Some New Evidence on Concentration and Profitability in Pakistan's Large-Scale Manufacturing Industries

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The purpose of this paper is to estimate the extent of industrial concentration in the major manufacturing industries and to analyse its effects on some standard behavioural aspects of oligopoly. Basically, it tests the hypothesis that excessive control of a market removes the pressure on monopolists to keep prices down to their competitive levels and thus generates excessive or 'monopoly profits'. Such behaviour by the oligopolist can be further split into a price-behavioural effect and a production effect [2]. According to the former, prices tend to be sticky as the oligopolist can effectively control output to influence market price. The production effect, on the other hand, implies that during a slowdown in economic activity, there is greater curtailment of output and a smaller reduction in price of products produced by more concentrated industries (henceforth referred to as MCIs). This tendency of a monopolist to restrict output and charge higher prices is generally described as one of the static allocative effects of monopolistic competition and has welfare implications, in that, it leads to a sub-optimal allocation of resources.¹ For a developing country (LDC) like Pakistan, where there is an acute shortage of manufactured goods, this restriction has obvious drawbacks.

Another allocative effect is the failure of the oligopolist to minimise costs or what is known in economic literature as X-inefficiency. As pointed out by White [16], "By using inefficiently too many resources (for his too small output), he (the monopolist) may be sharing his monopoly profits but he

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¹Some economists maintain that the welfare aspects have become some-what ambiguous since the development of the 'The General Theory of the Second Best' [15].

is depriving the economy of additional goods and services. Unfortunately, these costs are frequently over-looked or sometimes even applauded in LDC's. Governments in LDC's frequently have the goal of maximising the domestic value added of existing production processes. The quite life monopolist may well achieve this goal; but to the extent that the factors of production going into domestic value added have alternative uses, this goal can be quite costly" [16].

The existence of excessive profits can be explained by a number of structural characteristics of an industry. Industrial concentration and barriers to entry are considered to be the traditional characteristics of market structure that explain variations in profit. The amount of market power enjoyed by a firm is believed to depend mainly on the market share of the firm and the height of barriers to entry in that particular industry. Barriers to entry in turn, can be expected to depend on the economies of scale and the extent to which product differentiation is complemented with high advertising expenditures (product differentiation can also be treated as a barrier to entry quite independently of advertising expenditure). Advertising intensity, the rate of growth of demand, the rate of investment and capital intensity are also some of the additional factors that influence profits [10].

I. Methodology

Scope: There are numerous theoretical hypotheses that could be tested to estimate the effect of different variables on the level of profits in an industry. This paper is, however, limited in its scope as it focusses essentially on the measurement of concentration in the industrial sector and on testing hypotheses relating to the effect of concentration on the level of profits and capacity utilization. To estimate the effect of capacity utilization on profits, a model similar to the one used by White [16] will also be tested. Before proceeding further, however, there are two aspects of Pakistani industry which need to be highlighted, i.e., (i) Government control of industry and (ii) the nature of operations of industries dominated by multinational corporations (MNCs).

After 1971, heavy industries (and later on vanaspati) were nationalised. The control of these industries, thus, was shifted from the private sector to the Government. The objectives of a large nationalised firm are expected to be different from a private firm. The primary objectives of nationalised units may be to increase (for example) capacity utilization, production, etc. The nationalised firms may be expected to break even but not necessarily earn monopoly profits. This change in the market structure after 1971 may warrant the use of additional variables to explain variations in profit rates.

One would expect that MNCs would earn more profits, as the primary aim of a foreign investor would be to earn a quick return on his capital. Higher profits would also ensure as MNCs are better organized and have more technical know-how and resources available to them as compared with their local counterparts. An earlier paper [13] which based its results on some of the findings of the present study, reported that industry groups where MNC are in the dominating position are significantly more concentrated than those in which

local firms dominate.² It would thus appear that foreign investors prefer investing in industries which are more concentrated and where necessity to import technical know-how is relatively greater. Not only would this ensure monopoly profits, but the sheer size and the high cost of the imported technology in the field helps keep potential competitors out of the industry.

The variables used: Following variables are used to explain market structure and performance.

