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Industrial Concentration and Competition in Malaysian Manufacturing

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Abstract: Industrial concentration is the most widely studied area among various elements of market structure in the industrial organization literature. This paper is a first attempt to analyse the determinants of changes in industry concentration over time in the case of Malaysia. Using a partial adjustment model, a cross-sectional analysis is carried out against a sample of manufacturing industries between 1986 and 1996. Domestic factors in influencing competition eg, capital intensity, advertising intensity and market size are found to be significant in most cases to explain the level of concentration. Considering variable rate of adjustment of concentration, an increase in labour productivity of the large firms and high entry rates are found to be significant for faster adjustment towards equilibrium level. Compared with the other developed countries, the annual rate of structural adjustment is found to be slow in the case of the Malaysian manufacturing.

Keywords: Asia, Malaysia, manufacturing, competition, market power
JEL Classifications: L10, L11

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1. Introduction

MARKET structure represents the number and size distribution of firms, as well as entry barriers for potential competitors. Competition among firms provides internal and allocative efficiency with reward to the consumers and sellers. In a market, few dominant firms may enjoy economic power and charge higher prices to extract excess profits.[1] The inefficiency of monopolised markets and the efficiency of competitive ones are a major justification for the key role that antitrust policy plays in most market economies. Concentration measures are useful summary statistics that provide some indication of the extent to which a particular industry differs from the competitive benchmark.[2] Following the structure-conduct-paradigm (SCP) analysis, a high degree of concentration may cause monopolistic or oligopolistic behaviour; raising monopoly profit and lessen competition.[3]

Since the 1890s, antitrust laws remain the basic industrial policy of the U.S. economy. The policies are designed to limit market structure, which could lead to the exercise of monopoly power, such as resale price maintenance, and dominance due to merger activities.[4] Following the U.S., other developed countries have introduced regulatory units like the U.K.,

Japan, Canada, Germany, Australia and New Zealand.[5] Official acts and regulatory bodies exist in some developing countries like Korea, Thailand, India and Sri Lanka. In Malaysia, competition policy was non-existent until 1994. The Ministry of Domestic Trade and Consumer Affairs then introduced the Competition Bill to increase the efficiency and competitiveness of industries.

During the 1970s and 1980s, the Malaysian economy experienced rapid economic development. The industrialisation program was export-led based on mainly manufacturing industries. The government introduced various reform programs to increase the competitiveness in domestic as well as in international markets. In early phases of industrialisation, concentration of manufacturing was high. Concentration has been changing due to the effect of various government policies. A dynamic analysis of market structure may be helpful in formulating policy reform programs. The literature on developing countries is almost non-existent in this direction.

This paper explains industrial concentration in a steady-state model. An extension of this model incorporates a dynamic version, with incomplete and industry-specific adjustment to deviations of concentration from its steady-state level.

The paper is organised as follows. Section 2 provides an overview of the manufacturing within the Malaysian industrialisation program and highlights the trends of concentration in the manufacturing sector. A comparison of concentration with some OECD countries is included here. A summary of the literature is covered in Section 3. The model and data set are described in Section 4. Section 5 analyses the empirical findings and compares these with developed countries. The concluding section summarises findings and related policy implications for the economy.

2. Industrialisation, Concentration and Malaysian Manufacturing

2.1. Industrialisation and Malaysian Manufacturing

The manufacturing sector plays a major role in the Malaysian economy. The rate of growth in manufacturing output has been rapid since independence in 1957. In the 1950s and 1960s, the manufacturing sector started to become significant. Import substitution industries targeted local markets. Impressive growth was recorded for food, beverages and tobacco, printing -publishing and construction materials. To promote such industries, the government directly and indirectly subsidised the establishment of new firms and

protected the domestic market. Annual growth of the sector was 10 percent during the 1960s.

The import substitution phase generated little new employment and soon became saturated in the small domestic market. By the mid 1960s, the inherent weaknesses of this phase were becoming clear. Since 1965, the Federal Industrial Development Authority (FIDA) with the help of the Raja Mohar Committee encouraged the expansion of manufactured exports through various reform programs including changes in the labour market.

