MARKET STRUCTURE AND PERFORMANCE: SOME EVIDENCE FROM FINANCIAL MARKETS

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Introduction

Several studies have been undertaken of the determinants of bank profitability in the United States, including those which have focussed on the relationship between concentration and profitability and those which have examined the possibility of expense preference behaviour existing in regulated and concentrated industries such as banking. However, there have been only two major studies of international bank profitability [Revell 1980; Short 1979] of which only one (Short) examined the determinants of profitability, including concentration, in an international setting. Both of these works showed that it was possible to conduct a meaningful analysis in spite of the substantial differences in accounting practices and legal form between banks in various parts of the world. This paper has the objective of examining the relationship between market structure (or concentration) and performance on a more extensive scale than that attempted by Short and particularly to review the relevance of expense preference behaviour theories [Edwards, 1977] in this context. The Edwards-Heggestad-Mingo theory [Edwards and Heggestad, 1973; Heggestad and Mingo, 1976] that higher concentration in banking markets encourages banks to hold less risky assets and to modify their behaviour in other ways is also examned. The concept of value-added (in addition to accounting profit) is introduced to assist in overcoming some of the differences in accounting standards and to allow testing of the expense preference theories.

Data Collection

The data is based on the financial statements of 116 banks each year from 1972 to 1981 in fifteen countries or territories — Australia, New Zealand, California, Massachusetts, New York, Canada, Ireland, Scotland,

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England and Wales, France, Belgium, Holland, Denmark, Norway and Spain. The banks included in the sample were every bank in these countries which fell within the Top 500 banks in the world in June 1980, ranked by total assets. For the purposes of the study of the effects of concentration, Scotland and New Zealand were excluded from tests presented here because concentration data were not available. France was also excluded because its notoriously low capital ratios and pervasive state controls were felt to bias the sample. In so far as possible data were standarised to remove differences in local accounting practices particularly in relation to the treatment of reserves. Contrary to common practice, total assets are defined to include acceptances on both sides of the balance sheet.

Market Structureand Performance

(a) *Theoretical Background*

The exercise of dominant economic power and its consequences in terms of prices and profits has long been of interest to economists. Market structures range between perfectly competitive and monopolistic and the key question to be posed is how does the behaviour of market participants change as the structure of the market alters.

An early article by Chandler (1938) noted that the behaviour of participants in many apparently reasonably competitive banking markets resembled that of monopolists and the number or fewness of banks in a particular market tended to exacerbate these monopolistic tendencies. The classic early work in this area is by Bains (1951) who developed what has come to be called the Structure-Conduct-Performance (SCP) hypothesis. Bains postulated that, in a market with relatively few firms and barriers to entry, firms would, through collusion or price leadership, etc., achieve super-normal prices and profits. The SCP hypothesis has generated substantial empirical research; the main thrust of this research has been to examine the relationship between structure and performance because it is, of course, difficult to measure conduct in any meaningful way except through its effects. SCP studies have benefitted from extensive inter-disciplinary interest because of the relevance of concentration theory to the implementation and interpretation of U.S. anti-trust legislation. American anti-trust legislation has the objective of maintaining competition in any particular market and "line of business" and while the definition of market and "line of business" have proved fruitful areas of discussion for both lawyers and academics alike, the centrepiece of the argument has been the relationship between market structure and competition as measured usually by price or profit.

There is a long line of SCP research in the industrial sector but studies

of bank markets and structures have only developed since the middle 1960s mainly because the U.S. Bank Merger Act 1960 required regulators, for the first time, to consider the competitive effects of merger proposals.

Rhoades in *Structure and Performance Studies in Banking: a Summary and Evaluation* (1977) summarises "the elements of market structure that are theorised to have the greatest influence on firms' conduct" as follows:

"(1) the number and size distribution of firms in the market (often measured by the concentration ratio or Herfindahl index)

(2) barriers to the entry of new firms. . . .

(3) the growth of the market — rapid growth can facilitate new entry and may lead to such uncertainty among rivals as to cause competitive conduct".