(a) *The top 2 Concentration Ratios (CR):* This measure is calculated by taking the sales of the largest two firms (where the size ranking is by sales), as a percentage of total industry sales as recorded in Census of Manufacturing Industries (CMI).³ Sales have been chosen in preference to other variables, since they measure actual market power of a firm. Some of the other variables that can be used to measure concentration are installed capacity and production but these variables have disadvantages in that capacity utilization measures only potential market power and production is a difficult variable to work with due to the problem of weightage. The top-2 firm measure has been chosen for two reasons. Firstly, the normal pattern in most industry groups is that one or two firms dominate the market. This pattern warrants the use of an indicator of concentration of the top-1 or top-2 firms. Secondly, where industry groups have only three or four large firms,⁴ this measure can take into account the distributional difference within the top four firms. Perhaps the need for using an alternative measure of concentration can best be highlighted with a comparison with White's work [16] who uses the share of the top four firms in an industry to measure concentration. With the exception of one industry group, the number of sizeable firms per industry group is rather small and as a result, White, who uses a sample of 17 industry groups, ends up with as many as 10 industry groups with a concentration ratio of 100 percent. The use of the two firm measure, therefore, helps analyse more sharply the effect of high concentration on profits. The concentration ratio series also becomes more continuous as a result of using top 2 concentration ratios.

Concentration ratios have been constructed for three of the four selected years ending in 1967, 1968 and 1970. Due to the nonavailability of CMI data after 1970 the concentration ratios for 1973 have been constructed from

²Khilji [13] uses a guideline of 50% or more of equity ownership to define an MNC. "An industry is said to be dominated by a firm, if that firm is the largest in the industry as well as accounts for at least 20% of the industry sales. The requirements are to be satisfied for at least 1968 and two other years between 1968-73". The same definition of an MNC dominated industry is followed in this paper. Also, Khilji [13] based its findings on tentative results of the present effort, our calculations indicate that figures of average concentration in MNC dominated industry were slightly exaggerated by Khilji [13]. The figures of concentration, using the full sample, for the four years ending in 1967, 1968, 1970 and 1973 for MNC dominated industries, are 58%, 60%, 67% and 69% respectively as compared with 54%, 58%, 54% and 57% respectively for the remaining industry groups. The general pattern is, however, the same as reported earlier.

³For three industry groups where industry aggregates are not available in CMI, viz. Alcoholic Beverages, Matches and Industrial Gases, CRs have been calculated from the primary data. The firm data as well as the CMI data are probably biased because of under-reporting by individual units. The concentration ratios, however, may not suffer from this bias, as the under-reporting is common to CMI as well as firm data and, therefore, in the numerator as well as the denominator.

⁴e.g., Tea, Shoes, etc.

data for a sample of 283 firms. The specified four years were chosen as they were relatively stable years.⁵

(b) *Industry Profits (P) and (PR)*: Two measure of profits are used, viz, profit before tax as a percentage of paid up capital (P) and profit before tax as a percentage of paid-up capital and reserves (PR). Profit rates have been calculated from the annual corporate reports and are net of depreciation. As profit rates have been constructed from the primary data they are representative of profits in only the large-scale manufacturing sector in Pakistan.

(c) *Domination by Foreign Firms (DO)*: A dummy variable to indicate the presence of an industry where the leading firm is an MNC.

(d) *Domination by Government Regulated Firms (DC)*: A dummy variable to indicate the presence of an industry dominated by a Government Regulated Firm.⁶

(e) *The level of Imports (DM)*: DM is the value of the imported goods as a percentage of the total value of domestically produced and imported goods. [7, 8].

(f) *Capacity Utilization (CU)*: The variables used in the study make some additions to what have become 'standard variables' in analysing the structure, behaviour or performance of industry. Previously, research in this area had relied chiefly on statistics obtained from the various publications of the Government of Pakistan. These publications are used only as a 'secondary source' of data in this study. [6, 12].

Hypotheses

In addition to analysing the effect of concentration on price/quantity changes, this paper, by using the ordinary least squares methods, tests four basic hypotheses. The following specifications are used:

- (i) Profits: $y = f_1(\text{CR})$ where y is, in turn, one of the two measures of profits and CR is the concentration ratio for the four years ending 1967, 1968, 1970 and 1973. *A priori*, one would expect profit rates to be positively related with the level of concentration.
- (ii) Ownership: $y = f_2(\text{CR}, \text{DO}, \text{DC})$; where DO is a dummy variable for domination by an MNC (which takes the value 1 if the industry is dominated by MNC, otherwise 0) and DC is also a dummy variable

⁵For the period of 1965 to 1975, the years 1965, 1969 and 1971 are considered abnormal as regards business activity in the country due to the disruptions and dislocations caused either by war or unusual political instability arising from unexpected change in Government. It is, therefore, felt that economic explanations alone may not be sufficient in analysing industrial performance and for this reason the accounting years 1969, 1971 and 1972 (overlaps with calendar year 1971) have been excluded from the study.