The switch to an export-oriented industrialisation strategy in late the 1960s boosted the export sector. The manufacturing sector shifted its direction of growth from import-substitution industries to focus on resource-based (mainly rubber, tin, palm oil and timber) processing and labour-intensive industries.

Since the 1970s, non-resource based (mainly electrical and electronic components) export industries have developed. The share of manufactured exports increased rapidly from 11.9 percent in 1970 to 21.4 percent in 1975. New Free Trade Zones (FTZs) and export processing zones (EPZs) were introduced to expand exports using imported equipment and material. During this period government intervened heavily in the market in the form

of public sector ownership in industries like food, chemicals, iron and steel, petroleum, cement, transport, tyres and tubes, and wood products.

In the early 1980s, there was a major push for heavy industries. This included the Malaysian car project, a sponge iron and steel billet plant, a petroleum refining and petrochemical project, three motorcycle plants, two new cement factories and a paper mill. Most of these involved expensive foreign technology and caused large amounts of government borrowing. Due to economic liberalisation, there was an increase in foreign direct investment and private ownership.

In the mid 1980s, Malaysia's terms of trade fell sharply; the economy was in crisis.[6] Since 1987, the economy has been through the fifth phase of its industrialisation program. Two Industrial Master Plans (IMP) along with the Seventh Malaysian Plan (7MP) recognise the problems and provide recommendations to improve the efficiency, productivity and competitiveness of the manufacturing sector.[7]

The manufacturing sector still contributes a large share of GDP, employment and exports in the economy. The share of manufacturing in total gross domestic product has increased from less than 10 percent in the late 1950s to 26 percent in thirty years. Manufacturing employment increased from 8.4% in 1970 to 20.1% in 1999.

Nevertheless, the sector still remains a highly segmented one consisting of resource-based export oriented industries, import competing industries and EPZs. The adequate supply of skilled manpower, expansion of technological base and promoting higher-value added activities are needed to increase the competitiveness of this sector. Therefore, the future performance of manufacturing lies in how the 'dual structured' industries are interlinked to serve domestic and international markets.

2.2. Trends in Manufacturing Concentration

Four-firm concentration (CR4) ratios of Malaysian manufacturing industries over three years (1986, 1991 and 1996) are presented in Table 1. Between 1986 and 1996, the percentage of industries with CR4 above 60 percent has gone down from 48 percent to 42 percent.[8] These industries can be classified as oligopolistic in nature. Only 5 to 8 percent of industries are with CR4 below 20 percent. Gan (1978) reports 8 out of 42 (around 19 percent) industries have CR4 above 60. Rugayah (1993) finds 45 percent (14 out of 31) of industries are with CR4 above 60. [9]

In the case of developed countries, Ratnayake (1999) reports 59 percent (65 out of 109) of industries have CR4 above 60 in 1987 for New Zealand. In case of Australia, Bhattacharya (1997) finds 36 percent of industries (37 out of 102) have CR4 above 60 for 1984. Moreover, from

Table 1 we find that the mean value of CR4 is 0.55 for 1996 for the Malaysian industries. This value is relatively high compared to the value for the developed world even for the 1970s and 1980s.[10]

Insert Table 1 near here

3. A Summary of Literature

The dynamics of industrial concentration have been studied covering various countries and time periods. In most cases, cross-industry studies are conducted using change in concentration as the dependent variable.[11] The initial level of concentration is used as one of the explanatory variables. Other explanatory variables are considered to explain the equilibrium level of concentration or the change in concentration between equilibria. The findings from each study are explained in terms of a partial adjustment model, where the coefficient of the initial concentration variable gives an estimate of the adjustment of concentration towards the equilibrium level.

From the literature on developed countries, Jenny and Weber (1978) report a concentration model for French manufacturing sector over an eight-

year period. For their full sample, the estimated adjustment coefficient is 0.02. Levy (1985) with U.S. data estimates a lagged concentration coefficient between 0.30 and 0.43 for an eleven-year period. Geroski et al (1987) consider a varying rate of adjustment model for the US manufacturing sector. They find an adjustment coefficient as 0.123 for a four-year period. In Australia, Dixon (1987) estimates a lagged concentration coefficient of 0.12 over a fourteen–year period. Table 2 summarises the annual adjustment rate from various studies.[12]

Insert Table 2 near here

4. The Model Specification and Data

4.1 The Concentration Model

For the purpose of discussing the causes of concentration in Malaysia, we specify the model in two versions. Following is an equilibrium (or steady state) version.

