CHAPTER 4

MARKET STRUCTURE

4.1 Introduction

According to Bain (1968, p.7), market structure refers to the organizational characteristics of a market. Market structure has a bearing on the nature of competition and pricing within a market. The structure-conduct-performance paradigm (SCP) predicts that the conduct and performance of firms will be influenced by the structure of the markets in which they operate[1]. Most of the empirical studies reviewed in the previous chapter indicated that there is a positive and significant relationship between market structure and conduct and performance of firms.

This chapter is organised as follows. Section 4.2 elaborates on the dependent and independent variables used in market structure regression equations. This section also briefly explains the data source used in this study. Section 4.3 discusses the historical trend of industrial concentration in Malaysia. Section 4.4 examines the determinants of market structure. Section 4.5 tests the traditional structure-conduct-performance paradigm by using the ordinary least

[1] Market structure can be illustrated in various ways such as the number of sellers in the market, their degree of product differentiation, their cost structure, the degree of vertical integration with suppliers, the condition of entry. Conduct variables include price, research and development, product strategy, advertising. Performance is measured in terms of efficiency, ratio of price to marginal cost, product variety, innovation rate, profits and its distribution.

squares equation method. Finally, Section 4.6 concludes with a summary of the overall findings of this chapter.

4.2 Market Structure Variables and Sources of Data

4.2.1 Market Structure Variables

(1) Dependent Variable

The dependent variable for the regression model is the price-cost margin (PCM). PCM is defined as the percentage gross return (before taxes, interest, and depreciation) on gross output for the industries[2].

(2) Independent Variables

(i) Concentration Ratios

The first independent variable is market concentration which measures the degree of competition in a market. It is an indication of the potential for control that a small number of firms might have over a market. The larger the market share of these firms, the greater the probability of collusion among them (to control the market). When firms collude, they act like a collective monopoly. It will enable them to reap monopoly profits. Hence, profits are likely to be positively correlated to concentration. There are many measures of concentration such as: (a) the Herfindahl Index, which is the sum of the squares

[2] Output instead of sales figure is used due to unavailability of data.

of market shares; (b) the Entropy Index, which is the sum of the market shares times their logarithm; and (c) the n-firm concentration ratio.

The most commonly used measure of concentration is n-firm concentration ratio. The n-firm concentration ratio is the percentage of the value of sales accounted for by the largest firms in an industry, often the largest four firms, but the ratio is also defined and measured for other numbers of firms in a market. A very high concentration ratio may indicate an absence of competition while a low concentration ratio may indicate a high degree of competition. However, there are problems with concentration ratios as measures of competitiveness. They are as follows:

a) The geographical scope implicit in the definition of the market concentration ratio data is usually based on a national view of the market. This ignores the fact that some goods are sold in regional markets and even in the global market. If goods are sold in a regional market, the degree of concentration will be understated. This is because the degree of concentration varies between cities and villages, for instance, in newspaper industry. On the other hand, if goods are sold in a global market, imports may account for a high share of domestic sales in many industries, thus resulting in an overstatement of the degree of concentration.

b) Concentration ratios do not tell us how severe the barriers to entry in an industry. A highly concentrated industry may operate in an contestable market[3] where entry and exit by new firms are completely free.

c) Concentration ratio is a structural measure whereas competition is a behavioural phenomenon. The nature of competition in a market depends on the strategies adopted by firms. The choice of strategies depends on how these firms perceive their rivals will react. Therefore it is possible that two markets with exactly the same concentration ratios will exhibit very different types of competitive behaviour.

Herfindahl Index may be a more desirable index but its computation requires data at the individual firm level. Since the Department of Statistics in Malaysia does not provide such data for analysis on grounds of confidentiality, the four-firm concentration ratio is the second-best alternative.

Many empirical studies have measured concentration in terms of the percentage of industry output (in value terms) attributable to the top four or eight firms in the industries. Instead of using industry output, this study uses the percentage of industry employment attributable to the largest four

[3] See Baumol (1982).

establishments in each industry[4]. The substitution of employment for output in measuring the concentration ratios presents no particular problem as both variables are likely to be highly correlated, so that the value of one can be used with great confidence for estimating the other[5].

The four-firm concentration ratio (CR4) is calculated as follows:-

$$CR4 = (C_m + C_n) / 2 \qquad (1)$$

$$C_m = [A - (N - 4) F] / TE$$

$$C_n = 4(A / N) / TE$$

where,

C_m = Maximum share of total employment the largest 4 establishments can have.

C_n = Minimum share of total employment the largest 4 establishment can have.

A = Total employment in the largest class size.