The typical SCP study consists of regression analysis with profit or price as the dependent variable and independent variables specified to include various possible determinants of profit including market concentration. Several problems emerge in the testing of the hypothesis postulated in SCP research — definition of market, measurement of performance (profit or price), measurement of concentration including definition of bank output — and these issues are incorporated into the discussion of the design of the model below. However, another major issue remains — the control of risk between banks subject to comparison.

This issue was first raised by Galbraith in the New Industrial State (1967) and developed by Caves (1970) who summarised what has become known as the Galbraith-Caves Hypothesis as follows:— "That a significant portion of the potential profits latent in a firm's position of market power is taken in the form of avoiding uncertainty". This hypothesis has been tested by Edwards and Heggestad (1973) using an approach developed by Heggestad (1973) who suggested that the appropriate measure of risk should be the variance of profitability divided by average profitability.

The Heggestad-Edwards findings were as follows:— (a) they found a negative relationship between concentration and risk i.e. findings consistent with the Galbraith-Caves hypothesis (b) it was also found that a bank's exposure to risk decreased as its size increased.

However, neither the Galbraith-Caves hypothesis nor its Edwards-Heggestad exposition are able to suggest the underlying reasons for the risk avoidance behaviour of firms in concentrated markets. Two possibilities are suggested. Firstly, that managers of firms in concentrated markets may be more risk-averse than managers of firms in other markets.

Secondly, that firms in concentrated markets "may be able to take advantage of more favourable market opportunities". There is no evident reason why risk-averse managers should gravitate towards concentrated industries although possibly the second finding that a bank's size was inversely related to risk may throw some light on the phenomenon. There is also no reason why firms in concentrated industries should be able to benefit from more favourable market opportunities unless participation in a concentrated industry provided some form of dominant market power which allowed all the firms to select more favourable risks. If, on the other hand, the power to select risks was confined to the larger firms within the industry (which hypothesis is supported by the second finding) the supposition that the power of risk selection was industry-wide falls down. (For further discussion of several characteristics of bank size, see Gallick (1976), Schuster (1984). While the Galbraith-Caves Hypothesis and the Edwards- Heggestad exposition leave many questions unanswered about the role of risk in market structure analysis, the fundamental point raised is of considerable interest and importance.

Finally, it may be worth anticipating the results of the section on empirical results below and noting that most surveys find that the relationship between concentration and performance in banking markets is positive, significant but small. This is to be compared with the results of SCP studies in other industries (reported by Rhoades (1977) which find that there is a relatively large correlation between concentration and performance. Rhodes notes that there are two possibly important differences between industrial and banking SCP studies. Firstly, industrial studies examine performance across different industries in the one market while banking studies compare performance among banks by definition within the same industry but in different geographical markets. Secondly, the absolute levels of concentration observed in banking are extremely high relative to those observed in industrial studies. This lack of a broad spectrum of concentration levels may militate against obtaining a statistically valid relationship between market structure and performance.

(b) *Empirical Results*

Apart from the other characteristics of SCP studies mentioned above, research in this area also differs in respect of whether performance is measured in terms of price levels or profitability.

As early review by Almarin Phillips (1965) cites a Federal Reserve Board study which examined the relationship between the price of short-term small business loans and market structure variables. This study found that there was a slight but significant tendency for the rates charged by the individual banks to decrease as the market share of the bank increased.

Among other variables checked, the 3 bank concentration ratio possessed no explanatory value. Phillips also speculates that rates may be connected with a lower risk profile on the loan book, a point developed by Edwards and Heggestad (1973) as noted above. Flechsig (1965) describes a study of loan rates and market concentration in 19 major American metropolitan areas based on data relating to 1955 and 1960. His results indicated that concentration (as measured by the market share of the surveyed banks) is not significantly related to loan rates when account is taken of differences in loan characteristics and in the supply and demand conditions in local and regional markets. In attempt to avoid the problem of differences in loan characteristics (or indeed in other measures of bank output), Bell and Murphy (1969) undertook a study of the effects of concentration using a standard bank product as the measure of output — the regular checking acount. They summarise their results as indicating that "concentration does have a positive and significant effect on price" to the extent that that a 10% increase in the concentration ratio results in a 2% increase in price. However, the conclusions that may be drawn from a study based on such a restricted (if convenient) view of bank output must be treated with caution.

