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MARKET STRUCTURE AND INDUSTRY PERFORMANCE: THE CASE OF KENYA

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A B S T R A C T

        The paper has two goals. An attempt is made to relate the
structural characteristics of industries in Kenya to the performance of
industries using the 1963 Census of Industrial Production. Structure
is measured by a concentration index, which incorporates the influence
of foreign competition, while performance is measured by the difference
between average price and average cost, as a percentage of average
price. Secondly, the paper brings evidence to bear on the controversy
over whether the relationship between performance and concentration is
continuous and whether concentration alone partly explains performance or
whether barriers to entry exert an independent influence on perfor ance
in addition to concentration.

Introduction

Price theory has traditionally placed great emphasis on the structural features of a market as a guide to the expected performance outcome in that market. Among other indicators, the number of competitors in relation to the size of the market, as measured by an index of concentration, has been singled out to denote the degree of competition or monopoly in the industry. Given some rather restrictive assumptions, there is expected to be a positive relationship between seller concentration and particular indicators of market performance, such as the difference between price and cost or the rate of return on capital. There have been a number of very recent responses to J.S. Bain's call for "detailed empirical studies which would formulate specific hypotheses on the relations of market structure to market performance and would then test such hypotheses with available evidence"[1] The respondents related the performance and structure of industries in developed countries and on the whole, they indeed found a positive relationship between the degree of monopoly and various measures of profitability.[2]

This paper has two goals. First, to the author's knowledge no previous attempt has been made to relate the structural characteristics of industry to its performance in a developing country, where foreign competitors play such a large role in many industrial markets that their presence cannot be ignored as it has in previous studies of monopolistic market structures in developed countries. Hence, a major task has been to incorporate the influence of foreign competition in the concentration index. The results of such a study should be of special interest to legislators seeking a competitive environment, where such policy instruments as trade licensing, investment incentives, import quotas and tariffs could all be manipulated to bring about a greater degree of competition, if the existing degrees of monopoly were shown to lead to excessive profit margins.

Second, it brings evidence to bear on the controversy raging in the literature over whether the relationship between performance and concentration is continuous and whether concentration alone partly explains performance or whether barriers to entry exert an independent influence on performance in addition to concentration.[3]

The study has attempted to estimate the importance of certain structural variables as an explanation of the differences in performance of manufacturing industries in Kenya. The analysis is based on the data contained in the 1963 Census of Industrial Production[4] in Kenya.[5]

The Hypotheses

The basic hypothesis of the paper is that price-cost margins will be higher the further removed an industry's structure is from the competitive model. The difference between price and cost is taken to measure industry performance while industry concentration is used as a measure of the degree of monopoly. A number of assumptions are required to generate a testable hypothesis from this proposition.

If total costs include normal profit then the difference between price and cost would be zero in competitive industries and would increase, depending on demand and cost conditions, as the degree of monopoly increased. Available cost data include current and the depreciation part of capital costs but do not include opportunity or interest costs, so that price-cost margins could be expected to be higher in the more capital-intensive industries for this reason alone.[6] This proposition was tested.

Because of differences in the elasticity of demand for final products it might be that two monopolised industries had different price-cost ratios. Hence, for the purpose of testing the hypothesis that, for a given cost structure, an industry with a higher revenue-cost ratio more closely resembles the monopoly performance than an industry with a lower ratio, it is necessary to assume that industries' demand functions do not differ so greatly in price elasticity that any price-cost differences could be attributable to this cause.

Industrial structures are usually ranked according to a concentration index, from single-firm monopoly to many-firm competition. However, in the context of a developing country, or indeed, of any open economy, the usual concentration ratio which attributes x% of industry sales or employment to the largest three or four domestic firms would be of limited significance when the contribution of imports to total sales is very large. The sole domestic producer in an industry would be accorded a concentration ratio of 100% by the usual reckoning, yet this would grossly over-represent any market influence he might have over price if his sales made up only 10% of domestic market sales, the remaining 90% being imports. Therefore, it was necessary to incorporate the influence of foreign producers in the concentration ratios which were then related to price-cost margins.

In addition to concentration, Bain and Mann found certain barriers to entry, such as economies of scale, product differentiation and capital requirements, to have an independent influence on industry performance.[7] Because of the lack of information about such variables in Kenya this study has been constrained to only relating price-cost margins to a proxy measure of absolute capital requirements, which stands as the 'barrier to entry'.