N = Number of establishments in the largest class size. For $N<4$, combine the top few class sizes until $N \geq 4$.

TE = Total employment of the industry.

F = Lower limit of largest class size.

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[4] Gideon Rosenbluth (1955) remarked that "the set of dimensions actually used will depend only partly on what is most appropriate and very largely on the statistics that are available. In every empirical study of concentration the investigator will have to substitute what he can get for what he would like".

[5] See Rosenbluth, 1955, p.92.

In this study, the concentration ratios (in terms of employment) are calculated for each industry for the period 1975-1992. Due to the absence of survey data for 1977 and 1980, an estimation was made for these two years[6].

(ii) Barriers to Entry

The second independent variable is entry barrier. In 1956 Bain identified four elements of market structure that affect the ability of established firms to maintain their supernormal profit: economies of scale, absolute cost advantages, product differentiation, and absolute capital requirements.

(a) *Minimum Efficient Scale*. Bain argued that if the minimum efficient scale (MES) is a significant proportion of the industry demand, the market can sustain only a small number of firms that make supernormal profits without inviting entry. Hence, the MES can be regarded as a source of entry barrier since the larger the minimum efficient scale of the plant for an entrant relative to the industry output, the higher will be the entry forestalling price. Price-cost margins can therefore be expected to be positively related to the level of scale economy.

To estimate the minimum optimum plant scale, this study used the Comanor and Wilson (1967) method[7]. The method entails the computation of

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[6] Estimates for 1977 and 1980 were derived by simply averaging the immediate preceding and succeding years.

[7] Minimum optimum plant scale is the lowest output level at which long-run average costs are minimised.

the average size of the largest plants which account for about 50 per cent of the industry output. The average plant size is then divided by the total industry output to obtain a measure of scale economies, that is:

$$MES_j = [(\sum_{i=1}^{M} X_{ij}) / M_j] / \sum_{i=1}^{N} X_{ij} \qquad (2)$$

$$\text{where } \sum_{i=1}^{M} X_{ij} \geq 1/2 \sum_{i=1}^{N} X_{ij}$$

M = minimum number of establishment accounting for at least 50% of total output.

N = total number of establishments in the industry.

X_{ij} = total output of establishment i in industry j.

j = 1,....., k counts over industries.

Due to incompleteness of data, only the MES from 1986 onwards could be tabulated.

(b) *Product Differentiation.* Product differentiation is another form of entry barrier which arises from the preference of buyers for the product of established firms over new ones. New entrants may find it difficult to compete with the established products. Entrants have to overcome the problem by incurring large sales-promotion costs. The proxy often used to approximate the intensity of promotional effort is the ratio of advertising expenditure to total sales. In this

study, due to data constraints, we use output instead of sales data[8]. The variable for product differentiation is given by:

$$ADV = \sum_{i=1}^{N} A_i \Big/ \sum_{i=1}^{N} X_i \qquad (3)$$

where

A_i = advertising expenditure of establishment i.

X_i = total output of establishment i.

(c) *Capital Requirement.* The absolute amount of capital requirement for entry indicates the amount of capital an entrant requires to set up an efficient plant. As the capital required for entry increases, the ability to raise funds becomes more difficult for new entrants because capital markets in developing countries are relatively imperfect. The ability of new unknown firms to obtain adequate financing may be limited[9]. Hence, the amount of capital requirement is expected to be positively related to industry price-cost margins. Formally, the capital requirement ratio is as follows:

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[8] A previous empirical study in Malaysia which also substituted output for sales is Zainal and Phang (1993). Sales data are only available for selected industries only. Hence, studies based on selected industries sample were able to use sales data. See Gan and Tham (1977), Rugayah (1992).

[9] See Drake (1969).

$$ACR = MES \times \left(\sum_{i=1}^{N} F_i / \sum_{i=1}^{N} X_i\right) \qquad (4)$$

where

MES = minimum efficient scale.

F = total fixed asset of the industry.

X = total output of the industry.

(iii) Growth Rate of Industry (GR)

The third independent variable is the growth rate of industry. Economic theory suggests that short-run industry growth may have an important influence on industry prices and profits. An rapidly growing industry which is operating near full capacity is expected to experience a rise in prices and profits (Rhoades and Cleaver, 1973)[10]. Hence, to account for the possible influence of industry growth on price-cost margins, a growth variable is included in the regression model. In the model, this variable is measured by the percentage change in value-added. Data for this variable is available over the period from 1970 to 1992 (taking 1970 as the base year). Formally, the derivation of the industry growth variable is as follows:

$$GR = (V_{t+1} - V_t) / V_t \qquad (5)$$

where V_t refers to value-added at time t.