Edwards and Heggestad's (1973) exposition of the Galbraith Caves Hypothesis has already been referred to. Their empirical analysis is based on data from sixty-six of the hundred largest American banks in 1960 in banking markets throughout the country and is designed to test the hypothesis that high market concentration allows a bank to reduce the riskiness of its loan portfolio. The 3-bank concentration ratio is used as the measure of market structure and profitability is defined as the after tax rate of return on assets rather than capital. Riskiness is measured as the ratio of profits to expected profits. Expected profits are defined as the bank's average annual rate of return over the period 1954-1960.

The findings are consistent with the Galbraith-Caves Hypothesis — that there is a negative relationship between market power and risk avoidance. Bank size is also negatively correlated with risk avoidance.

Fraser and Rose (1982) examine the hypothesis that there will be significant differences between the operations of banks in one bank towns (in the United States) compared to banks trading in two-or three-bank towns in 1965 and 1966. Their study is interesting because it examines a range of determinants of profitability including labour expense and finds them to be insignificant. In general the effects of market structure on profitability (on a range of measures) and on prices and expenses is found to be extremely limited. The strongest effects of market structure were observed in relation to balance sheet structure variables — the ratio of time to

deposit accounts and particularly, capital to total assets. Specifically, it was observed that capital adequacy was negatively correlated with concentration. A further variant on the Galbraith-Caves Hypothesis is examined by Heggestad and Mingo (1976) who postulate that, whereas market structure may not impact on profitability because of a reduction in the riskiness of the banks portfolio, price levels and levels of service may indeed be related to concentration. Their findings may be summarised by noting that they found statistically significant relationships between concentration and most of the dependent variables and in the direction expected. The relationship between concentration and prices was found to be relatively weak but was much stronger between concentration and the existence or otherwise or the level of services. In relation to some prices and services the relationship was curvilinear. A weakness of the study is that the costs of providing services in different parts of the United States is not considered.

An important article by Franklin Edwards "Managerial Objectives in Regulated Industries: Expense — Preference Behaviour in Banking" (1977) examines the possibility that "managements of monopolistic banks appropriate part of the profits through expense-preference behaviour: by paying themselves higher salaries, hiring excessive staff, or being lax in their personnel supervision, all of which may enhance their utility (and increase costs) while lowering reported profitability". Edwards cites several sources (some of which are reviewed here) which report that there is a small positive relationship between market concentration and bank prices but no relationship between market structure and bank profitability. One of the several possible explanations for this phenomenon is the "appropriation of profits" theory described above.. Franklin's findings support the hypothesis that there is an element of expense preference spending in concentrated markets. From the point of view of the present study, they raise the necessity of explicitly allowing for the possible inadequacies of profitability as a measure of performance in terms of SCP theories.

An extensive study (70 banks over seven years) by Kwast and Rose (1982) examines the determinants of bank profitability using a wide range of variables in a regression analysis. Concentration is shown as having a slight, inconsistently significant, and positive effect on performnce as defined.

If it is felt that the empirical findings of the concentration literature thus far reviewed are inconclusive, a short review of the literature by Brozen in other industries tends to indicate a similar if possibly less pronounced lack of certainty. Whereas other industries are frequently less regulated and exhibit broader ranges of concentration, the difficulty of defining

markets in geographical terms affect the overall conclusions that may be drawn.

Finally, returning to Rhodes' extremely useful "Structure and Performance Studies in Banking" (1977), he notes that of the 39 SCP studies which he reviewed prior to 1977 (some of which have been reviewed above) "the basic findings . . . . are generally consistent in a broad sense. Specifically, thirty of the thirty-nine studies found a statistically significant relationship between some measure of market structure and some measure of performance but the effect was generally small in magnitude". In this connection he also notes that, because of the consistent findings in the industrial sector of a market structure/performance relationship, "it may be difficult for researchers [in the banking industry] to regard this conclusion as the ultimate truth on the issue".