The Variables to be Measured

The study utilizes the 1963 Census of Industrial Production in Kenya which has a 3-digit classification of 38 industries. However, four of these industries were dropped from the analysis. The Meat Products industry is almost entirely dominated by the Kenya Meat Commission, which is a Statutory Board appointed by the Minister for Agriculture and is a non-profit making body. For this reason, Meat Products was excluded. Miscellaneous Chemicals was excluded because of its heterogeneous nature while the Shipbuilding and Repairing industry and the Railway Rolling Stock industry were excluded, 50% of the former and 100% of the latter industry being owned by the nationalised and non-profit making East African Railways and Harbours Board.

Profitability or performance is measured by the difference between average price and average cost, expressed as a percentage of average price. This price-cost margin, which includes normal profit, is calculated thus:[8]

$$p-c[9] = \frac{\text{Gross Production-Industrial Costs-Non Industrial Costs-Depreciation-Labour Costs}}{\text{Gross Production}}$$

In a much quoted passage Scitovsky has written: "Monopoly and oligopoly consist of a power relation among the sellers or the buyers in a certain market, and this power relation depends largely on the number and size distribution of the competing sellers or buyers. Measures of concentration try to express the number and size distribution of competitors in terms of a one-parameter index, which could then be regarded as a direct measure of the degree of oligopoly"[10] Hence, the strength of this "power relation" of the oligopolists is expressed via the concentration index. How has this index been constructed for Kenya?

The vast majority of the previous studies undertaken
have measured concentration by the percentage of industry output in value
terms attributable to the top 3 or 4 or 8 firms in the industry. However,
in a developing country, where the number of firms engaged in
manufacturing activities is necessarily small, official data sources are
loathe to reveal information that could be easily attributed to one or two
firms. For this reason the first part of the concentration index that
has been constructed is necessarily restricted to establishment data.[11]
The measure adopted incorporates the percentage employment of each industry
attributable to the largest three establishments in the industry.[12]

The precedent for using employment and plant data to measure
concentration is found in Rosenbluth's "Measures of Concentration"[13] where
he concludes that "analysis of the Canadian statistics.....shows that the
ranking of industries by firm-concentration index is very similar to the
ranking by plant-concentration index. The Spearman correlation
coefficient for the two rankings is .947. This analysis is based on
employment concentration."[14] .In addition, "output and employment concent-
ration are highly correlated, so that the value of one can be used with
great confidence for estimating the other.....while in general, concentra-
tion in terms of fixed assets exceeds output concentration, which in turn
exceeds employment concentration, the ordering of industries by
concentration level is much the same, no matter which standard of size is
used, so that the results of cross-section analysis based on one measure
will also be applicable to the others."[15]

If the concentration index is to express the strength of the
market power of oligopolists it is important in the Kenya market to
incorporate the influence of foreign competition in the index. The 3 -
establishment concentration index has been multiplied by the percentage
of total Kenya market sales (home gross production plus the value of
imports) attributable to Kenya domestic production. The implicit
assumption is that the larger is this percentage and the larger is the
3 - establishment concentration index the greater is market power.

Of course, it could be argued that where the domestic producers
in industry A have 100% of the domestic market, while in industry B they have
10%, it does not necessarily follow that the entrepreneurs in industry A have
more monopoly power than those in B, because of the threat of competiton from
potential imports. This threat restricts the ability of producers to raise

price untempered. However, it seems reasonable to assume that the
domestic producers in an industry where imports are already significant would
have less leeway to raise price, because of the threat of even greater
imports, than the producers in an industry where imports are zero, unless
the price in this industry has been raised to the margin where any small
rise in price would be import-inducing.[16]

In the case of a homogenous product such as sugar, where the
3 - establishment employment concentration index is 100% yet domestic
production is only 37% of total Kenya market sales, the revised hybrid-
concentration index is 37% (i.e. 100% x 37%). Where the 3 - digit industry
classification incorporates rather heterogeneous sub-industries use is made
of the information in the 1963 Census of Industrial Production on the value
of imports at the 4 - digit level.[17] For example, in the industry
classified as Basic Industrial Chemicals the 3 - establishment employment
concentration index was 60%. The value of domestic production was £2.4
million while the total value of imports under this industry-heading was
£3.8 million, yet the author calculates from the 4 - digit data in the
Census that only £0.4 million of total imports were competitive with Kenya's
domestic production. Despite the large value of imports, it is estimated
that Kenya producers held 85% of the market for the line of goods they
produced, so that the revised concentration index falls by a small amount
to 51% (i.e. 60% x 85%). Such an amendment has been made for all 34
industries.

