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The Banks' Profitability – Concentration Relationship in an Era of Financial Integration

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Abstract

This paper investigates the impact of concentration ratio of the Greek commercial banking market on banks' return on equity; that is, it examines the structure – conduct – performance (SCP) hypothesis. This examination is performed by estimating a relationship that combines time series and cross-sectional data over the period 1993-1997. To accomplish this task we use panel data procedure and consider the total model, the fixed effect model and the random effect model. The leverage multiplier, the asset utilization, an expense ratio and a productivity ratio are employed as a vector of control variables that may differ across banks, or time periods. The empirical results indicate that the financial variables are important determinants of banks' profitability. However, their impact appears to differ across banks. This finding reveals the different importance that the banks place to financial factors. Moreover, market structure is found to have no influence on banks' performance, which suggests that the existing competition among Greek banks is not bounded by the market structure.

JEL classification: G20; G21

Key Words: Greek Banking; Decision Making; Bank Profitability

1. Introduction

In the past decade, the banking structure of the 15 – member European Union (EU) has changed substantially. Although the single – market program in banking has been in place since 1993, it was the single currency that marked a dramatic change in the EU's banking environment. One of the implications of this financial integration for the banking market has been an increased merger and acquisition activity. This activity has focused first on within – country mergers (economies of scale) and mergers of banks with nonblank providers of financial services (economies of scope). An increased cross – border merger activity is expected to follow. The above indicates that the EU financial integration affects banking market concentration and profitability considerably. The relationship of these two variables (i.e. banks' concentration and profitability) is the kernel of this paper.

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The examination of the factors that affect the profitability of the firms has always been a major concern of economics. The most influential approach in this area is the one that is usually described as the structure – conduct – performance (SCP) hypothesis[1]. The traditional SCP theory postulates that exogenous basic conditions determine the structure of a market and that there is a one-way causation scheme from market structure, through conduct, to performance. Therefore, a large number of empirical studies have tried to assess the importance of market structure and/or the conduct of firms. The structure of an industry covers factors like concentration, diversification, product differentiation, barriers to entry, and scale economies. Of these, the concentration characteristic has received by far the greatest attention. The conduct of firms covers the objectives of the firms, price – setting behaviour, attitudes to rivals (actual and potential), the way in which the volume, quality and range of products are determined, advertising and marketing strategy, research and development planning and implementation, and legal tactics. The modern industrial economists concentrate on the role of conduct factors as determinants of the performance of the firms. However, they have concentrated on issues such as R&D policies, advertising expenses etc, but they did not pay the appropriate attention on firms' financial policy. Financial factors may be considered as strategic conduct variables because they affect the cost of capital and ultimately the performance of the firms. Put differently, the lessons of business finance seem to have been ignored. Consequently, the aim of this paper is to investigate the SCP relationship in Greek commercial banking, by employing the most important financial factors that affect the profitability of Greek banks. Recently, there is a shift in emphasis from the industry to the firm as a focal point for the analysis of the SCP relationship[2]. This shift induced us to use firm level data rather than industry data in our analysis.

The SCP hypothesis has been challenged by the efficiency hypothesis[3]. The efficiency hypothesis points out that the observed relationship between profitability and concentration reflects the superior efficiency of the large oligopolistic firms and not the power to elevate prices above the competitive levels. The proponents of this approach suggest that an industry may become concentrated because one or more firms in that industry have a strong efficiency advantage over their rivals. It is apparent that the firm with the lowest costs in the market will tend to increase its size as well as the market share it commands. This expansion may enforce all the firms in the market either to be efficient or to exit from the industry. As a result, there will be a tendency for market concentration to increase. Consequently, this hypothesis argues that performance determines market structure rather than the other way round. Given that the efficiency hypothesis is correct, its advocates claim that a positive relation between profitability and market share of firms in an industry should exist. The policy implications are different in the two cases. A confirmation of the SCP hypothesis provides a

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1 For more information on the SCP hypothesis see Bain (1956) and Collins and Preston (1969). For a linkage between the SCP hypothesis and economies of scale see Vasiliou (1997a).