4.1.1 An Equilibrium Version

The market share of the dominant firms (measured by four-firm concentration ratio; CR4). CR4 depends in general on entry barriers (BTE), demand conditions (DD) and international influences (IF).

ie, CR4 $=\phi$ (BTE, DD, IF)

where BTE includes proxies for barriers to entry. These barriers reduce competition and are a source of market power. Capital intensity (K/L) and advertising intensity (ADV) as barriers can have a positive sign with concentration.[13] Demand condition depends on market size (MS). Larger the value of MS, the lower is the level of concentration.

Among international influences, we include export intensity (EXPINT) and import penetration (IMPINT) to incorporate international linkages. Manufactured exports are expanding in Malaysia, hence broadening the market. A negative relationship can be expected with concentration.[14] Due to the effect of trade liberalisation, a potential import threat increases efficiency among domestic firms. Small inefficient firms can not survive due to foreign competition and this causes an increase in concentration. A positive sign is expected with concentration.

Summarising the arguments above, we have the following steady-state concentration model, with the expected direction of impact indicated underneath each explanatory variable:

$$CR4_t^* = \rho_0 + \rho_1 MS_t + \rho_2 K/L_t + \rho_3 ADV_t + \rho_4 EXPINT_t + \rho_5 IMPINT_t \quad (1)$$

$$\qquad\qquad - \qquad + \quad + \qquad\qquad - \qquad\qquad +$$

$CR4_t^*$ is the steady-state concentration level expressed in terms of four-firm concentration ratio.[15] A linear specification is chosen for simplicity and to enhance comparability with previous studies. The coefficients of the explanatory variables in (1) can be estimated using ordinary least squares regression.

4.1.2. *The Change in Concentration over Time*

The direction of the change in concentration is a function of actual concentration relative to steady-state concentration ($CR4_t^*$). Any deviation of the actual level of concentration from its equilibrium level should result in an adjustment process that leads to changes in concentration. With less than

complete adjustment between periods, we have the partial adjustment model given by

$$\Delta CR4_t = CR4_t - CR4_{t-1} = \gamma (CR4_t^* - CR4_{t-1}) \qquad (2)$$

where $\Delta CR4_t$ is the change in concentration between two periods.[16] For empirical purposes, we assume t=1996 and t-1=1986. γ is the partial adjustment, which is the same in all industries and takes values between zero and one. $CR4_t^*$ is the equilibrium level of concentration in period t and is determined as in (1).

Substituting from (1) into (2) to remove the unobservable equilibrium concentration level, $CR4_t^*$, and solving for $CR4_t$, gives the following equation for the linear dynamic model:

$$CR4_t = \gamma (\rho_0 + \rho_1 MS_t + \rho_2 K/L_t + \rho_3 ADV_t + \rho_4 EXPINT_t + \rho_5 IMPINT_t) + (1 - \gamma) CR4_{t-1} \qquad (3)$$

When equations in the form of (3) are estimated using linear estimating techniques, the coefficient of the lagged concentration variable, $CR4_{t-1}$,

gives the estimate of one minus the partial adjustment.[17] The coefficients of the remaining explanatory variables are estimates of the long-run impact multiplied by the partial adjustment.

Alternatively, a model with partial adjustment that varies across industries is given by

$$\Delta CR4_t = CR4_t - CR4_{t-1} = \gamma_i (CR4^*_t - CR4_{t-1}) \qquad (4)$$

where γ_i is the partial adjustment for the ith industry. γ_i should be non-negative and less than one for all values of its determinants. γ_i is specified as a function of variables related to the internal and external adjustment process of the industry. The variable adjustment coefficient in our model depends on relative labour productivity of the top four firms (RP), net entry of firms into an industry (NETENT) and on export intensity (EXPINT). The higher the productivity of the top four firms, the greater is the competition within industries, and faster adjustment will take place towards an equilibrium level of concentration. An increase in the NETENT variable also will operate in a similar direction, so a positive effect is expected on γ.