Previous researchers in developed economies have felt the
need to take into account concentration in regional markets, but in a small,
largely rural country such as Kenya, such an inclusion was held to be
unnecessary.

It is generally recognised that the absolute amount of money
required to set up an efficient plant or firm can deter new entrants to
an industry. This capital requirements barrier stands as a proxy for
overall "barriers to entry", since this was the only variable it was found
possible to quantify under this heading. The Census of Industrial
Production reported depreciation for each industry, and these figures were
divided by the number of establishments in each industry to generate a
series for average depreciation per establishment. Although the absolute
numbers themselves have little meaning, the proposition is that the larger
is depreciation per establishment in one industry relative to another, the
larger is the relative capital requirement barrier in that industry.[18]

Since the price-cost margins are inclusive of 'normal profits'
it is to be expected that the margins are greater in the more capital-
intensive industries. A survey of capital assets[19] was undertaken in
Kenya in 1963 and although there was a good deal of aggregation of
industries the ratio of capital assets at current value to net output
was used to measure capital-intensity.

It could be argued that, since the price-cost margins are
observations for one year only, high margins may be the result of short-
run changes in demand which, over time, would be eroded by the competitive
adjustment process. Or technical progress may have occurred in some
industries, resulting in their having high margins that would be eroded
in time as the new techniques are adopted and costs fall in other
industries. To the extent that these factors have operated high price-cost
margins will not be the result of market power as hypothesized. Equally,
no account can be taken of the so-called "expense preference"[20], in which
a large part of any monopoly profits would be absorbed by inflated
managerial salaries or by expenditures undertaken by management for prestige
purposes only.

Methods of Analysis

Previous researchers in the U.S. have tended to follow one of
two different hypotheses. Those following the "distinct break" hypothesis[21],
such as Bain and Mann, purport to have found a significant difference
between the performance of highly concentrated industries and all other
industries, and from within the highly concentrated category to have found
a significant difference in performance between industries with high barriers
to entry and those with lower entry barriers. Others, such as Collins and
Preston, and Rhoades have sought to find a continuous functional relationship
between performance and certain structural variables. Collins and Preston
found a continuous and significant relationship between performance and
average concentration, especially amongst the larger, two-digit industry
groups. At this level of aggregation they found no significant association
between price-cost margins and the capital-output ratio,[22] while when they
examined groups of industries at the four-digit level they concluded that
"the capital-output ratio proved to be a significant explanatory variable
in only three cases, out of ten (sic.), and in two of these the sign was the
reverse of that expected."[23]

Rhoades, in disputing Bain and Mann's conclusions about the independent role of barriers to entry in determining profitability claims that "it is highly unlikely that an industry characterized by high concentration would have low barriers to entry.......it seems likely that high concentration and low barriers to entry could exist in an industry in the short run.....but such situations are the exceptions and are of a transitory nature."[24] Using Mann's data and a linear multiple regression equation relating average rates of return to concentration and a dummy variable representing barriers to entry, Rhoades found that his barriers to entry variable was insignificant in explaining rates of return. He concluded that "barriers to entry may not exert a significant influence on profit rates independent of the effect of concentration".[25]

For the case of Kenya it was felt desirable to apply both the "distinct-break" hypothesis and the "continuity" hypotheses. The theory of oligopoly is not at present so complete, even at the purely formal level, that we may unequivocally describe either the discrete or the continuous hypothesis as the theoretical expectation. Both are worthy of analysis".[26]

Results of the Analysis

1. The "Distinct - Break" Hypothesis

Table I shows the average price-cost margin for industries with a hybrid-concentration index of greater than 40% and for those industries with an index of less than 40%[27]. The average margin of the former industries is over twice as large as that of the latter and the difference between them is significant at the 1% level.

Table II indicates a clear difference between the average price-cost margins of the 'high', 'medium' and 'low' capital requirements categories, but the most distinct demarcation is shown to exist between the 'high' and the 'medium' requirements categories.

These results are in accordance with those of Bain's and Mann's for the U.S. and suggest that capital requirements are important in contributing to price-cost differences.

Table III tends to confirm Mann's result that within the highly concentrated industries those with 'high' capital requirements have a distinctly higher price-cost margin than those with 'medium' and 'low' capital requirements. Based on similar evidence for the U.S. Mann argued that these results show that barriers to entry exert an independent

influence on performance. However, Rhoades disclaimed this conclusion and the results presented below make any such inference for Kenya highly questionable.[28]

Table I

Price-Cost Margins for 34 Manufacturing Industries of Kenya, classified into those industries with a Hybrid - Concentration Ratio above 40% and those with a Hybrid - Concentration Ratio of less than 40% for the Top 3 Establishments.