2 See for example Bresnaham (1989), Martin (1993), and Carlton and Perloff (1994).

3 For more information on the efficiency hypothesis see Demsetz (1973, 1974).

case for reducing monopoly power and concentration via anti-trust laws. On the other hand, if the efficiency hypothesis were found to hold, it would suggest the markets are best left alone.

There are many studies testing the SCP and/or efficiency hypothesis in banking, especially for the USA[4]. Unfortunately, the findings of theses studies are far from conclusive[5].

The paper is divided into four parts. The first section describes the analytical framework and the variables utilized. The second section outlines the data and the models that are employed. The third section presents the estimation of the empirical model, and interprets the regression results. Finally, some concluding remarks are presented.

2. Analytical framework and Variables

Business finance assumes that the primary goal of the managers is to maximize the shareholder wealth. For publicly held banks operating in efficient capital markets, this objective is obtained by maximizing the price of the bank's common stock. Following the discounted cash flow (DCF) approach, we know that the value of a share of common stock is the present value of all future dividends or earnings (which are the source of dividends). Consequently, the stock price of a bank depends upon its future performance. By far the most popular measure of a bank's financial performance among investors and senior managers is the return on equity (ROE). For this reason we employ return on equity as a dependent variable in our study. Return on equity equals net income divided by equity capital (i.e. par value, paid in surplus, undivided profits, and capital reserves). It is a measure of the efficiency with which the bank employs owners' capital, because it presents the amount that has been earned on the book value of common stockholders' investment in the bank. In other words, this ratio measures the percentage return to owners on their investment in the bank. Following the Du Pont analysis, a bank's return on equity can be decomposed into two principal components, its return on assets (ROA) and its leverage multiplier (or equity multiplier – LM). This relationship is generated as follows:

$$ROE = \frac{Net\ \ income}{Equity\ \ capital}$$

$$ROE = \frac{Net\ \ income}{Total\ \ assets} \times \frac{Total\ \ assets}{Equity\ \ capital}$$

$$ROE = ROA \times LM$$

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[4] For reviewing the SCP literature in banking see Rhoades (1977, 1982), and Gilbert (1984). For articles that find evidence to support the efficiency approach in banking see Brozen (1982), Smirlock (1985), and Evanoff and Fortier (1988).

[5] See for example Berger and Hannan (1989), Jackson (1992), the Berger and Hannan reply to Jackson (1992), Molyneux and Forbes (1993), and Vasiliou (1998).

Consequently, a bank can increase its return on equity by increasing its return on assets and/or its leverage multiplier. The leverage multiplier compares assets with equity, such that large values imply a large amount of debt financing relative to equity. Thus, the leverage multiplier measures the financial leverage[6] used by a bank and influences its return on equity. This is because it has a multiplier impact on return on assets to determine a bank's return on equity. At the same time the leverage multiplier represents a measure of financial risk[7] of the firm, because it reflects how many assets can go into default before a bank becomes insolvent. Consequently, a high leverage multiplier raises a bank's return on equity when net income is positive, but it also signals high financial risk. This is because financial leverage magnifies the impact of a negative return on assets on a bank's return on equity. Leverage is a two-edged sword.

Return on assets is lower for banks than for most non-financial business. For this reason, most financial institutions utilize financial leverage heavily to increase return on equity to a competitive level. In general, firms with highly predictable and stable cash flows can utilize more financial leverage than firms facing a high degree of uncertainty. Moreover, firms such as commercial banks, which have a diversified portfolio of liquid assets, can safely employ more financial leverage, than the characteristic non-financial institutions. However, investments that are exposed to low risk, have high degree of liquidity and generate relatively stable cash flows tend to produce low return on assets. Commercial banks are notable examples of this pattern. Return on assets can be decomposed into the product of a bank's profit margin (PM) and asset turnover or asset utilization (AU). This relationship is generated as follows:

$$ROA = \frac{Net\ \ income}{Total\ \ assets}$$

$$ROA = \frac{Net\ \ income}{Total\ \ revenues} \times \frac{Total\ \ revenues}{Total\ \ assets}$$

$$ROA = PM \times AU$$

Profit margin is affected by the interest margin (i.e. the difference between interest income and interest expense divided by earning assets) and by the burden (i.e. the difference between non-interest expense and non-interest income). Asset utilization shows how many assets are employed as earning assets and the yields earned on these earning assets.