(c) *International Research*

The leading contribution in the international area is Brock Short's "The Relation between Commercial Bank Profit rates and Banking Concentration in Canada, Western Europe and Japan" [(1979); see also Short (1977)]. Short examines the relationship between concentration (and other variables) and profit rates for sixty banks in Canada, Japan, Austria, Belgium, Denmark, England and Wales, France, West Germany, Italy, Japan, Holland, Sweden and Switzerland in 1973.

The profit rate variable used is the average annual ratio for 1972-1974 of after-tax profits to total shareholder funds. Short summarises his results as follows:—

(a) linear functions produced as good results as any other functional form.

(b) the government dummy, concentration measures and the capital scarcity proxies all provided explanatory power at at least the 95% confidence level in the direction expected.

Thus this international survey, with its weak correlation between profit and market structure, tends to corroborate the findings reported above in relation to the United States. Several points must, however, be made. The underlying quality of the data may well be poor. Bank balance sheet and income statement information are abstracted from the "Bankers Almanac and Yearbook" and not from source documents.

Finally, the inputs into the market measurement series must be reviewed. Firstly, it is not clear that bank markets are consistently defined — i.e. whether non-banks are included in all countries. Secondly, it appears that there are substantial difficulties in ascertaining the correct bank input in

the market share figures. Specifically, banks' published information (e.g. balance sheets) includes both domestic and foreign assets while market figures relate only to domestic assets in a particular country. The working assumption in Short's paper is that banks in the sample have equivalent proportions of foreign business within their portfolios. Short does, however, provide a clear model for further research in this area.

Summary

The empirical results of concentration/performance studies in banking show a weak but positive and significant relationship between market structure and prices and/or profits. The possibility of concentration impact on other variables also raised.

Design of the Model

The literature reviewed above suggests a research model designed to test the relationship between concentration (and other determinants of bank profitability) and various measures of performance such as return on capital and return on assets. Other dependent variables — price, level of service — are also suggested but have not proved feasible in the context of international research. Also of relevance are the expense preference theories of Franklin Edwards (1977) who postulated that excess or super-normal profits of regulated industries may be diverted away from net profit into sub-optimal expenditure patterns related to management as opposed to shareholder preferences. There is also the posibility, relevant particularly in countries where the banking industry is unionised, that the super-normal profits earned by firms in a regulated industry may be appropriated in the form of payroll expenditure.

Another area which a successful model must encompass is the problem of the variability in accounting standards and reporting which may exist between various countries. The steps taken in the data collection process to deal with these general problems have already been discussed but the ability to use the loan loss account as a means of building hidden reserves is common throughout all banking systems.

As a step towards dealing with this general problem, the concept of "value added" is advanced as part of the solution process. Two variants on this approach are used. Firstly, net income before tax + staff expenses is used to test the expense preference theory on the basis that this measure of value added largely removes the possibility of either managerially induced expenditure or union-negotiated wage demands appropriating excessive proportions of net income and allows the relationship between concentration and other independent variables and this dependent variable to be

estimated. Secondly, net income before tax + staff expenses + loan losses is a proxy for gross margin which is frequently unavailable on an international basis and allows the determinants of gross profit to be tested. Additionally, by observing the relationships between net income before tax + staff expenses + loan losses and concentration, comment may be made on the possibility of the Edwards-Heggestad effect occurring because this effect would be manifested in lower loan losses in concentrated markets compared to less concentrated markets.

Accordingly, it is proposed to test the relationship between profitability as defined in the several ways described below and the following independent variables:

- capital ratios i.e. capital including reserves as a percentage of total assets.
- liquidity ratio i.e. the ratio of liquid assets to total assets. The reciprocal of this ratio can also be used as a proxy for the loan/deposit ratio.
- concentration ratios. The 3 bank concentration ratio is used, the concentration basis being taken as the share of the largest three banks of either all deposits or assets, depending on data availability. Data availability also made impracticable the use of the Herfindahl ratio even in its truncated form. (see Rhoades [1977] for a review of the relative merits of both the 3 bank concentration ratio and the Herfindahl Index; also Kinsella [1981]). The market share of either deposits or total assets in a particular country is determined by the sum of deposits or total assets of the top three banks (as obtained from their published financial statements) as a ratio of the deposits or total assess of the banking system (obtained from the Annual Reports of Central Banks for each country). The assumption inherent in this methodology is that the top three banks in each country have approximately the same proportion of foreign business in their portfolios which, given that the largest banks in each country are well known international banks, may not be an unreasonble assumption. This assumption was also made by Short [1979] in his classic study already cited.
- government ownership. Short [1979] had found that the government ownership of banks is correlated inversely with profitability and, accordingly, a dummy variable representing the ownership status of each bank is incorporated.
- growth in total market may be considered as a potential variable in the sense that an expanding market, particularly if associated with entry barriers, should produce the capability of earning increased profits. Accordingly, annual growth in money supply in each country