Industry	Price - Cost Margin (%)
Above 40%	
Canned Fruit and Vegetables	0.5
Grain Mill Products	12.7
Spirits	50.8
Beer and Malt	26.6
Soft Drinks	41.3
Tobacco	22.9
Cordage, Rope and Twine	12.1
Footwear	19.4
Other Wood Products	12.0
Tanning and Leather	12.3
Rubber Products	7.4
Basic Industrial Chemicals	28.9
Paints	5.3
Soap	12.5
Glass and Products	21.6
Cement	17.4
Average	19.0
Below 40%	
Dairy Products	5.0
Bakery Products	3.5
Sugar	5.4
Confectionery	6.6
Miscellaneous Foods	4.1
Textiles	7.8
Clothing	10.9
Sawn Timber	6.2
Furniture and Fixtures	10.7
Paper and Products	24.7
Printing and Publishing	7.2
Clay and Concrete	6.3
Metal Products	12.9
Non-Electrical Machinery	15.8
Electrical Machinery	16.2
Motor Vehicles	9.7
Motor repairs	7.2
Miscellaneous Manufacturing	5.8
Average	9.2

Source: Kenya Census of Industrial Production 1963, op. cit.

Table II

Price - Cost Margins for 34 Manufacturing Industries of Kenya for 1963,
classified by 'High', 'Medium' and 'Low' Capital Requirements.[29]

Industry	Price - Cost Margin (%)
'High' Capital Requirements	
Sugar	5.4
Spirits	50.8
Beer and Malt	26.6
Tobacco	22.9
Footwear	19.4
Basic Industrial Chemicals	28.9
Glass and Products	21.6
Cement	17.4
Average	24.1
'Medium' Capital Requirements	
Dairy Products	5.0
Grain Mill Products	12.7
Soft Drinks	41.3
Cordage, Rope and Twine	12.1
Textiles	7.8
Other Wood Products	12.0
Rubber Products	7.4
Soap	12.5
Average	13.9
'Low' Capital Requirements	
Canned Fruit and Vegetables	0.5
Bakery Products	3.5
Confectionery	6.6
Miscellaneous Foods	4.1
Clothing	10.9
Sawn Timber	6.2
Furniture and Fixtures	10.7
Paper and Products	24.7
Printing and Publishing	7.2
Tanning and Leather	12.3
Paints	5.3
Clay and Concrete	6.3
Metal Products	12.9
Non-Electrical Machinery	15.8
Electrical Machinery	16.2
Motor Vehicles	9.7
Motor Repairs	7.2
Miscellaneous Manufacturing	5.8
Average	9.2

Source: Kenya Census of Industrial Production 1963, op. cit.

Table III

Price - Cost Margins for Sixteen Manufacturing Industries of Kenya for 1963, all with a Hybrid - Concentration Ratio of more than 40% classified according to 'High', 'Medium' and 'Low' Capital Requirements.

Industry		Price - Cost Margin (%)
'High' Capital Requirements		
Spirits		50.8
Beer and Malt		26.6
Tobacco		22.9
Footwear		19.4
Basic Industrial Chemicals		28.9
Glass and Products		21.6
Cement		17.4
	Average	26.8
'Medium' Capital Requirements		
Grain Mill Products		12.7
Soft Drinks		41.3
Cordage, Rope and Twine		12.1
Other Wood Products		12.0
Rubber Products		7.4
Soap		12.5
	Average	16.2
'Low' Capital Requirements		
Canned Fruit and Vegetables		0.5
Tanning and Leather		12.3
Paints		5.3
	Average	6.0

Source: Kenya Census of Industrial Production 1963, op cit.

II. The 'Continuity' Hypothesis

The 'continuity' hypothesis suggests a continuous functional relationship between industry performance and the various measures of industry structure. The hybrid-concentration ratio generated here for Kenya is treated as a continuous variable while the capital requirements barrier is given a value of one or zero, one if capital requirements are 'high' or 'medium' and zero if they are 'low'. A linear functional form is assumed and ordinary least-squares applied to the data. "Student's 't'" statistics are in parentheses. The first equations estimated were:

(1) $\quad P = 5.243 + 0.186 \, C_m \qquad R^2 = 0.194$

$\qquad (1.40) \quad (2.52)$

(2) $\quad P = 7.864 + 0.092 \, C_p \qquad R^2 = 0.078$

$\qquad (1.85) \quad (1.50)$

where:　　P = Price - Cost margin 1963

C_m = Hybrid - Concentration index, account being taken of imports.