[10] It should be noted that the growth variable may have a negative relationship with profitability (Mueller and Hamm, 1974, p.514).

(iv) Capital-Output Ratio

The fourth variable for the regression model in this study is the capital-output ratio. The rationale for the inclusion of this variable is that since price-cost margins are not net of capital costs, a capital-output ratio (K/O) is included in the regressions to control for different degree of capital intensity among industries. It is measured as ratio of net fixed assets to gross output.

$$K / O = \sum_{i=1}^{N} F_i / \sum_{i=1}^{N} X_i \qquad (6)$$

where

F = total fixed asset of the industry.

X = total output of the industry.

(v) Export Opportunities (EO)

The fifth independent variable is export opportunities. Export activity is a risky undertaking. It is susceptible to uncertainties associated with operating in foreign markets such as competition from other foreign firms and difficulties in building up market share in these markets. Hence, for a firm to engage in export activities, it must be rewarded by a risk premium (Javad Khalilzadeh-Shirazi, 1974). This imply that export opportunities should increase an industry's profitability. Export opportunities for each industry are approximated by the ratio of net exports to total industry output.

$$EO = \sum_{i=1}^{N} EX_i / \sum_{i=1}^{N} X_i \qquad (7)$$

where

EX represents total volume of exports.

X represents total output of the industry.

(vi) Import Competition (IO)

The sixth independent variable is import competition. Imports coming from established producers abroad (who already have substantial home markets share), represent the most immediate form of entry threat into a domestic market. Thus, a high level of imports will reduce domestic profit margins. However, it may also possible that the relation between the two variables be positive. This happens when firms are involved in both producing for the domestic market and importing similar goods at the same time. It is also possible if the collusion between domestic and foreign firms is greater than the collusion between domestic firms.

The variable for import competition used in this study is derived as follows:

$$IO = \sum_{i=1}^{N} IM_i / \sum_{i=1}^{N} X_i \qquad (8)$$

where

IM represents total volume of imports.

X represents total output of the industry.

(vii) Direct Foreign Investment (DFI)

Direct foreign investment is another important independent variable affecting the performance of firms in the manufacturing industries. This is particularly true for the case of Malaysia which has an extremely open economy and is heavily dependent on DFIs. Caves (1971) suggested that DFI is most likely to occur in industries characterised by oligopoly and product differentiation (i.e. a differentiated oligopoly). Industries with large flows of direct foreign investment can be expected to have greater profitability. The influence of direct foreign investment is measured by the ratio of output attributed to foreign firms to total industry output, averaged over 1988-92.

$$DFI = \sum_{i=1}^{f} X_{fi} \; / \sum_{i=1}^{N} X_i \qquad (9)$$

where X_{fi} represents output by foreign establishment[11].

4.2.2 Data Source:

The study uses annual data from the Department of Statistics' Industrial Surveys. The data comprise 28 three-digit manufacturing industries classified under the Standard Industrial Classification (SIC). In Section 4.3 annual data

[11] Foreign establishment refers to those establishments with more than 50 per cent foreign equity.

from 1975 to 1992 will be used to tabulate the concentration ratios for these industries. The export and import data from Standard International Trade Classification (SITC) three-digit industries are reclassified into SIC three-digit industries to obtain data for the export-output and import-output ratio (see Appendix 1). However, due to incompleteness of data, only data for the period 1986-1992 are used in Sections 4.4 and 4.5 to run cross-section regressions.

4.3 Performance and Market Structure

4.3.1 Concentration in the Malaysian Manufacturing Industries

Average four-firm concentration ratios (CR4) have been calculated for three-digit manufacturing industries in Peninsular Malaysia from 1975 to 1992[12]. Table 4.1 summarises the average four-firm concentration ratios for the whole manufacturing sector throughout the eighteen years. Table 4.1 reveals that the degree of concentration during the 1970s was high. However, the level of concentration has decreased slightly over the period covered by the study. In 1975, the largest four-firms account for 42.3 per cent of total industry employment. The average CR4 decreased by about 12 per cent to 30.2 per cent in 1992. According to Bain (1951), when four largest firms account for less than 20 per cent of total industry output, it can be considered a competitive industry.

[12] Data before 1975 are not available.

However, for the whole of the manufacturing industry in Malaysia, the average CR4 has never been less than 20 per cent between 1975 and 1992.