In Malaysia, manufacturing exports have become increasingly important over recent years. To incorporate the role of exports in influencing industry

structure we add the EXPINT variable. If exports are profitable, domestic firms become more competitive and a faster rate of adjustment can be expected.[18] On the other hand, most of the manufactured exports are low-value added products, hence less attractive for new firms to enter into the market. Hence, we can have effect on γ in both directions.

If the relationship between the variables of interest and the degree of adjustment is assumed to be linear, we have

$$\gamma_i = \alpha_0 + \alpha_1 RP_t + \alpha_2 NETENT_{t,t-1} + \alpha_3 EXPINT_t \qquad (5)$$

$$+ \qquad + \qquad +/-$$

The partial adjustment coefficient in (5) is not directly observable. However, substituting (1) and (5) into (4) and solving for $CR4_{t-1}$, gives the following version in non-linear form as follows:

$$CR4_t = = (\alpha_0 + \alpha_1 RP_t + \alpha_2 NETENT_{t,t-1} + \alpha_3 EXPINT_t)(\rho_0 + \rho_1 MS_t + \rho_2 K/L_t + \rho_3 ADV_t + \rho_4 EXPINT_t + \rho_5 IMPINT_t - CR4_{t-1}) + CR4_{t-1} \quad (6)$$

All variables are as described above, with the indicated direction of impact carried over from (1) and (5). When equations in the form of (6) are estimated using non-linear estimating techniques, each coefficient gives a direct estimate of the parameter of the underlying model. The estimated partial adjustment for an industry is then determined indirectly by multiplying the industry value of each of the variables, RP_t, $NETENT_{t,t-1}$ and $EXPINT_t$, by its estimated coefficient, and then adding the estimated constant, α_0.

4.2 The Data

The Department of Statistics (West Malaysia, Kuala Lumpur) conducts a survey of manufactures; the Department supplied unpublished data for 1986 and 1996. The choice of the time period was dictated by the availability of data. Considering all variables we have ended up with 102 manufacturing

industries at the five-digit level. The descriptions of variables with means and standard deviations are given in the Appendix 1a.

5. *The Findings*

5.1. *Levels of Concentration*

First, we discuss the findings from the steady-state version for determinants of the level of concentration, so that we can compare the findings from the dynamic versions later on. The first column of Table 3 presents the findings from the steady-state model. Ordinary least squares regression is used for estimation.[19] The four-firm concentration in 1996 is the dependent variable.

Except EXPINT, each of the estimated coefficients for the steady-state model in Table 2, has the expected sign. The adjusted R^2 is 0.189, lower than findings from overseas studies.[20] MS, KL and IMPINT are significant at the one- percent level, while the estimated coefficient of EXPINT is not statistically significant. All the proxies of entry barriers are quite significant in influencing the shares of top firms in Malaysian manufacturing. IMPINT variable has a positive and strong significant effect on concentration. This reflects the fact that foreign competition helps in improving competition

among domestic firms, hence increasing the level of concentration among manufacturing industries.

Insert Table 3 near here

5.1. Changes in Concentration

The second column of Table 3 reports the results of estimates for the model, in which the speed of adjustment, γ, is uniform across industries. Each estimated coefficient has the expected sign. The coefficient of lagged concentration is significantly less than one at the one percent level, so the restriction that no adjustment to long-run equilibrium is achieved during the ten-year interval is rejected. Also, the restriction that full adjustment to equilibrium is achieved, $\gamma = 0$, is clearly rejected. Comparing with the steady-state version, MS and KL are still significant at the one- percent level, but ADV lost its significance. Most importantly, international linkages viz, EXPINT and IMPINT are correctly signed and significant at the five-percent level. The partial adjustment over ten years is one minus the estimated coefficient of lagged concentration or 0.262, which corresponds to

an annual rate of adjustment of about three percent.[21] The adjusted R^2 is 0.673, notably higher than for the steady-state model.