C_p = Simple index of plant concentration i.e. % age of employment in 3 largest plants.

Equation (2) fulfills our expectations that in an economy such as Kenya's where imports of manufactured goods are large, plant concentration explains little of the variation in price-cost margins. R^2 is very low and the coefficient of C_p is not significant at even the 10% level.

However, when plant concentration is combined with the importance of imports in the so-called 'hybrid' - concentration ratio in equation (1), C_m accounts for very nearly 20% of the variance in price-cost margins and the R^2 is significant at the 2% level. The t - test indicates that the coefficient of C_m is significant at the 2% level.

On the basis of this evidence it appears that there is a continuous relationship between price-cost margins and the degree of monopoly power, as measured by C_m, in the manufacturing industries of Kenya.[30]

The next step was to explore the possibility of any independent influence of capital requirements barriers on price-cost margins as suggested by the "distinct-break" hypotheses of Tables II and III. The equation estimated was:

$$(3) \qquad P = 5.780 + 0.109 \, C_m + 6.255 \, D_p \qquad R^2 = 0.254$$
$$\qquad\qquad (1.56) \quad (1.19) \qquad (1.39)$$

where D_p = Dummy variable representing depreciation per plant equal to 1 if depreciation per plant is 'high' or 'medium' and 0 if depreciation per plant is 'low'.

Equation (3) shows that, compared with equation (1), C_m and D_p together now explain 25.4% of the variance in price-cost margins and this R^2 of 0.254 is significant at the 1% level. Whereas the coefficient of C_m was highly significant in equation (1) neither of the coefficients of the variables C_m and D_p is significant at the 5% level in equation (3), and the coefficient of C_m has been markedly reduced from its value in equation (1). This necessitated a test for multicollinearity in equation (3) and the simple regression of C_m on D_p showed

$$(4) \qquad C_m = 30.667 + 29.872 \, D_p \qquad R^2 = 0.368$$
$$\qquad\qquad (5.87) \quad (3.90)$$

Both the R^2 of 0.368 and the coefficient of D_p are significant at the 1% level.[31]

It seems that the apparent independent influence of C_m on price-cost margins of equation (1) ignores the correlation between C_m and D_p and this is large enough to destroy the reliability of the estimate of the coefficient of C_m. Because concentrated industries have high capital requirements it appears to be impossible to disentangle the separate influences of C_m and D_p on price-cost margins. This tends to confirm Rhoades' assertion that one is unlikely to find highly concentrated industries with low barriers to entry.[32]

To test the hypothesis that, because 'normal profits' are included in price-cost margins the latter are positively related to capital-output ratios, the following equation was estimated:

(5) $P = 8.974 + 0.196 C_m - 1.205 K_y$ $R^2 = 0.230$

        (1.77)   (2.64)   (1.09)

where K_y = capital-output ratio. The R^2 of 0.23 is significant at the 1% level while the coefficient of C_m is significant at the 2% level. However, the sign of the coefficient of the capital: output ratio is negative which is not what could have been expected. Even though price-cost margins are inclusive of 'normal profits' they are unrelated to capital-intensity.[33]

Conclusions

The test of the 'distinct-break' hypothesis shows there is a positive relationship between price-cost margins and monopoly power, as measured by the 'hybrid'-concentration index, which incorporates the influence of imports, in the manufacturing industries of Kenya. This result is confirmed by the test of the 'continuity' hypothesis.[34] However, it proved to be impossible to separate the independent influences on price-cost margins of concentration and capital requirements barriers to entry, because the highly concentrated industries, on the whole, have high capital barriers.[35] All we can say is that plant concentration and the size of home production in total market sales as well as capital requirements together create market power in manufacturing industries in Kenya, which is positively related to price-cost margins.

The results presented here suggest further areas of research effort. When the results of the 1967 Census of Industrial Production become available it is proposed to undertake a similar exercise, in order to establish whether such market power and high price-cost margins persisted in the intervening years and whether the industries identified

as holding market power in 1963 maintained such power through these years.
Furthermore, a closer examination of government licensing, quota and
tariff policies in respect of the concentrated industries is required as
well as an assessment of the presence and policies of multi-national
corporations in these industries. It could well be that, if the authorities
in Kenya are concerned about the creation of a competitive industrial
environment, for some industries more imports might be encouraged by
liberalising the machinery of import restriction and for other industries
investment incentives and other financial aid might be granted for plant
construction.[36)

APPENDIX

The data in Table IV were generated from the Census of
Industrial Production of Kenya for 1963 and the Survey of Capital Assets
for 1963.