Table 4.1
Average Four-Firm Concentration Ratio (CR4)
for the Manufacturing Sector

Year	CR4 (%)
1975	42.3
1976	40.5
1977	40.9
1978	39.6
1979	38.8
1980	38.9
1981	33.2
1982	34.8
1983	38.0
1984	37.8
1985	36.7
1986	38.2
1987	38.7
1988	37.0
1989	33.9
1990	33.7
1991	30.8
1992	30.2

Within the manufacturing sector, the food industry (SIC 311/312) and manufacture of wood, and wood and cork products, except furniture (SIC 331) have the lowest concentration ratio (below 10%) among all the manufacturing industries but the CR4 for the latter has increased slightly to over 10% in 1989, 1990 and 1991 (see Table 4.2).

Table 4.2
Manufacturing Industries: Four-firm Concentration Ratio (CR4)
1975-1992

Industry Code	Industry Description	1975	1976	1978	1979	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	199
311,312	Food manufacturing	0.09	0.07	0.06	0.06	0.04	0.04	0.05	0.06	0.05	0.05	0.04	0.05	0.05	0.06	0.07	0.0
313	Beverage industries	0.44	0.40	0.43	0.44	0.39	0.44	0.47	0.46	0.45	0.45	0.46	0.47	0.48	0.50	0.48	0.4
314	Tobacco manufactures	0.44	0.48	0.47	0.58	0.37	0.40	0.74	0.76	0.77	0.73	0.75	0.75	0.46	0.49	0.48	0.4
321	Manufacture of Textiles	0.22	0.21	0.20	0.22	0.18	0.19	0.22	0.20	0.22	0.24	0.22	0.19	0.19	0.16	0.14	0.1
322	Manufacture of wearing apparel, except footwear	0.44	0.42	0.34	0.32	0.24	0.24	0.22	0.20	0.22	0.22	0.23	0.25	0.25	0.17	0.16	0.1
323	Manufacture of leather and products of leather	0.57	0.46	0.38	0.35	0.33	0.39	0.43	0.45	0.47	0.46	0.50	0.42	0.44	0.50	0.51	0.4
324	Manufacture of footwear	0.58	0.65	0.61	0.70	0.70	0.86	0.73	0.86	0.76	0.79	0.78	0.78	0.79	0.84	0.61	0.5
331	Manufacture of wood, and wood and cork products	0.09	0.09	0.07	0.06	0.08	0.06	0.07	0.07	0.08	0.08	0.08	0.08	0.11	0.13	0.11	0.1
332	Manufacture of furniture and fixtures	0.27	0.26	0.41	0.24	0.15	0.13	0.13	0.14	0.18	0.17	0.19	0.27	0.33	0.14	0.20	0.1
341	Manufacture of paper and paper products	0.27	0.25	0.23	0.21	0.15	0.19	0.15	0.15	0.16	0.15	0.15	0.15	0.15	0.17	0.17	0.1
342	Printing, publishing and allied industries	0.19	0.19	0.18	0.18	0.15	0.17	0.23	0.21	0.20	0.21	0.23	0.23	0.21	0.23	0.27	0.2
351	Manufacture of industrial chemicals	0.40	0.37	0.35	0.38	0.31	0.30	0.32	0.30	0.29	0.26	0.24	0.17	0.23	0.22	0.23	0.2
352	Manufacture of other chemical products	0.26	0.25	0.18	0.21	0.24	0.18	0.22	0.22	0.21	0.19	0.17	0.17	0.17	0.16	0.17	0.1
353	Petroleum refineries	0.99	0.99	0.99	0.99	0.99	0.95	0.92	0.89	0.82	0.82	0.88	0.87	0.91	0.90	0.90	0.9
354	Mfg. of miscellaneous products of petroleum & coal	0.83	0.86	0.78	0.78	0.68	0.54	0.69	0.57	0.54	0.55	0.61	0.60	0.42	0.55	0.51	0.5
355	Manufacture of rubber products	0.19	0.20	0.19	0.20	0.17	0.19	0.17	0.16	0.17	0.14	0.15	0.12	0.13	0.11	0.11	0.0
356	Manufacture of plastic	0.22	0.19	0.25	0.15	0.11	0.10	0.12	0.11	0.10	0.10	0.14	0.12	0.16	0.14	0.12	0.1
361	Manufacture of pottery, china and earthenware	0.70	0.63	0.67	0.68	0.59	0.52	0.75	0.80	0.76	0.86	0.85	0.74	0.55	0.57	0.46	0.5
362	Manufacture of glass and glass products	0.93	0.82	0.82	0.85	0.80	0.89	0.89	0.87	0.88	0.95	0.94	0.84	0.77	0.78	0.76	0.7
369	Manufacture of non-metalic mineral products	0.19	0.22	0.19	0.17	0.13	0.14	0.16	0.15	0.15	0.15	0.19	0.14	0.13	0.12	0.11	0.1
371	Iron and steel basic industries	0.34	0.37	0.38	0.34	0.26	0.33	0.33	0.34	0.35	0.36	0.34	0.35	0.32	0.31	0.28	0.2
372	Non-ferrous metal basic industries	0.96	0.91	0.87	0.81	0.69	0.75	0.80	0.76	0.70	0.75	0.66	0.64	0.57	0.49	0.41	0.3
381	Mfg. of fabricated metal products,except machinery and equipment	0.17	0.16	0.17	0.12	0.08	0.11	0.13	0.14	0.12	0.14	0.16	0.18	0.15	0.13	0.09	0.0
382	Manufacture of machinery except electrical	0.17	0.15	0.16	0.14	0.10	0.12	0.14	0.14	0.14	0.20	0.24	0.26	0.25	0.27	0.22	0.2
383	Manufacture of electrical machinery, apparatus, appliances and supplies	0.30	0.28	0.29	0.27	0.24	0.23	0.24	0.22	0.19	0.17	0.17	0.13	0.13	0.08	0.09	0.0
384	Manufacture of transport	0.38	0.33	0.37	0.35	0.34	0.34	0.32	0.31	0.30	0.33	0.32	0.27	0.35	0.27	0.25	0.2
385	Mfg. of professional & scientific and measuring & controlling equipment	0.86	0.69	0.66	0.66	0.54	0.52	0.63	0.63	0.54	0.61	0.58	0.58	0.20	0.42	0.24	0.3
390	Other manufacturing industries	0.35	0.44	0.40	0.40	0.25	0.43	0.37	0.41	0.47	0.57	0.57	0.55	0.60	0.52	0.47	0.4