The partial adjustment model of concentration with the adjustment rate varying across industries as set out in (6) is non-linear in the estimated coefficients, so ordinary least squares estimation is impossible. Instead, we estimate using the maximum likelihood, non-linear estimation procedure in SHAZAM. The results are shown in Table 3. The first column presents the results for the steady-state concentration equation. Each variable has an estimated coefficient with the expected sign. Only ADV and EXPINT are significant at the one and five percent level, respectively. MS and KL variables lose significance but they are close to significant at the ten- percent level.

Insert Table 3 near here

The second column of Table 3 gives the findings for determining the degree of adjustment. The coefficient of RP is positive and statistically significant, indicating that an increase in the relative labour productivity of larger firms helps in increasing the degree of adjustment towards the equilibrium of lower concentration. The coefficient of NETENT is

significant at the one percent level, higher the net entry, faster is the speed of adjustment. The EXPINT variable is insignificant and negative.[22]

The likelihood-ratio strongly supports rejection of the restriction that the coefficients associated with varying adjustment rates across industries are collectively zero. This implies the varying adjustment rate specification of the model is statistically superior to the common adjustment rate specification.[23] The mean value of the partial adjustment coefficient across industries in the sample is 0.328. This implies an annual adjustment rate of around four- percent, which is only around one percent higher than the rate we found from the model with common adjustment across industries. Thus, these results confirm (although not strongly) the finding by Geroski, *et al* (1987) for U.S. manufacturing that the assumption of a common adjustment rate across industries leads to downward bias in the estimate.

Applying the estimated coefficients to the values of the variables yields estimates of the partial adjustment of concentration for each industry, with a standard deviation of 0.283 around the mean of 0.328. The great bulk of values (72 out of 102) are within one standard deviation of the mean value, implying annual rates of adjustment for these industries are close to four-percent on average. There are a few outliers among the estimated values of partial adjustment. In particular, five values are greater than one,

implying perverse adjustment. These are all for industries with high efficiency and net entry. Only one industry has an adjustment coefficient of 0.989.

In summary, the annual adjustment rates are generally low but similar to the most of the estimates from overseas studies cited in Table 2.[24] In most developed countries, regulatory practices started at early dates. Considering that the Malaysian government has taken the initiatives only in the recent past, the annual adjustment rate although slow is easily comparable with that of developed countries.

6. Summary and Policy Implications

The Malaysian manufacturing industries are more concentrated compared to the most of developed countries. However, the level of concentration has declined significantly over the period under consideration. The government efforts to reduce monopoly power and increase competition have been successful in this direction.

The increase in use of capital, market opportunities and removing barriers are major development strategies under the 7MP.[25] This is supported in our econometric findings. The significance of capital intensity, advertising

intensity and market size variables are established in explaining the level of concentration of Malaysian manufacturing.

Considering the dynamics of concentration over a ten-year period, we find the annual adjustment rate of concentration is still slow compared to the developed countries. Labour productivity and the net entry of firms are found to be significant in explaining the adjustment procedure. In this respect, the current government through its privatization program may be successfully contributing towards the increase in efficiency and competitiveness. Also, an increase in the speed of structural adjustment integration among industries is needed to serve the domestic as well as international market.

Finally, the successful implementation of competition policy requires the adequate interaction among consumers, producers and government. In this respect, the government should continue its lead role in achieving this objective.

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Table 1: Percentage of Industries under Each Range of Four-Firm Concentration Ratio in 1986, 1991 and 1996

	Percentage of Industries (%)		
Four-firm Concentration	1986	1991	1996
0-0.2	5.64	6.8	8.59
0.21-0.4	18.54	19.08	23.43
0.41-0.6	28.22	27.48	25.78
0.61-0.8	14.51	20.61	22.65
0.81-1	33.06	25.95	19.53
Mean	0.62	0.60	0.55
Standard Deviation	0.26	0.25	0.24

Source: Prepared using data from the Department of Statistics. The maximum numbers of industries is taken into account from the data set.