is suggested (with trepidation in the light of its obvious imperfections for this purpose) as an independent variable.

Dependent Variables

The following general categories of dependent variable were used.

(a) Return on capital. Net income before and after tax as a ratio of total capital including all reserves. The ratio of after-tax profits to capital was used by Short [1979]. A further variable is defined as the ratio of net income before tax to capital + total borrowings (as a proxy for subordinated loan stock which is used in substitution for equity capital).

(b) Return on assets: Net income before tax as a ratio of total assets.

(c) Value added return on total assets.
   (i) the ratio of net income before taxes + staff expenses to total assets.
   (ii) the ratio of net income before taxes + staff expenses + loan losses to total assets.

Economies of Scale

The literature is reasonably clear that larger banks (across a broad range of magnitudes for domestic U.S. banks) do not experience economies of scale [Benston, Hanweck and Humphrey, 1972]. Short (1979) tested for this variable but obtained no significant rsults. Accordingly, it is not proposed to test for economies of scale. It should be noted, however, that recent developments in technology and their widespread application may require these findings to be re-evaluated.

Functional Form of the Equation

The literature generally, in so far as it is discussed, comes to the conclusion that the appropriate functional form for testing is a linear function although there are dissenting options. Short investigated the question of functional form and concluded that "linear functions produced as good results as any other functional form". Accordingly, it is proposed to test using a linear function of the form

$$y = c + a_1 x_1 + a_2 x_2 + a_3 x_3 \ldots\ldots a_n x_n$$

where y is the dependent variable
c is the constant term

and x_1 to x_n are the independent variables as described above.

Results

Findings are reported in Tables 1 and 2. Regression equations for the general data including France produced broadly equivalent results but with less explanatory power and are not reported. Table 1 replicates Short's work to a greater or lesser extent depending on the particular equation examined.

Table 1: *Estimates of Relation between Return on Capital and Selected Independent Variables*

		GOVT	CONC	INT	MON	R^2 (adj)
1 BTCR	=	−0.089	0.17*	—	0.3*	0.1
2 ATCR	=	−0.27	0.04*	0.1	—	0.01
3 BTCRTB	=	−0.6	0.05*	—	0.25*	0.04

*significant at 5% level; constants omitted

Variable names are defined in Table 3.

Table 2: *Estimates of the Relation between Return on Assets and Selected Independent Variables*

	CRTA	CBINVTA	GOVT	CONC	INT	MON	R^2 (adj)
1 BTTA	0.1*	0.0056*	−0.09	0.007*	—	—	0.52
2 BTSETA	0.10*	0.0062*	0.21	−0.015*	—	0.02*	0.37
3 BTSEPLTA	0.12*	0.0049*	0.21	−0.01*		0.016*	0.31

*significant at 5% level; constants omitted

Variable names are defined in Figure 3.

Table 3. *Variable Names*

Dependent Variables

(NPBT=Net Profit before tax; NPAT = Net Profit after tax)

BTCR — NPBT as % of Capital and Reserves

ATCR — NPAT as % of Capital and Reserves

BTCRTB — NPBT as % of Capital and Reserves + Total *Borrowings*

BTTA — NPBT as % of Total Assets

BTSETA — NPBT + Staff Expenses as % of Total Assets

BTSEPLTA — NPBT + Staff Expenses + Provision for Loan Losses as % of Total Assets

Independent Variables

GOVT — A dummy variable representing government ownership, 1 — when a bank is owned by a government, national or provincial; zero — otherwise.