⁶Government domination implies the presence of a Government Regulated Firm that accounts for at least one-third of the industry sales and includes: Vanaspati, Cement, Silk, Art and Rayon, Oil Refining, Fertilizer and Machinery (except electrical). Fertilizer is, however, a borderline case as the two leading firms are in the private sector. The Government, however, owns 4 out of the 6 firms in the industry. As will be seen later, the inclusion of fertilizer makes no difference to the results obtained with this dummy, as fertilizers made fair profits in 1973.

for domination by a Government Regulated Firm (which takes the value 1 if the industry is dominated by a Government Regulated Firm otherwise 0). One would expect MNCs to earn high profits and Government firms to earn comparatively lesser profits.

- (iii) White's Model: Using $p=f_3$ (CR, DM, CU, CU²), which is similar to the model used by White, except that DM is a dummy variable that represents the level of imports (1 if imports exceed 20%, otherwise 0), instead of "the percentage by which domestic price exceeds cif import prices" used by White and CU is the capacity utilization.
- (iv) Determinants of Capacity Utilization: $CU=f$ (CR, DM), where CU is the average capacity utilization. As pointed out earlier one would expect lower capacity utilization by concentrated industries. One would also expect that the CU factor may be low where there are competing imports.

The Data Used

As this paper is primarily concerned with firms in the large-scale manufacturing sector it was initially intended to work with only the firms listed on the Karachi Stock Exchange (KSE). It was, however, felt that whilst such a sample would represent firms belonging to a uniform category, which are not competitors of the smaller units within the same industry groups (for example, a listed firm that manufactures cotton cloth cannot be considered as competitor of a cottage industry unit that operates two handlooms and manufactures coarse cloth,⁷ it has some obvious limitations and would not be representative of large-scale manufacturing sector for three main reasons. Firstly, the industry groups listed on KSE lump together a variety of firms belonging to different industry groups under one general heading.⁸ Since the validity of a concentration ratio is dependent upon the definition of markets, a sample based on the KSE data would lead to erroneous conclusions due to an aggregation across dissimilar industries. Secondly, in quite a few industry groups, one of the top-2 firms is not listed on the Exchange.⁹ If these 'leaders' are not included in the sample, the final picture may be fairly distorted. Finally, if the listed firms are grouped according to a classification that defines markets narrowly, quite a few of the industry groups would comprise of 1 or 2 firms in toto, which need not be the case.¹⁰ For these reasons and keeping in view the fact that large scale manufacturing units do not compete with the smaller firms, 89 unlisted firms of comparable size were included in the sample.¹¹

The procedure followed in constructing the primary source of data for the study was that initially all the firms listed on KSE were classified into

⁷The 'machinery except electrical' industry can further illustrate this point. The total number of reporting establishments in this industry is 308 (CMI 1967), of which two listed firms manufacture as much as eighty percent of total industry sales. The smaller units may manufacture similar products but they are probably of a comparatively lower quality and, therefore, cannot compete with the products manufactured by their listed counterparts.

⁸For example, the firms included in the industry group labelled 'Chemicals and Pharmaceuticals' on KSE, contains five industry groups at a 4 digit level of classification, viz, (i) Fertilizers, (ii) Pharmaceuticals, (iii) Paints, (iv) Industrial Gases, and (v) Acids, Alkalies and Salts.

⁹For example Pharmaceuticals, Electric Motors and Appliances, Paints, etc.

¹⁰For example, Tea, Tin Cans, Glass Products and Paints have 6, 21, 23, and 21 reporting establishments respectively (CMI-1967) and only 1 or 2 listed firms.

¹¹The 89 unlisted firms have assets above Rs. 30 lakhs.

industry groups using a four digit level of classification (PSIC-70) [9], from which a sample of 27 industry groups, comprising of a total of 194 listed firms was chosen. The 89 additional unlisted firms were also classified at the four digit level of classification and included in their respective industry group, thus forming a total sample of 273 firms.¹² The resulting 27 industry groups and their corresponding industry groups of PSIC-70 are shown in Appendix 'A'. To ensure that all industry groups have been classified at comparative levels of aggregation, a slight departure had to be made from PSIC-70 and two industry groups were classified at a three digit level. Another two industry groups define markets rather broadly at the 4 digit level, viz, Silk, Art Silk and Rayon (this can be easily broken into Synthetic Fabrics and Synthetic Fibres) and Cotton Textiles (which should ideally be broken into Cotton Spinning and Cotton Weaving). The latter classifications are presently not feasible, as corresponding aggregates for industry groups are not available in the Census of Manufacturing Industries. [5].