Table 2: Estimated Annual Rate of the Partial Adjustment Coefficient for Different Countries

Researcher(s)	Country	Period	Number of Years	Estimated Annual Adjustment Rate
Wright (1978)	U.S.	1947-63	16	0.008
Jenny and Weber (1978)	France	1961-69	8	0.002
Hart and Clarke (1980)	U.K.	1958-68	10	0.027
Levy (1985)	U.S.	1962-73	11	0.031
Geroski, Masson and Shaanan (1987)	U.S.	1963-67	4	0.032
Dixon (1987)	Australia	1968-82	14	0.009

Note: Only Geroski *et al* (1987) consider varying rate of adjustment model.

Table 3: Results of the Steady-state Model and for the Dynamic Model, when γ is Constant Across Industries (Ordinary Least Squares Estimation)

Variable	**Steady-state Model** Estimated Coefficient Column (1)	**Linear Dynamic Model** Estimated Coefficient Column (2)
$CR4_{86}$	-	0.738[a] (11.90)
MS	-0.00003[a] (2.41)	-0.00001[a] (2.75)
KL	0.193[a] (10.13)	0.054[a] (2.93)
ADV	4.422[a] (2.75)	0.306 (0.29)
EXPINT	0.018 (1.20)	-0.020[b] (1.69)
IMPINT	0.006[a] (4.82)	0.003[b] (2.26)
Intercept	0.470	0.086
R^2 (adjusted)	0.189	0.673

Note: $CR4_{96}$ is the dependent variable.

Figures in parentheses are heteroscedastic consistent t-ratios.

a) Indicates coefficient is significant at the 0.01 level using a one-tailed t-test.

b) Indicates coefficient is significant at the 0.05 level using a one-tailed t-test.

Table 4: Results of Estimation of the Dynamic Model, when γ Varies Across Industries
(Non-Linear Maximum Likelihood Estimation)

Variable	Steady-state coefficients Column (1)	Adjustment coefficients Column (2)
MS	-0.00002 (1.24)	-
KL	0.175 (1.23)	-
ADV	9.146[a] (2.92)	-
EXPINT	-0.216[b] (1.74)	-
IMPINT	0.016 (0.93)	-
RP	-	0.219[b] (1.70)
NETENT	-	0.001[a] (3.32)
EXPINT	-	-0.003 (0.41)
Intercept	0.267[a] (4.66)	0.016 (0.939)

Notes: $CR4_{96}$ is the dependent variable.

Figures in parentheses are t-ratios.

a) Indicates coefficient is significant at the 0.01 level using a one-tailed t-test.

b) Indicates coefficient is significant at the 0.05 level using a one-tailed t-test.

APPENDIX 1A: VARIABLES WITH DESCRIPTIVE STATISTICS

Variables[26]	Definition	(Mean, Std Deviation)
$CR4_{96}$	Industry sales accounted by the top four firms divided by total industry sales for 1996.	(0.523, 0.240)
$CR4_{86}$	Industry sales accounted by the top four firms divided by total industry sales for 1986.	(0.607, 0.253)
MS	Total industry value added for 1996.	(664.22,0.25 3)
K/L	The average of capital expenditure over employment for 1996.	(0.146, 0.409)
ADVS	Advertising expenses over sales for 1996.	(0.005,0.011)
EXPINT	Export divided by sales for 1996.	(0.720,1.137)
IMPINT	Import divided by sales plus import minus exports for 1996.	(1.654, 6.158)
RP	Value-added per worker of the top four firms over the value-added per worker for the industry, 1996.	(1.255, 0.308)
NETENT	Change in number of firms between 1986 and 1996 with respect to 1986.	(109.99, 183.88)

APPENDIX 1B: CALCULATION OF ANNUAL ADJUSTMENT RATES

A1B.1. For Linear Dynamic Model:

$CR4_t - CR4_{t-1} = \gamma (CR4_t^* - CR4_{t-1})$

$CR4_t - CR4_{t-n} = [1 - (1 - \gamma)^n] (CR4_t^* - CR4_{t-n})$

$CR4_t = [1 - (1 - \gamma)^n] CR4_t^* + (1 - \gamma)^n CR4_{t-n}$

Let, $X = (1 - \gamma)^n$

Then $\gamma = 1 - X^{1/n}$

$n = 10$

$X = 0.738$ and $\lambda = 2.9\%$

A1B.2. For Non-Linear Dynamic Model:

$CR4_t - CR4_{t-1} = \gamma (CR4_t^* - CR4_{t-1})$

$CR4_t - CR4_{t-n} = [1 - (1 - \gamma)^n] (CR4_t^* - CR4_{t-n})$

$CR4_t = [1 - (1 - \gamma)^n] (CR4_t^* - CR4_{t-n}) + CR4_{t-n}$

Let, $Y = 1 - (1 - \gamma)^n$

Then $\gamma = 1 - (1 - Y)^{1/n}$

$n = 10$

$Y = 0.328$ and $\lambda = 3.8\%$

[1] Cowling and Waterson (1976) derive an oligopoly model of profit with market structure elements and collusion among firms. Bhattacharya and Bloch (2000) provide a summary of literature on persistence of profits.

[2] Discussions on measures of industry concentration can be found in Carlton and Perloff (1994, Chapter 9), pp 344-47.

[3] Sawyer (1982) discusses the structure-performance relationships in detail.

[4] On antitrust, see Scherer and Ross (1990).

[5] For a summary of antitrust in other countries, see Shepherd (1997, pp 366-67).

[6] For more details see Jomo (1989, 1990 and 1993)

[7] Details are in Malaysian Management Review (1989), and Malaysia (1989).

[8] We follow Shepherd (1997) classification for the U.S. manufacturing industries. He considers industries with oligopolistic, dominant and monopoly behaviour if four-firm concentration is above 60 percent.

[9] From the developing world, Go , Kamerschen and Delorme (Jr) (1999) report mean CR4 as 68.15 percent for 83 manufacturing industries in Philippine.

[10] Average four-firm concentration was 47 percent for the US in 1972, and 43 percent for Argentina in 1984, see Frischtak (1989).

[11] Schmalensee (1991) for literature survey

[12] The formula in Appendix Ib is used to find the annual rate of adjustment for various studies from the coefficient of lagged concentration.

[13] See Comanor and Wilson (1979), Martin (1979) and Shepherd (1982, 1997)

[14] Chou (1986)

[15] The Herfindahl index of concentration satisfies all desirable properties of a concentration measure that are suggested by Hannah and Kay (1977). It combines aspects of both the number and size distribution of firms. For the sample, we do not have dis-aggregated data to find Herfindahl index. Literature shows various concentrations measures are highly correlated and provide similar findings.

[16] Time-series data would be ideal. Due to non-availability of time-series data we consider here cross-section analysis, see Martin (1979), Levy (1987).

[17] We use estimating equations in the form or (3), with the level of concentration as the dependent variable, rather than follow the practice of many earlier studies and use the change in concentration as the dependent variable. This allows for a more direct comparison of goodness of fit with the estimating equations for the equilibrium model in (1) above and for the

model with varying speed of adjustment in concentration in (6) below. Finally, we avoid a spurious relation that could arise from using an independent variable, the lagged level of concentration, in calculating the change in concentration as the dependent variable.

[18] Import intensity as a determinant of adjustment coefficient was considered, but the findings are insignificant and hence are not reported here.

[19] A simultaneous model is not considered. Kalirajan (1993a, b) shows simultaneity is not prominent for the Malaysian manufacturing industries.

[20] Levy (1987), Ratnayake (1999).

[21] Calculations of the compound annual rate of adjustment for both models (linear and non-linear versions) are shown in Appendix Ib.

[22] Till early the 1990s, most of the manufactured exports were low value added products. Also the export sector was mainly based on Singapore, Japan and U.S.

[23] The log-likelihood ratio is 16.32, which exceeds the critical value, $\chi^2_4 = 13.27$, at the one percent significance level.

[24] The existing overseas literature are based on old data set mostly during 1960s to early 1980s, the data set for this study is the most updated for the Malaysian economy.

[25] Yean (1995) reports capital as a major source of growth, contributing 22.4 percent of growth in Malaysian manufacturing between 1986 and 1991.

[26] The Department of Statistics (Kuala Lumpur, Malaysia) supplied all industry data, from the Census of Manufacturing Industries, West Malaysia and Surveys of Manufacturing Industries for the financial year 1986 and 1996. This table presents descriptive statistics of 102 common industries.

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