Table IV

Price-Cost Margins, Plant- Employment Concentration Ratios, Gross Home
Production as a percentage of Total Market Sales, Hybrid - Concentration
Ratios, Capital Requirements Proxy and Capital: Output Ratios for 34
Manufacturing Industries of Kenya 1963.

Industry	Price-Cost Margin %;	C_p %	H_p %	C_m %	D_p	K_y
Dairy Products	5.0	29	92	27	1	3.39
Canned Fruit and Vegetables	0.5	96	79	76	0	4.42
Grain Mill Products	12.7	43	96	41	1	2.98
Bakery Products	3.5	38	96	36	0	4.42
Sugar	5.4	100	37	37	1	4.42
Confectionery	6.6	100	28	28	0	4.42
Miscellaneous Foods	4.1	64	56	36	0	4.42
Spirits	50.8	100	78	78	1	2.14
Beer and Malt	26.6	60	97	58	1	2.14
Soft Drinks	41.3	41	99	41	1	1.11
Tobacco	22.9	100	94	94	1	2.14
Cordage, Rope and Twine	12.1	96	65	62	1	2.71
Textiles	7.8	62	16	10	1	2.71
Clothing	10.9	26	40	10	0	1.63
Footwear	19.4	100	76	76	1	1.63
Sawn Timber	6.2	4	94	4	0	5.43
Other Wood Products	12.0	85	61	52	1	5.43
Furniture	10.7	1	96	1	0	3.53
Paper and Products	24.7	58	62	36	0	1.29
Printing and Pub.	7.2	23	81	19	0	1.31
Tanning and Leather	12.3	62	85	53	0	3.60
Rubber Products	7.4	61	73	45	1	7.17
Basic Ind. Chemicals	28.9	60	85	51	1	7.17
Paints	5.3	86	71	61	0	1.75
Soap	12.5	70	88	62	1	2.26
Clay and Concrete	6.3	26	72	19	0	3.15
Glass and Products	21.6	100	64	64	1	5.91
Cement etc.	17.4	81	100	81	1	5.91
Metal Products	12.9	44	81	36	0	2.75
Non-Electrical Mach.	15.8	4	7	1	0	2.20
Electrical Mach.	16.2	18	100	18	0	2.20
Motor Vehicles	9.7	27	28	8	0	2.22
Motor Repairs	7.2	1	100	1	0	2.22
Misc. Manufacturing	5.8	42	73	31	0	2.90

Footnotes.

(1)   J.S. Bain: 'Relation of Profit Rate to Industry Concentra-
tion: American Manufacturing, 1936-1940', Quarterly Journal of Economics,
Aug. 1951, p. 293.

(2) H. Michael Mann: 'Seller Concentration, Barriers to Entry
and Rates of Return in Thirty Industries, 1950-1960', Review of Economics
and Statistics, Vol. 48, 1966, p. 296.

K.D. George: 'Concentration, Barriers to Entry and Rates of
Return', Review of Economics and Statistics, Vol. 50, 1968, p. 273.

N.R. Collins and L.E. Preston: Concentration and Price-Cost
Margins in Manufacturing Industries, (Univ. of California: Berkeley,
1968).

S.A. Rhoades: 'Concentration, Barriers and Rates of Return:
A Note' Journal of Industrial Economics, Nov. 1970, p. 82.

All these studies were based on U.S. data.

(3) Bain and Mann assigned industries to either of two
conentration categories, namely, 'concentrated' and 'unconcentrated'
and found a significant difference between the average performance of
each category. They also concluded that barriers to entry independently
influenced performance. Collins and Preston were able to find a
significantly continuous relationship between performance and structure
as did Rhoades in his recent paper, although the latter has called into
question the independent influence of barriers to entry on performance.

(4) Kenya Census of Industrial Production 1963 (Ministry of
Economic Planning and Development, Statistics Division 1965).

(5) The analysis is restricted to 1963, the year of the last
published industry census. It is proposed, at a later time, to undertake
a similar exercise using the, as yet unpublished, 1967 Census of Industrial
Production and to make comparisons with the results obtained for 1963.
However, the 1967 Census contains a much greater degree of aggregation
of industries, a problem which awaits resolution.