The secondary sources of data include the various publications of the Government of Pakistan [4; 5; 6; 7; 8; 9] which have been mentioned wherever they have been used.

II. Analysis of Structure and Regression Results

As the extent of concentration has not changed significantly, over the six year period from 1967 to 1973, an analysis of only one of the years is made for purposes of explaining structure. Table 1 shows that the 27 selected industry groups account for nearly 70 percent of all manufacturing sales for the year ending in 1970. The sample can therefore be expected to be fairly representative of the manufacturing sector.¹³ Cotton Textiles alone account for 28 percent of the sample sales and nearly 20 percent of the total CMI sales. The share of the largest 54 firms (and this is only 1.5 percent of the total number of reporting establishments) is about 27 percent of total CMI sales and as much as 39 percent of sample sales. As is obvious from the table, the structure of industry exhibits a high level of overall concentration (i.e., between industry groups) as the leading 7 industry groups account for nearly 50 percent of sales for the universe while the remaining twenty industries account for only 20 percent of total sales for the universe.

Of the remaining 30 percent that have not been included in this paper, five industry groups viz, (i) Cotton Ginning, (ii) Grain Milling, (iii) Transport Equipment, (iv) Printing and Publishing, and (v) Soap, account for an additional 18 percent of total manufacturing sales. These industry groups have been excluded as they operate small units which cannot strictly be termed as large-scale.¹⁴ The industrial sales and contribution to the total manufacturing output of the top 10 industry groups that have not been included in the study (ranking in order of volume of sales), is given in Appendix 'B'.

¹²For the years 1967 and 1968, the industry group Jute Textiles had to be dropped, as aggregate figures were not available in CMI. This exclusion reduces the sample to 26 industries for 1967 and 1968. Coverage by the sample varies between 63-70%.

¹³Coverage of the selected industry groups for the other three years is between 63-70 percent.

¹⁴Average fixed assets per firm for the 5 industry groups work out to Rs. 6 lakh as compared to an average of Rs. 84 lakh for the Cigarette Industry and Rs. 203 lakh for Petroleum products.

Table 1

Industry Sales as a Percentage of All Manufacturing Sales

Industry Groups	'CMI—1970 Sales by Ind. Group as a % of all Manufacturing	Cummulative percentage
Cotton Textiles	19.63	19.63
Sugar	6.95	26.58
Vanaspati	6.41	32.99
Petroleum Products	5.54	38.53
Cigarettes	5.53	44.06
Iron and Steel	3.23	47.29
Cement	2.64	49.93
Pharmaceutical	2.54	52.47
Tanning and Leather	2.23	54.70
Silk Art and Rayon	2.10	56.80
Tea and Coffee	1.63	58.43
Fertilizer	1.57	60.00
Heavy Engineering	1.46	61.46
Paper and Paper Products	1.46	62.92
Electrical Apparatus	1.21	64.13
Leather Footwear	0.84	64.97
Radio and TV	0.76	65.73
Woolen Textiles	0.75	66.48
Jute Textiles	0.67	67.15
Acids, Alkalies and Salts	0.57	67.72
Paints	0.45	68.17
Tin Cans	0.38	68.93
Beverages	0.32	69.25
Industrial Gases	0.27	69.52
Glass Products	0.19	69.71
Matches	0.11	69.82
Alcoholic Beverages	0.09	69.91

Table 2

Concentration Ratios for Different Industries

Industry Groups	CR 1967	CR 1968	CR 1970	CR 1973
Alcoholic Beverages	100.00	100.00	100.00	100.00
Industrial Gases	100.00	100.00	100.00	100.00
Matches	100.00	100.00	100.00	100.00
Tea	96.28	92.66	85.87	78.08
Cigarettes	95.23	95.23	90.02	84.55
Oil Refinery	90.44	90.01	48.80	83.71
Leather Footwear	84.94	85.42	99.70	96.88
Paper and Board	77.37	86.74	77.40	68.68
Machinery	79.47	82.97	66.31	63.56
Beverages	87.82	83.04	80.04	63.42
Fertilizer	49.57	49.57	62.07	76.23
Cement	42.52	48.34	40.73	43.05
Tin Cans	52.91	67.46	63.92	75.83
Woolen Textiles	46.92	50.10	57.16	55.83
Leather Tanning	31.43	31.59	23.93	36.29
Electric Motors	42.33	41.03	38.27	32.91
Pharmaceuticals	39.27	39.27	39.41	35.66
Paints	34.39	52.25	50.84	66.13
Vanaspati	30.70	29.46	26.70	27.76
Glass Products	32.44	41.60	76.44	79.74
Sugar	25.83	28.51	18.89	16.42
Communications	22.22	21.35	28.06	45.03
Acids, Alkalies and Salts	35.76	38.10	90.92	85.92
Silk, Art Silk and Rayon	19.37	40.57	26.74	51.71
Iron and Steel	22.70	23.99	22.82	17.72
Cotton Textiles	7.65	7.17	8.94	12.49
Jute Textiles	NA	NA	68.98	70.73