One of the most highly concentrated industry in the manufacturing sector is petroleum refineries (SIC 353) where its CR4 on average, exceeds 90 per cent. Glass and glass products (SIC 362) too has a high degree of concentration (CR4 > 0.7). Another heavily concentrated industry is the industry which manufacture miscellaneous products of petroleum and coal (SIC 354). The industry's CR4 exceeded 80 per cent during 1970s but the ratio declined after 1980. Before 1987, the non-ferrous metal basic industries' (SIC 372) CR4 was greater than 70 per cent. However, by 1992 the ratio had declined to around 40 per cent. The industry which manufactures professional and scientific and measuring and controlling equipment (SIC 385) has become more competitive over the years. However, its CR4 is still greater than 20 per cent.

Industries which are more competitive with CR4 less than 40 per cent include industries involved in: (a) textile; (b) furniture and fixtures; (c) paper and paper products; (d) printing and publishing; (e) chemicals; (f) rubber products; (g) plastic products; (h) non-metallic mineral products; (i) iron and steel; (j) fabricated metal products; (k) machinery; (l) electrical machinery, appliances; and (m) transport equipment.

The CR4 at 40 percent has been commonly used as an indication of the existence of an oligopolistic market structure[13]. If this criterion is used, 12 out of 28 manufacturing industries under study in 1975 can be considered to be

[13] See Rugayah (1992).

oligopolistic (see Table 4.3). By 1992, only 9 out of 28 industries had CR4 greater than 40 per cent. Hence, the manufacturing sector is less concentrated in 1992 compared to 1975.

Table 4.3
Distribution of Manufacturing Industries by Levels of Concentration

CR4 by Employment (percentage)	Number of Industries				
	1975	1979	1985	1990	1992
70% and above	6	5	6	3	2
60% to <70%	0	2	0	0	0
50% to < 60%	2	1	2	5	3
40% to < 50%	4	2	3	3	4
30% to < 40%	4	5	2	1	2
20% to < 30%	5	6	5	4	5
10% to < 20%	5	5	8	10	8
< 10%	2	2	2	2	4
Total no. of industries	28	28	28	28	28

4.4 An Empirical Investigation on the Determinants of Industrial Market Structure in Malaysia

As discussed in Section 4.2, variation in industries' concentration can be explained by barriers to entry such as economies of scale, product differentiation and absolute capital requirements. It is generally hypothesised that the larger the minimum efficient scale of the plant for an entrant, the higher the possibility for scale efficient firms to dominate the market. Higher product differentiation and larger absolute amount of capital requirement tend to increase concentration levels. Concentration also depends on the relative growth rates of firms - the greater the differences in growth rate, the greater the concentration. Capital-output ratio is included in the concentration equation to control for

different degrees of capital intensity among industries. Higher capital intensity is expected to increase the level of concentration since it acts as an additional barrier to entry. Export is expected to be positively related to the level of concentration. While import competition will encourage market concentration because domestic producers might be encouraged to compete with imports by cooperating with each other. To examine whether these variables influence the level of concentration in the Malaysian manufacturing industries, we conducted OLS regressions to test for these relationships.