(6) If the rate of return on capital is equalised in all
industries, then the absolute amount of 'normal' profit will be larger
the more capital-intensive the industry.

(7) As already mentioned, Rhoades, op cit, has disputed this
conclusion.

(8) The main source of data was Appendix Table 1 of the Census
of Industrial Production 1963, op cit, In Table 1 some of the industries'
value added and net output data were aggregated amd these were allocated
in what seems to be economically justifiable, in the ratio of their labour
costs. The Census defines 'Gross Production' as "the value of sales plus
the net increase in stocks of work in process and finished goods."
Meanwhile 'value of sales' includes "the value of sales of goods produced
and work done. The valuation is ex-factory or workshop and excludes cost
of delivery....it also excludes excise taxes." 'Industrial Costs' means
"cost of materials used in production, plus fuel costs, plus the cost of
work given out to sub-contract plus repair and maintenance work," while

'Non-Industrial Costs' are defined as "all current costs except labour costs, industrial costs and depreciation". The depreciation data were taken from Appendix Table 24,

(9) Collins and Preston, op cit,also used price-cost margins as their measure of performance but they used gross margins since capital costs were not included as part of cost. Here, the price-cost margins are net of depreciation charges which have been included in costs but still include 'normal' profits.

(10) Tibor Scitovsky: "Economic Theory and the Measurement of Concentration" in Business Concentration and Price Policy, (Princeton University Press: Princeton 1955) p. 109.

(11) It is as well to remember Gideon Rosenbluth's remark 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", G. Rosenbluth: "Measures of Concentration" in Business Concentration and Price Policy, Ibid, p. 84).

(12) These data are taken from Appendix Table 16(e) of the Census of Industrial Production. op cit, p. 122.

(13) G. Rosenbluth, op cit, p. 57-99.

(14) Ibid p. 85.

(15) Ibid p. 92. These conclusions are based on U.S., Canadian and British industry data.

(16) A similar argument could be made against the more usual concentration ratios which ignore imports in the domestic market. There, the restraining influence on concentrated industries comes from the threat of new entrants into the industry. The constraints on their ability to do so would be labelled 'barriers to entry', just as the ability of importers to enter the domestic market is reduced by such barriers as trade liecenses, import quotas, tariffs and transport costs. In addition, international markets are not necessarily competitive. It may be the case that the domestic industry is dominated by a branch of a large multi-national corporation whose policy is not to allow the products of its overseas branches to compete in the domestic market.

(17) Census of Industrial Production. Op cit, p. 15-100. These data are derived from the Annual Trade Reports.

(18) If depreciation is calculated using a declining balance formula, then the age distribution of the assets of an industry will partly determine the value of depreciation. In addition, if depreciation in one industry is larger than another because the assets in the former industry are of a more recent vintage and carry a higher purchasing price, in some sense the barriers to entering this industry are greater than those which might deter entrants to the industry with the older equipment.

(19) Survey of Capital Assets (Ministry of Economic Planning and Development, Statistics Division, Nov. 1966).

(20) This term belongs to Oliver E. Williamson: <u>The Economics of Discretionary Behavior</u> (Prentice-Hall, New Jersey, 1964).

(21) Collins and Preston, op cit, p.105.

(22) Ibid, p. 67. The capital-output ratio is included here as an explanatory variable because price-cost margins are inclusive of 'normal profits', which are expected to be positively related to capital-intensity. However, Collins and Preston, in addition, use the capital-output ratio to represent 'barriers to entry'.

(23) Ibid. p. 95.

(24) Rhoades, op cit, p. 83.

(25) Ibid. p. 87. -If Rhoades is correct that high concentration and high barriers are correlated one would expect to, find difficulty in disentangling the separate influences of concentration and barriers on profit rates. His main results, with standard errors in parentheses, show

$$Y = 6.111 + 0.0839\ X_2 + 0.5731\ X_3 \qquad R^2 = 0.4330$$
$$ (1.56) \quad (0.03) \qquad (1.21)$$

$$Y = 6.0487 + 0.0901\ X_2 \qquad\qquad R^2 = 0.4267$$
$$ (1.527) \quad (0.023)$$

where Y = Profit rate; X_2 = Concentration Index; X_3 = Dummy Variable representing 'High Barriers' (X_3 = 1) and 'Low Barriers' (X_3 = 0). His test for multicollinearity between X_2 and X_3 has an R^2 = 0.24 which is significant at the 2% level. He then concludes that this is not high enough to suggest multicollinearity is a serious problem and that "it does lend some weight to the earlier argument that in most situations high and low barriers and concentration exist simultaneously". But his "earlier argument" was that highly concentrated industries would invariably have high barriers. If the R^2 of 0.24 is considered to reveal a significant relationship between concentration and barriers, which Rhoades would expect from his initial argument, then it cannot be said unequivocally that concentration exerts an independent influence on performance. The influences are inseparable.