Concentration ratios for 26 industry groups for the years ending in 1967 and 1968 and 27 industry groups for the years ending in 1970 and 1973 are shown in table 2. As can be observed from the table, the ranks of the CRs are fairly stable over the four years.

Average CRs, P and PR: Table 3 shows average concentration and average profits for the four years ending in 1967, 1968, 1970 and 1973. As can be seen from the table, both measures of profits are fairly stable over the four years. There is, however, a small increase in average concentration over this period.

Table 3

Average Concentration and Profit Rates

Industry Average for	1967	1968	1970	1973
CR	55.62	58.69	59.01	61.79
P	39.04	37.54	40.19	39.04
PR	19.77	20.08	17.59	18.63

Prices: No rigid relationship has been found between price flexibility and concentration ratios on a cross-sectional basis. There is, however, some evidence which suggests that the MCIs have had, on the whole, a large price increase than the lesser concentrated industries (LCIs). Table 4 shows average price change for some 10 MCIs and 9 LCIs.¹⁵ Using alternative base years, the table shows that there is a distinct trend in the averages for the two categories of industry groups. For the three years 1971, 1972 and 1973 prices of MCIs have risen more than in LCIs.

Table 4

Trends in Average Prices for Different Industries

	1969	1970	1971	1972	1973
(Base year 1960)					
MCIs	129	127	134	162	181
LCIs	127	132	131	139	158
(Base year 1969)					
MCIs	100	99	104	126	140
LCIs	100	104	103	110	124

Source: [7]

¹⁵All relevant industry groups of the Monthly Statistical Bulletin [7] have been included. MCIs have been defined as those industries where the top two CR exceeds 50% and includes, Glass Products, Jute Textiles, Alkalies, Acids and Salts, Paints, Machinery (except electrical), Matches, Shoes, Paper and Board, Tobacco and Tea. LCIs include Sugar, Vanaspati, Cotton Yarn, Iron and Steel, Silk Art and Rayon, Pharmaceuticals, Cement, Electric Motors and Manufactured Cotton.

The resulting pattern is also consistent with evidence from other countries.¹⁶

Production: Again, no rigid relationship has been found between quantity changes and CRs on a cross-sectional basis. There is, however, some evidence to show that LCIs have had a larger growth in output over the five year period (1968-1973). The exercise was carried for 7 MCIs and 6 LCIs.¹⁷ Table 5 presents the results.

Table 5
Quantity Changes (Base year 1969)

	1969	1970	1971	1972	1973
MCIs	100	102	102	101	111
LCIs	100	113	116	113	124

Source: [7]

Regression Results

Profits(P): Results of the regression analysis between P (profit before tax as percentage of paid-up capital) and CRs, are shown in table 6. The co-efficients for the concentration variable are significant at the 1% level. The highest correlation co-efficient is for the year ending in 1968 where over 66% of the variation in profit rates is 'explained'. The weakest relationship between the two variables is found to emerge for 1973 when R^2 is only 0.19.

Profits(PR): Results of the regression analysis between PR (profit before tax as a percentage of paid-up capital and reserves) and CRs, are shown in table 7. The strength of the relationship is relatively weak but still consistent with the results obtained for the measure of profit by P. For 1972-73 the regression shows no relationship between the two variables. It appears that concentration ratios alone may not be very useful in explaining differences in profits rates after 1973. Regressions using averages of P and PR over 1967-70 CRs for 1970 are shown in table 8. The results are highly significant with both definitions of profits.

Ownership: Table 9 shows the results of three regressions with additional variables. The first uses an average P (based on an average for 1967, 1968 and 1970) as the dependent variable; and CRs for 1970 and a dummy variable for MNC dominated industry as the independent variables. R^2 improves with the use of dummy as compared with the earlier result (as reported in table 8). Even though the size of the co-efficient for MNC domination is fairly large, the co-efficient on the dummy is significant only at 10% level. The same regression was re-run using PR as a measure of profits instead of P.