Table 4.4 summarises the results for six regression equations. Except for equation 1, equation 2 to 6 have excluded certain market variables to test for the influence of the omitted variables on market concentration. The multiple regression equations of 1,2, 5 and 6 were able to explain over 80% of the variance in the market concentration across industries. The values of the F-ratic also supports the overall significance of the estimated regression.

The absolute capital requirements variable (ACR) shows a negative an insignificant value when the MES variable is included. However, it shows positive and significant result when the MES variable is excluded. This is nc surprising, for one would expect these two variables to have the same effect or

Table 4.4
OLS Estimates of Concentration and Market Variables

Mkt Variables	Eqn.1	Eqn.2	Eqn.3	Eqn.4	Eqn.5	Eqn.6
Constant	0.0355	0.1334	0.3961	0.2007	0.1182	0.0807
ACR	-0.2125 (-0.70)	-0.0366 (-0.13)	1.5932* (4.17)	1.3123* (2.87)	-0.1206 (-0.42)	-
ADV	-1.0095 (-0.88)	-	0.4071 (0.23)	0.5904 (0.26)	-1.4632 (-1.38)	-0.9569 (-0.87)
K/O	0.0672 (0.57)	-0.0023 (-0.02)	-0.3330** (-1.99)	-0.1496 (-0.66)	0.0041 (0.04)	-0.0006 (-0.01)
EO	0.1007 (1.12)	-	-	0.1480 (0.83)	-	0.0831 (0.99)
IO	0.0191 (0.42)	-	-	0.0100 (0.11)	-	0.0140 (0.32)
DFI	0.0240 (0.28)	-	-	0.1834 (1.10)	0.0113 (0.13)	-
GR	0.0257 (0.23)	-	-	-0.0384 (-0.17)	0.0376 (0.36)	0.0345 (0.34)
MES	1.6586* (7.75)	1.5913* (8.07)	-	-	1.6729* (7.97)	1.5750* (10.83)
Adj R^2	0.82	0.83	0.37	0.31	0.83	0.84
F ratio	17.0	45.2	6.3	2.7	23.1	24.2

Note: Figures in parentheses are t-values
* significant at 95% level
** significant at 90% level

market concentration. The correlation coefficient between the ACR and the MES variables is estimated to be around 0.65 (see Table 4.5).

Industrial economists have different views on the role of advertising. Some see it as a device for differentiating products, increasing market power,

and raising barriers to entry. Others regard advertising as a source of information for consumers which can decrease firms' market power. The result in this study indicate a negative effect of advertising on concentration. However, advertising seems to have positive effect on concentration when MES is excluded from the regression.

Table 4.5
Correlation Coefficients of Market Variables in the Concentration Equation

	ACR	ADV	K/O	EO	IO	DFI	MES	GR
ACR	1.000							
ADV	-0.070	1.000						
K/O	0.696	-0.142	1.000					
EO	0.033	-0.227	-0.295	1.000				
IO	-0.020	-0.314	-0.009	0.014	1.000			
DFI	-0.046	0.166	-0.355	0.110	-0.058	1.000		
MES	0.652	0.169	0.218	0.148	-0.076	0.267	1.000	
GR	0.047	-0.399	0.021	0.083	0.372	0.224	-0.040	1.000

Minimum efficient scale (MES) appears to be the most significant explanatory variable. This suggests large firms have a significant impact on industrial concentration. Capital-output ratio has a positive effect in equation 1 and 5 but shows a negative effect in the rest of the equations. Exports of a country usually comprise commodities in which the country has a comparative advantage or where there is an advantage in world markets based on successful product differentiation. Thus, one would expect that a high export level to be associated with a more concentrated market (Hay and Morris, 1991). This study indicates a positive relationship between the two variables. Imports and growth rate show positive effect on market concentration. The relationship of import and concentration in this study is in agreement with the findings of Rugayah

(1992) and Zainal and Phang (1993). Direct foreign investment (DFI) has a positive effect on market concentration as discussed by Lall (1979), Rugayah (1992) and Zainal and Phang (1993) but the variable is not statistically significant.

The correlation coefficients between the market variables are shown in Table 4.5. Besides ACR and MES being highly correlated, the correlation coefficient between ACR and K/O at 0.7 is high. This suggests that capital intensity plays a part in determining the absolute capital requirements to enter an industry. The advertising variable, ADV, negatively correlated to growth rate.