(26) Collins and Preston, op cit, p. 13.

(27) The 40% cut-off point was quite arbitrary but it was chosen because it divides the 34 industries so that almost half of them fall in the 'high concentrated' (16) and half in the 'low-concentrated' (18) categories.

(28) Of the 16 industries classified as being highly concentrated only 3 had 'low' capital requirements while amongst the 'low' concentration industries only one had 'high' capital requirements and two had 'medium' capital requirements. The importance of these facts becomes apparent when the 'continuity' hypothesis is examined.

(29) The 'high' capital requirements industries had more than £12,000 depreciation per plant in 1963, the 'medium' industries had depreciation per plant of more than £2,500 and less than £12,000 while the 'low' industries had depreciation per plant between £0 and £2,500. Eighteen of the industries fell into the 'low' category while the remainder were equally divided between the 'high' and 'medium' categories.

(30) When C_p and H_p are included as separate variables in the same equation, the following equation was obtained:

$$p = -4.405 + 0.117 \; C_p + 0.144 \; H_p \qquad R^2 = 0.16$$
$$ (0.49) \quad (1.89) \quad\;\; (1.55)$$

The coefficient of C_p is now significant at the 10% level and there is an inverse relationship, as we might expect, between C_p and H_p:

$$C_p = 91.175 - 0.396 \; H_p \qquad\qquad R^2 = 0.068$$
$$ (4.14) \quad (1.39)$$

where H_p = Gross Home Production as a percentage of total market sales.

(31) Since plant concentration C_p is a component of the 'hybrid' - concentration index C_m one might expect C_p to be related to D_p, that is, plant concentration and capital requirements are positively associated. This test resulted in the following equation:

$$C_p = 45.933 + 34.221 \; D_p \qquad\qquad R^2 = 0.290$$
$$ (6.42) \quad (3.26)$$

Both the R^2 of 0.290 and the coefficient of D_p are significant at the 1% level. As one might expect, high capital requirements contribute to plant concentration.

(32) However, he was still able to attribute the major influence on performance to concentration and to dismiss the independent influence of barriers to entry. The conclusion here is not so unequivocal.

The significance of the earlier observation that only 3 of the 16 highly concentrated industries in Table III had 'low' capital requirements and only 3 of the non-concentrated industries did not have 'low' capital requirements is now apparent. Concentration and capital barriers are positively related and do not allow their separate influences on price-cost margins to be detected.

(33) At this point a possible explanation of why depreciation per plant is positively related to price-cost margins in equation (3) yet the coefficient of the capital output ratio has a negative sign when related to price-cost margins in equation (5) is needed. Examination of the industries with relatively high depreciation per plant yet relatively low capital output ratios shows that among this list are the Spirits, Beer, Tobacco, Cordage, Rope and Twine, Textiles and Footwear industries. Each of these industries utilizes a small number of plants which necessitates a relatively large capital expenditure which acts as a 'barrier to entry'. In other words, these industries use large plants, but because of their numbers of employees, they can still be classified as relatively labour-intensive. Conversely, listed among the industries which have low depreciation per plant but high capital: output ratios are the Bakery Products, Sawn Timber, Furniture and Clay and Concrete industries. They utilize a large number of relatively small plants, where scale would appear to be unimportant, but because of their small numbers of employees they are classified as relatively capital-intensive industries.

(34) The relatively low Rs^2 in the estimated equations suggest that other unidentified forces are at work which contribute to the explanation of differential price-cost margins.

(35) An example of an attempt to overcome 'barriers to entry' occurred in the Tobacco and Cigarettes industry in Kenya in 1966 when Rothmans of Pall Mall (Kenya) Ltd. was formed with a capital of £600,000 with the intention of challenging the monopoly of the British American Tobacco Company (Kenya) Ltd. During 1967, a fierce fight for the East African market took place, but within the year Rothmans were defeated and sold their assets to B.A.T. for half the origin price.

(36) Of course, these arguments ignore the claims of "infant-industries".