¹⁶e.g., Eichner [3] has divided the United States wholesale price index into two separate indexes for oligopolistic and competitive industries. A comparison of the two indexes shows that price behaviour in the two sectors has differed significantly. Whereas prices in oligopolistic industries have increased steadily, prices in the competitive industries have varied with the aggregate growth rate.

¹⁷MCIs include all relevant industry groups of the Statistical Bulletin [7]. MCIs are again those industry groups where CRs exceed 50% and include Alcoholic Beverages, Beverages (or soft drinks), Paints, Acids, Alkalies and Salts, Matches, Paper & Board and Cigarettes. LCIs include Cotton Cloth, Cotton Yarn, Vanaspati, Sugar, Iron and Steel and Cement.

The co-efficient for the dummy becomes totally insignificant. The third regression in the table uses P for 1973 as the indicator of profit (the dependent variable); and CR (1973), a dummy variable (DO) for MNC dominated industry (1973) and a dummy variable (DC) for Government dominated industry (1973) as the independent variables. R^2 again improves significantly from 0.19 in the previous run (table 6, regression 4) to 0.57. A comparison of regression 1 and 3 in table 9 reveals that the co-efficient on concentration is fairly stable as well as highly significant. Regression 3 shows rather large co-efficients on both dummies but as these co-efficients are significant only at the 10% level, the results can only be treated as 'indicators' of large profits in MNC dominated and lower profits for firm in Government regulated dominated industries.

Results of Regression Analysis

Table 6
Profit Before Tax as a Percentage of Paid-up Capital (P) and Two Firm Concentration Ratios (CR)

P (Dependent Variable)	Constant Term	Regression Co-efficient for Concentration Variable	R ²	N
<i>Years</i>				
1. 1966-67	4.836	0.615 ^a (4.60)	0.459	26
2. 1967-68	-1.180	0.659 ^a (6.95)	0.669	26
3. 1969-70	2.537	0.638 ^a (3.51)	0.330	27
4. 1972-73	7.253	0.546 ^b (2.41)	0.189	27

- a. Significant at the 1% level.
b. Significant at the 5% level.

Note: Figures in parentheses are t-values.

Table 7
Profit Before Tax as a Percentage of Paid-up Capital and Reserves (PR) and Top Two Firm Concentration Ratios (CR)

PR (Dependent Variable)	Constant Term	Regression Co-efficient Concentration Variable	R ²	N
<i>Years</i>				
1. 1966-67	8.012	0.211 ^b (2.12)	0.158	26
2. 1967-68	4.953	0.258 ^a (3.79)	0.375	26
3. 1969-70	5.722	0.201 ^b (1.92)	0.128	27
4. 1972-73	14.045	0.074 (0.81)	0.026	27

- a. Significant at the 1% level.
b. Significant at the 10% level.

Note: Figures in parentheses are t-values.

Table 8

Average Profits (1967-70) (P&PR) and Top Two Firm Concentration Ratios (CR)

Profit indicator (Dependent Variable)	Constant Term	Regression Co-efficient for Concentration Variable	R ²	N
1. Av. P (67,68,70)	4.069	0.584 ^a (4.43)	0.44	27
2. Av. PR(67,68,70)	1.881	0.299 ^a (3.83)	0.37	27

a. Significant at the 1% level.

Note: Figures in parentheses are t-values.

White's Model: For analysing the model similar to the one used by White, an alternative set of industries had to be used, as data is presently not available at the required level of aggregation. New measures of concentration were also constructed using the method described previously. The final sample consisted of 17 industry groups,¹⁸ The regression equation for 1968 is as follows:—

$$P = 15.266 + 0.587^a CR - 12.847 DM + 0.034 CU - .077 CU^2$$

(3.78) (1.51) (0.27) (0.59)

$$\bar{R}^2 = 0.607$$

$$F = 4.248$$

$$N = 17$$

a. = Significant at the 1% level

Even though signs of all co-efficients are the same as White's [16, Pp. 145-6], the co-efficients on CU and CU² low¹⁹ and not significantly different from zero. The model suggests lower profits in industries where imports exceed 20%. The model finds absolutely no link between the capacity utilization factor and the measure of profits used. As will be seen shortly the high value of $\bar{R}^2$ may be due to a high correlation between some of the independent variables.