The relatively low correlation of ADV with DFI (0.17) suggests that the presence of foreign investment does not really affect the level of domestic advertising activities. DFI is not highly correlated with MES (0.27). Hence, there appears to be a weak relationship between the presence of multinational corporations (MNC) and firms with large plant size. The DFI variable is inversely related to the K/O and ACR variables. This is similar to Rugayah's (1992) findings.

The results display in Table 4.4 indicate only one significant variable for equations 1, 4, 5 and 6 despite the high R^2 may be due to aggregation of the data in our study. As noted earlier, as a result of data constraint, the data in our

study covered only 3-digit manufacturing industries. This is unlike other similar study by Zainal and Phang (1993) which covered 5-digit industries. Although it may be quite probable that market variables that may affect concentration ratio such as ADV, EO, IO, DFI and GR could be applied to certain industries, however, the results in both studies may not be comparable.

4.5 Relationship between Market Performance and Market Structure

This section examines the joint effects of various structural variables as an explanation of the differences in performance of manufacturing industries in Peninsular Malaysia. The basic hypothesis is that firms with high concentration will tend to earn higher profit rates. The level of industry profitability is positively associated with the degree of market concentration.

Table 4.6 presents the multiple regression equations relating price-cost margins to various combinations of structural variables for the sample of twenty-eight industries. Although the result seems to indicate a positive relationship between concentration and profitability, it is not statistically significant[14].

[14] The insignificance of the relationship between profitability and concentration ratio is also found in the studies of Comanor and Wilson (1967), Esposito and Esposito (1971) and Javad Khalilzadeh-Shirazi (1974).

Table 4.6
OLS Estimates of Performance and Market Variables Equations

Mkt Variables	Eqn.1	Eqn.2	Eqn.3	Eqn.4	Eqn.5	Eqn.6
Constant	0.0907	0.1625	-0.1338	0.1067	0.0445	-0.1025
CR4	0.0040 (0.02)	0.0455 (0.31)	-	0.0362 (0.28)	0.0012 (0.01)	-
ADV	0.7179 (0,85)	0.4636 (0.63)	0.9258 (0.84)	0.5337 (0.82)	0.9508 (1.36)	0.5246 (0.49)
ACR	1.4420* (6,50)	1.2399* (9.61)	-	1.0213* (5.91)	0.9795* (5.11)	-
MES	-0.2849 -(0.90)	-0.3285 (-1.21)	-	-0.2352 (-0.93)	-0.1776 (-0.65)	0.2644** (1.73)
K/O	0.0862 (1.01)	-	0.4659* (6.61)	0.1020** (1.77)	0.1242** (1.79)	0.4071* (5.40)
EO	0.0304 (0.45)	-0.0189 (-0.36)	0.1492** (1.84)	-	0.0295 (0.51)	0.1046 (1.28)
IO	0.0136 (0.41)	0.0061 (0.21)	0.0368 (0.84)	-	0.0028 (0.10)	0.0320 (0.76)
DFI	0.0131 (0.21)	-	0.0952 (1.21)	-	-	0.0424 (0.52)
GR	-0.0136 (-1.24)	-0.0957 (-1.42)	-0.1151 (-1.05)	-0.0834 (-1.41)	-	-0.0979 (-0.93)
Adj R^2	0.86	0.82	0.59	0.85	0.83	0.63
F ratio	20.2	19.2	7.6	27.2	20.4	7.5

Note: Figures in parentheses are t-values
* significant at 95% level
** significant at 90% level

However, when low value-added industries are excluded from the samples, CR4 appears significant[15] (see Table 4.7). This indicates that

[15] Low value-added industries are the industries that contributed less than 1 per cent of the total value-added. In this study they include: (a) manufactures of leather and products of leather; (b) manufactures of footwear; (c) manufactures of miscellaneous products of petroleum & coal; (d)

concentration ratio is an important market structure variable in determining the price-cost margins. The other important market structure variables are ACR and K/O (see Table 4.6).

Table 4.7

Concentration and Market Variables in High Value-added Industries[1]

Constant	CR4	K/O	ADV	GR	EO	IO	ACR	Adj R^2	F Rat
0.0588	0.2277** (2.09)	0.1952* (3.32)	0.3329 (0.63)	-0.1155 (-1.75)	0.0026 (0.06)	0.0340 (1.24)	-0.8470 (-1.37)	0.40	3.0

Notes: Figures in parentheses are t-values.