CONC	— 3 bank concentration ratio.
INT	— the long-term bond rate for each country for each year [IMF].
MON	— growth in money supply for each country for each year [IMF].
CRTA	— Capital and Reserves as % of Total Assets.
CBINVTA	— Cash and Bank + Investment Securities as % of Total Assets.

However, equation 2 in Table 1 is the exact equivalent of Short's sixth equation (1979) which he expressed as follows (using the variable names employed in this paper as defined in Table 3):

$$ATCR = 2.04 - 2.36\ Govt^* + 0.03\ Conc^* + 0.6\ Int^* \quad R^2 = 0.52$$

*significant at 5% level

The almost total lack of correspondence between the present results and those of Short are surprising and are difficult to explain. However, the following comments may contribute to an understanding of the differences.

In addition to the inherent data collection problems of the present work which have been described, Short faced further difficulties:

(a) Short's profit data related to a two year period rather than to the ten year time span of the present work. However, equations 1-3 were re-estimated on a year by year basis for years 1981, 1979, 1976 and 1973 with resuls in line with those of time series with equally poor explanatory power.
(b) the data sources used were secondary e.g. almanacs as opposed to bank financial statements.
(c) while a greater number of countries are included, the number of banks from each country in the sample was small. For instance, Belgium is represented by two banks as opposed to eight banks in the present work.
(d) several countries are included in the sample where financial statement information is notoriously unreliable e.g. Germany, Italy and Switzerland, while several of the U.K. banks enjoyed and practised the privilege of hidden reserves. Of Short's sample of 60 banks, 21 banks are subject to these problems.

The results shown in Table 2 all relate to asset (as opposed to capital) based returns and in general show capital ratios, liquidity ratios and market growth as being positively relatively to profitability. The finding in relation to capital ratios is to be expected as, in accounting terms,

capital represents a "free" resource and Revell (1980) had noted an inverse relationship between capital ratios and costs of intermediation. It is also possible to speculate that well capitalised banks enjoy access to cheaper (because less risky) sources of funds or that the prudence implied by high capital ratios is maintained in the loan portfolio with consequent improvement in profit rates. The results in relation to liquidity ratios are less expected as conventional wisdom is that liquidity holdings (particularly if imposed by government) represent an expense to banks.

The results in relation to concentration require some consideration. In line with findings in other parts of the literature, concentration is shown to be moderately and positively related to pre-tax return on assets. However, when used in equations having one of the measures of value added as dependent variable, the sign of the relationship changes to an inverse relationship.

It had been postulated that if, for instance, support were to be shown for the expense preference theories, the sign of the relationship would remain positive and the relationship strengthen in the case of the dependent variable BTSETA (net income before tax + staff as ratio of total assets). The change of the sign of the concentration variable implies that, as concentration icnreases, staff expenses are squeezed. Support for this contention is found in Heggestad and Mingo (1976) who found that higher levels of concentration were associated with lower levels of service (and presumably lower staffing costs).

In relation to the dependent variable BTSEPLTA (net income before tax + staff expenses + loan losses as ratio of total assets) a similar phenomenon is evident as the sign of the CONC variable changes which carries the implication, in addition to that observed in relation to the BTSETA/CONC relationship, that higher levels of concentration are associated with lower loan loss costs. An immediate connection to the Edwards-Heggestad finding may be made — they hypothesised that higher levels of concentration were associated with lower levels of loan portfolio risk. Aditionally, a Federal Reserve Board study, cited by Almarin Phillips (1964) found a slight but significant tendency for the rates charged by a bank to decrease as its market share increased. Bearing in mind that the variable BTSELPTA is a reasonably close proxy or gross margin, the present findings are not in contradiction with the results of the earlier work.

Identical equations were estimated on a cross-sectional basis for the years 1981, 1979, 1976 and 1973 with little important differences in findings to those reported in Table 2.

Conclusions

The findings of Short's study are not confirmed except in the most general sense. The results are, however, in agreement with concentration and bank profitability studies for the domestic U.S. market and support is found for the Edwards-Heggestad hypothesis. No support is found for expense preference expenditure theories.

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