Capacity Utilization: Some Determinants

For analysing the variations in capacity utilization, a set of industries identical to one used in the previous paragraph was employed. For 1968,

¹⁸The 17 industry groups were also classified at the four digit level of classification and include (i) Sewing Machines, (ii) Glass Products, (iii) Machinery (except electrical), (iv) Motor Vehicles Assembly, (v) Cigarettes, (vi) Oil Refining, (vii) Radios, (viii) Paints, (ix) Paper and Board, (x) Electric Motors, (xi) Beverages, (xii) Cement, (xiii) Vanaspati, (xiv) Sugar, (xv) Cotton, Textiles, (xvi) Leather Tanning, and (xvii) Iron and Steel.

¹⁹Amjad [1] also finds no significant relationship between CU, CU² and Profits.

Table 9
Regression Analysis for Market Structure

Dependent Variable	Intercept	Concentration Ratio (CR)	Dummy for Foreign/Local Dominated Industries (DO)	Dummy for Govt./Private Sector Dominated Ind. (DC)	$\bar{R}^2$	N
1. Av. Profit before tax as a percentage of paid-up capital (1967-70) excluding 1968-69 (PR 67-70)	2.298	0.547 ^a (4.280)	9.624 ^c (1.705)	—	0.704	27
2. Av. Profit before tax as a percentage of paid-up capital and reserves (1967-70) excluding 1968-69 (PR 67-70)	4.213	0.247 ^a (2.877)	1.782 (0.360)	—	0.529	27
3. Av. Profit before tax as a percentage of paid-up capital (for 1973 only)	10.356	0.466 ^b (2.258)	13.955 ^c (1.758)	-17.197 ^c (1.741)	0.569	27

Note: Figures in parentheses are t-values.

- a. Significant at the 1% level.
b. Significant at the 5% level.
c. Significant at the 10% level.

the following result was obtained:

$$\begin{array}{llll} \text{CU} = & 83.053 - 0.353^a & \text{CR} - 25.551^b \text{DM} & \bar{R}^2 = 0.532 \\ & (3.060) & (2.577) & F = 7.952 \\ & & & n = 17 \end{array}$$

(a) Significant at the 1% level.

(b) Significant at the 5% level.

There is a significant relationship between CU and each of the two variables of CR and DM.²⁰

The signs on all co-efficients are also as expected. The co-efficient on DM is rather large, thereby suggesting the importance of competing imports in keeping down profit rates. The highly significant relationship between CU and CR also agrees with results derived by Islam [11] and Winston [17]. Winston's explanation is "that competition forces higher levels of utilization, since firms with market power can substitute either inventory accumulation or excess capacity for price fluctuations when faced with demand fluctuation". [17]. If actual figures for imports are substituted (i.e., imports as a percentage of total supply instead of dummy), in the above equation, the following results are obtained for 1968.

$$\begin{array}{llll} \text{CU} = & 83.571 - 0.368^b \text{CR} & \text{CR} - 0.405^c \text{M} & \bar{R}^2 = 0.45 \\ & (2.64) & (1.88) & F = 5.31 \\ & & & n = 17 \end{array}$$

(b) Significant at the 5% level.

(c) Significant at the 10% level.

A comparison with the size of the intercept and the co-efficient on CRs shows practically no change. $\bar{R}^2$ drops from 0.53 to 0.45, but the co-efficient on both independent variables are fairly significant.²¹

III. Conclusions

The main results of the study need to be summarized. A general caveat about the quality of data and the effect that such data may have on the results is warranted. By using dis-aggregated data, it was possible to classify industries in homogenous industrial groups. It was also possible to confine the study to a

²⁰The matrix of simple correlation shows insignificant correlation between the independent variables.

	CR	DM	CU
CR	1	0.329	-.560
DM	—	1	-.626
CU	—	—	1

²¹Again the matrix of simple correlations shows very little correlation between the independent variables. Perhaps the main reason for a 'better fit' with the use of the dummy is higher correlation of DM on CU

	CR	DM	CU
CR	1	0.33	-.55
DM	—	1	-.55
CU	—	—	1

particular class of industry. The data used has also some weakness that need to be pointed out, however. Profit rates, for example, were calculated from the annual corporate reports and have two main drawbacks: First, profits may have been understated and, second, since profits are net of depreciation, in relatively newer industries actual profits may be higher than those calculated. Finally, the secondary sources used for constructing series on imports and capacity utilization, may not be very reliable for large-scale manufacturing sector in Pakistan.