1 The sample only consists of 22 manufacturing industries.

* significant at 95% level

** significant at 90% level

When regressing price-cost margins on concentration alone, the following relationship was obtained;

$$PCM = 0.0805 + \underset{(2.31)}{0.265CR4}$$

(t-ratios in parentheses)

Market concentration is positively related to profits and this relationship is statistically significant at a 95% level.

manufactures of pottery, china and earthenware; (e) manufactures of glass and glass product; and (f) manufactures of non-ferrous metal basic industries.

Advertising intensity shows a positive relationship with price-cost margins. From equation 5 in Table 4.6, a one per cent increase in advertising expenditure is related an increase in profits by at least 0.9 per cent. Absolute capital requirements also seems to have a positive influence on profitability. The significant influence of ACR on industry profitability suggests that industries which are more capital intensive tend to earn higher profits. From equation 1 in Table 4.6, on average, a one per cent increase in ACR, is related to an increase in profits by about 1.44 per cent.

Capital-output ratio becomes less significant with the inclusion of ACR. But when ACR is excluded from the equation, it becomes very significant. This suggests that ACR and K/O might be highly correlated (0.7) [see Table 4.8]. Both exports and imports variables have positive influence on performance but they are not significant.

In theory, the relationship between growth and profitability may be positive or negative. In over three-quarters of all empirical studies, a significantly positive association between the two variables have been found (Hay and Morris, 1991, p.232). However, in this study, the growth variable does not explain price-cost margins of the manufacturing industries. The negative relationship between growth rate and profitability found in this study seems to support Caves' findings (1972, pp.30-31) where rapid growth induces firms to

behave highly competitively. The minimum efficient scale variable is negatively related to profitability. This suggests that price-cost margin is relatively low when firms in the industry reach an optimal size. When the concentration variable (CR4) is excluded from the equation (for example, in equation 6), the relationship between MES and profitability becomes positive and the relationship is significant at the 90 per cent level. This result is in agreement with Lall's (1979) findings. The role of DFI in determining profitability remains insignificant. This suggests that foreign investment is not an important determinant of industry performance.

Table 4.8
Correlation Coefficients of Variables in Profitability Equation

	CR4	ACR	ADV	K/O	EO	IO	DFI	GR	MES
CR4	1.000								
ACR	0.588	1.000							
ADV	0.033	-0.070	1.000						
K/O	0.187	0.696	-0.142	1.000					
EO	0.248	0.033	-0.227	-0.295	1.000				
IO	-0.007	0.020	-0.314	-0.009	-0.014	1.000			
DFI	0.264	-0.046	0.166	-0.355	0.110	-0.058	1.000		
GR	0.044	0.047	-0.399	0.021	0.083	0.372	0.224	1.000	
MES	0.922	0.652	0.169	0.218	0.148	-0.076	0.267	-0.040	1.000

The correlation coefficients among the independent variables are shown in Table 4.8. CR4 and ACR are highly correlated implies that concentrated industries are also likely to be characterised by high capital requirement. This is partly confirmed by the positive high correlation between ACR and K/O. The positive but low correlation between CR4 and GR suggests that market growth is

not sufficient to create a concentrated industries. Both the MES and CR4 are highly correlated with a value of 0.92.

Most of the market variables do not have significant impact on market performance as shown in Table 4.6 and 4.7 could be due to the similar reasons as noted on p.67 where data aggregation is the main influence on the results.

4.6 Summary

This chapter examines the influence of various market structure variables on the performance of the Malaysian manufacturing sector. Generally, variables such as concentration ratios, minimum efficient scale, capital requirements and advertising levels were found to have influence on profitability in Malaysia's manufacturing sector. These findings are similar to that of empirical studies conducted in the more developed countries.

The OLS estimates of the concentration equation indicate that barriers to entry through economies of scale, capital requirements and product differentiation are all found to have influence on concentration of the manufacturing industries in Peninsular Malaysia. The results of our statistical analysis of the Malaysian manufacturing industries provide considerable support for the market structure-performance hypothesis. Market performance as

measured by price-cost margins increases with four-firm concentration ratios, advertising intensity, absolute capital requirements, capital-output ratio, export opportunities and import competition. However, price-cost margins decreases with minimum efficient scale and industry growth rate. Price-cost margins are significantly associated with some major elements of market structure. Of the conventional dimensions of market structure variables included in our regressions, the proxy variables for economies of scale and absolute capital requirements emerge as statistically significant. Concentration ratio only appears statistically significant when it is regressed alone with price-cost margins. The insignificant impact of CR4 on profitability is found when it is treated as one of the independent variables. This could due to the multi-collinearity among CR4, ACR and MES. When low value-added industries are excluded from the sample, CR4 becomes significant.