The above analysis highlights the three determinants of a bank's return on equity. In summary form:

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[6] Financial leverage is the use of debt having a fixed cost in order to magnify the expected return on equity; this situation occurs whenever the expected return on assets exceeds the cost of debt.

[7] Financial risk is the increased variability in returns to common stockholders (i.e. ROE) as a result of the decision to finance a portion of the firm's assets with debt and/or preferred stock. In the other words, financial risk is caused by the use of financial leverage.

$$ROE = PM \times AU \times LM$$

Consequently, a bank's profitability should be influenced by the profit margin, the asset utilization and the leverage multiplier of the bank. Unfortunately, we cannot utilize all the three ratios as explanatory variables in our model, because it exhibits perfect collinearity. For this reason we have decided to estimate our model employing first the leverage multiplier as a control variable (among others), and second the asset utilization as a control variable (among others). We cannot employ both the asset utilization and the leverage multiplier as independent variables of our model, because in this case arise multicollinearity problems. Finally, the exclusion of profit margin from the explanatory variables of our model is based upon the insignificant results that it produced.

In our study we use the four – firm concentration ratio to measure the degree of firm concentration in the Greek banking market. The Greek commercial banking industry is dominated mainly by four large institutions, which may take into account the competitive responses of each other, but may also ignore the behaviour of their smaller rivals. Consequently, the concentration ratio appears to approximate more the reality of business behaviour in Greek banking, than other concentration measures that place some weight to all the firms in the market. Following the selection of concentration measure, we have to decide upon the choice of the size variable. Size can be measured in various ways such as output, employment, sales, assets, value-added and so on. However, the value-added figures are not readily available, the valuation of assets is based upon accounting conventions, and employment would underestimate the importance of capital-intensive firms. Therefore, we choose output as an evaluation variable. However, commercial banks are multiproduct firms and the correct measurement of their output has been the subject of disagreement in the literature[8]. Nevertheless, for the purpose of this study we employ the sum of total deposits and loans as a proxy for bank output. Thus, the four – firm concentration ratio is defined as the proportion of loans and deposits attributed to the top four firms in the industry[9].

We utilize two other independent variables in our study: an expense ratio and a productivity ratio. In banking industry employee expenses in the form of wages, salaries and benefits are second only to interest expenses in importance. Therefore, we employ an expense ratio which shows how much the average bank employee costs to the bank. The expense ratio equals personnel expenses divided by the number of employees ($\times 10^3$). The productivity ratio equals deposits plus loans divided by the number of employees ($\times 10^3$). This ratio indicates how much the average bank employee helps the financial institution in extending credit and acquiring deposits. The a priori sign of all control variables are expected to be positive, except of the expense ratio, which is expected to be negative.

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[8] For an interesting discussion on measuring bank output see Humprhey (1990, pp. 40-42).

[9] It is worth pointing out, however, that we find almost exactly the same results when we utilize total deposits as the size variable.

Following the preceding discussion, we can employ an often-used single equation linear model linking Greek bank profitability and concentration. The hypothesis that will be tested is that the return on equity of the banks of our sample are affected by the asset utilization or the leverage multiplier, by an expense or productivity factor, and by market structure – measured by the concentration ratio. Therefore, the following models will be estimated.

$$REO_{it} = a_0 + a_1 LM_{it} + a_2 EXP_{it} + a_3 CR_{4t} + u_{it} \quad (1)$$

$$REO_{it} = c_0 + c_1 AU_{it} + c_2 PRO_{it} + c_3 CR_{4t} + u_{it} \quad (2)$$

where REO_{it} = the ith bank return on equity ratio, LM_{it} = the ith bank leverage multiplier, AU_{it} = the ith bank asset utilization, EXP_{it} = the ith bank expense variable, PRO_{it} = the ith bank productivity variable, and CR_{4t} = the four – firm concentration ratio.

At this point, it is worth mentioning that the same models are also run including banks' market shares[10] instead of concentration, among the explanatory variables (the regression results are not presented in the tables). However, the coefficient of market share variable is found statistically insignificant. This indication seems to oppose the efficiency hypothesis claimed by Demsetz.

