacity, the imports/sales ratio is entered in the estimated equation.

3.9 Producer-Consumer Industries

Excess capacity is likely to be lower in consumer goods industries than in producer goods industries. To account for this, a dummy variable is entered into the estimated equation. A value of zero is given to producer goods industries, and a value of one is given to consumer goods industries. Industries classified as producer goods industries are those producing either material inputs or investment goods. From the 282 SIC industries, only 202 are classified as producer goods industries, and 80 are classified as consumer goods industries.

4. The Model Specification and Estimation Technique

Since the objective of this study was to discover if the relationship between market structure and excess capacity is nonmonotonic, the following functional forms were estimated.

$$EXC = \alpha_0 + \alpha_1 CR + \alpha_2 CRSQ + \alpha_3 B + \alpha_4 BSQ + \alpha_5 N + \alpha_6 NSQ + \alpha_7 PD$$

$$+ \alpha_8 PSQ + \alpha_9 PCD + \alpha_{10} MGD + \alpha_{11} DV + \alpha_{12} IS + \mu \qquad (1)$$

The Bureau of the Census published two utilization rates: the preferred utilization rates and the practical utilization rate. The practical utilization rate is the ratio of actual operations to practical capacity, where practical capacity is the maximum level of production which an establishment can reasonably produce using realistic work patterns. The preferred utilization rate is the ratio of actual operations to preferred capacity, the latter being that level of output which a manufacturer would prefer not to exceed because of costs or other considerations.

The economic definition of capacity refers to a firm's minimum average total cost output. Since the preferred capacity utilization rates more closely corresponds to the theoretical definition, they are used to construct the dependent variable.

Two alternative measures of excess capacity are used in the estimation procedure. The first is the average excess capacity over the period. The average excess capacity rate is equal to 100 minus the average preferred utilization rate for the period. The second measure is the peak demand excess capacity. The peak demand excess capacity is figured for the year in which the value of shipments is highest, and it equals 100 minus the preferred utilization rate for the year. The latter measures of excess capacity is used to capture the chronic excess capacity that Bain [4] defines as a persistent tendency toward redundant capacity at times of peak demand.

3.2 Seller Concentration

Concentration is measured as the percentage of total industry sales attributed to the four largest firms.

3.3 Barriers to Entry

The barriers to entry variable is constructed using data on total business receipts as value of shipments, and number of returns as number of firms.

Barriers to entry are represented by relative size, which is the percentage of business receipts from minimum efficient scale plant.(2) The value of barriers to entry by relative size is defined as a ratio whose numerator is business receipts from minimum efficient scale plants, and whose denominator is the ratio of number of returns to total value of business receipts.

3.4 Number of Firms

The number of firms variable is included in the estimated equation as a measure of market power.

(2) The minimum efficient scale plant is that plant where the sum of business receipts is equal to or greater than 50% of total business receipts for the industry.

as either tight oligopolies, partial oligopolies, or atomistic industries. He found that excess capacity appears in the "low barriers" industries and did not appear in the "moderate" or "high" barriers industries [4]. On the other hand, the Espositos investigated this relation using concentration as a measure of market structure. The results of their investigations suggest that partial oligopolies experience more excess capacity than that appears in tight oligopolies and in atomistic industries [1,7].

Previous studies revealed contradictory conclusions as regards the relationship between market structure and excess capacity. This contradiction may due in part to incomplete specifications. This study attempts to correct this problem using a more complete specification to estimate the above said relationship.

Thus, the objective of this paper is to discover the type of the relationship between market structure and excess capacity. It is expected that this relationship is nonmonotonic. Excess capacity rises as market power rises; but after some point, according to the hypothesis, excess capacity falls as market power continue to rise.

2. Data

The study uses the data collected by the U.S. Department of Commerce, the U.S. Bureau of the Census, and the Internal Revenue Service.

3. Methodology

This study of the relationship between market structure and excess capacity in American manufacturing industries utilizes cross-section data for the period 1976-1990. The industries are defined at the four-digit SIC level. Industries were included in the sample if the industry's capacity utilization rate for each year during the period was available. Using this criterion, 282 industries qualified for inclusion in the sample.

3.1 Excess Capacity

Excess capacity is the dependent variable. The variable is measured as a percentage estimate of unutilized capacity in an industry and is derived from the U.S. Bureau of the Census capacity utilization rates. The capacity utilization rates published by the Bureau are based on data collected in the Bureau's annual survey of plant capacity. This data is used to derive fourth-quarter estimates of capacity utilization rates for 450 manufacturing industries defined at the four-digit SIC level.

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Market Power and Industrial Performance: An Empirical Investigation

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Abstract. The main objective of this paper is to discover the type of the relationship between market power and excess capacity. It is expected that this relation is not linear. Excess capacity rises as market power rises; but after some point, according to my hypothesis, excess capacity falls as market power continues to rise.

The study uses multiple regression analysis on cross sectional data for the period 1976-1990, and two alternative measures of excess capacity, these being average excess capacity and peak demand excess capacity.

In general, the results of the model estimation provides weak support to the hypothesis. Stronger support could be too much to ask for, given the cross sectional nature of the data.

1. Introduction

The study of industrial organization concerns the relationship between market structure and market performance. Most of the studies in this area focus on allocative efficiency and progressivity. Little attention has been devoted to the relationship between market structure and another important aspect of market performance- the degree to which industries experience excess capacity.(1)

Of the few empirical studies on the relationship between market structure and excess capacity [1,4-9], only Bain [1] and Esposito and Esposito [1,7] directly related excess capacity to market structure. Bain used barriers to entry to classify industries

(1) Excess capacity is the difference between the output where the firm's long-run average total cost is at the minimum and the firm's actual output in long-run equilibrium [1;p.190, 2;p.295, 3;p.427].