The main results were summarized at each stage of the analysis. A consolidated summary may, nevertheless, be useful. First, concentration ratios are fairly stable and show a small increase over the period of the study. Second, a pooling of industries suggests that MCIs may have had a larger price increase and a smaller growth in output. Third, both measures of profit show a strong relationship with measures of industrial concentration for all years except 1973. The peculiar exception of 1973 suggests that due to the change in the organization of the industrial sector, concentration alone may not be sufficient in explaining variations in profits and that the privately run sector must be analysed separately from the Government Regulated Sector. The underlying factor for the separate analysis of the private and government sectors stems from different objectives. Fourth, inclusion of variables for Government Regulated Industries as well as MNC dominated industries improves results significantly. There is also some evidence to show that MNC dominated industries may be earning a lower (and perhaps too low) profit. Fifth, the model used by White was re-run and even though there is some relationship between profitability and capacity utilization, the relationship between capacity utilization and profits was not significant. It was found that capacity utilization was negatively related with both the industrial concentration and the reliance on imports.

Finally, even though the relationship between concentration and other characteristics of market structure was tested rigorously using both measures of profits for all four years and for the entire sample, the relationship between imports, concentration and capacity utilization was tested for only one year and for a small sample. In view of the limitations of data the results of this study may be treated as tentative.

Annexure—A

Industry Groups Used in the Study	Corresponding Industry Groups of Pakistan Standard Industrial Classification	PSIC
<i>I. Three Digit Classification</i>		
1. Paper and Board	Manufacture of Paper and Paper Products	341
2. Glass Products	Manufacture of Glass and Glass Products	362
<i>II. Four Digit Classification</i>		
3. Industrial Gases	Compressed, Liquified and Solidified Gases	3513
4. Alcoholic Beverages	Distilling, Rectifying and Blending of Spirits	3131
5. Cigarettes	Cigarettes (including pipe tobacco)	3141
6. Matches	Manufacture of Matches	3525
7. Leather Footwear	Leather Footwear including Rubber Footwear	3241
8. Fertilizer	Manufacture of Fertilizers	3514
9. Tea	Processing and Blending of Tea and Coffee	3121
10. Beverages	Manufacture of Soft Drinks and Carbonated Water (including bottling of natural spring and mineral water)	3134
11. Acids, Alkalies and Salts	Acids, Alkalies and Salts, (excluding Common Salt and Intermediates)	3511
12. Jute Textiles	Spinning, Weaving and Finishing of Jute Textiles, except handlooms	3202
13. Tin Cans	Tin Cans and Tinware	3814
14. Engines and Turbines	Manufacture of Engines and Turbines	3821
15. Paints	Manufacture of Paints, Varnishes and Lacquers including allied products	3521
16. Oil Refining	Petroleum Products	3541
17. Woolen Textiles	Spinning, Weaving and Finishing of Woolen Textiles except handlooms	3202
18. Cement	Manufacture of Cement	3692
19. Pharmaceuticals	Medical and Pharmaceutical preparations including basic drugs (allopathic)	3501
20. Electric Motors and Components	Manufacture of Electrical and Industrial Machinery and apparatus	3831
21. Communication Equipment	Manufacture of Radio, TV and Communication equipment and apparatus	3832
22. Silk, Art Silk and Rayon	Spinning, Weaving, Finishing of Silk and synthetic Textiles, except handlooms	3204
23. Vanaspati	Manufacture of Vegetable and inedible animal oils and fats	3115
24. Tanning and Leather	Tanning and Leather finishing.	3231
25. Iron and Steel	Iron and Steel Mills	3711
26. Sugar	Manufacture of Sugar 'Khandsari' and 'Gur'	3118
27. Cotton Textile	Spinning, Weaving and Finishing of Cotton Textiles except handlooms	3201

Annexure B

Sales of Industry Groups Not Included in the Study

Industry Groups	Sales (CMI-1970) (in lacs of Rupees)	Sales by Industry Groups as a % of all Manufacturing
Cotton Ginning	130.97	11.10
Grain Milling	32.98	2.97
Transport Equipment	24.70	2.09
Printing and Publishing	12.27	1.04
Soap	9.46	0.80
Non Edible Oils and Fats	8.91	0.76
Manufacture of Plastic Products	7.87	0.67
Rubber Products except Footwear	7.55	0.64
Dyeing and Bleaching of Textiles	7.38	0.63
Canning fish and Sea Foods	6.38	0.54
Total of top—10 Industry Groups excluded	248.47	21.06

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