3. The Data and the Model

The data used for this study are taken from Greek bank balance sheets and income statements. Our study covers the period 1993 – 1997. In 1993 the Greek Bank Accounting System changed. In consequence, we do not include the period before 1993 in our study, because the bank accounts will not be comparable. The Greek commercial banks that were listed in the Athens Stock Exchange the examined period were twelve (12). It is worth pointing out, however, that the market share, which is commanded by these 12 banks are over 90% of the whole commercial Greek banking industry. Nevertheless, our sample consists of sixty (60) observations; that is, five year observations of twelve commercial banks.

Our task is to estimate a relationship that combines time series and cross-sectional data. To accomplish this work we use panel data procedure and consider the total model, the fixed effect model and the random effect model.

(a) Total (basic-pooled) model: It assumes that all coefficients (i.e. slope coefficients and the intercept) are constant and the disturbance captures differences over time (t) and banks (i). The representation of this model is

$$ROE_{it} = x_{it} b + a + u_{it}$$

where x_{it} = a vector of explanatory variables, b = the slope coefficients, a = the intercept, and u_{it} = the disturbance.

[10] A bank's market share is the sum of deposits and credits as a percentage of the sum of deposits and credits of the whole commercial banking industry.

(b) Fixed effect model: It assumes a common slope but the intercepts (a_i) are fixed parameters and varied over banks. The representation of this model is

$$ROE_{it} = x_{it}\, b + a_i + u_{it}$$

(c) Random effect model (variance components): It assumes a common slope but the intercepts (a_i) are drawn from a common distribution with mean a and variance σ^2. In this model (random effect) the intercept terms are treated as random rather than as fixed and they are independent of the residuals and mutually independent. Since the variance components estimates are inconsistent when the individual intercepts are correlated with the independent variables, a Hausman test statistic is computed to test for correlation. The panel data procedure computes all the relevant F - tests, i.e. for the hypothesis that the slope coefficients are equal, and for the joint hypothesis that both slope and intercepts are equal. The representation of this model is

$$ROE_{it} = x_{it}\, b + a_i + u_{it}$$

4. Empirical results

Tables 1 and 2 present the results of the three estimated models (i.e. total model, fixed effect model, and random effect model). The reported results in table 1 indicate a strong positive impact of the leverage ratio and a negative influence of the expense ratio on banks' return on equity. The signs of the estimated coefficients of these two independent variables are as expected. The more financial leverage a bank it uses, and the less the average employee costs to the bank, the more return on equity the financial firm enjoys. However, a bank increases its financial leverage when it raises the proportion of debt relative to equity used to finance its business. Thus, a high leverage multiplier raises return on equity when net income is positive, but it also indicates high financial risk. The estimated coefficient of the expense variable is found extremely small. Consequently, the impact of this ratio on bank's profitability appears rather trivial. In addition, the estimated coefficient of the concentration ratio is found negative, but statistically insignificant. This finding implies that the concentration ratio has no impact on banks' profitability.

The value of the F-test for the hypothesis of equal slope is 1.9536, which is less than the critical value provided by the tables. Thus, we accept the null hypothesis of common slope. The value of the joint hypothesis that there is a common slope and a common intercept is 13.709, which is greater than the critical value provided by the tables. Therefore, intercepts vary across cross-section units, which implies the existence of inter-bank variability. To the extent that the estimated influence of the expense ratio on bank's return on equity appears rather trivial, inter-bank variability suggests that the impact of financial leverage on bank's profitability is not the same. This may occur due to the different levels of financial leverage that the sample banks use. If we look at individual bank data we observe that state-controlled banks employ more financial leverage than

private banks[11], and consequently the former have placed more financial risk on their stockholders, than the latter.

The computed value of the Hausman test is 0.9062, which is less than the critical value given by the tables. Thus, we accept the null hypothesis of no correlation between the individual intercepts and the explanatory variables in the random effect model. This finding indicates that the estimates of the random effect model are consistent.

The evidence presented in table 2 illustrate that there is a strong positive impact of asset utilization and a rather trivial positive influence of productivity ratio on banks' profitability. The signs of the estimated coefficients of these two independent variables are as expected. The more gross yield on assets a bank earn, and the more the average bank employee helps the firm in extending credit and acquiring deposits, the more return on equity the financial firm enjoys. The estimated coefficient of the productivity variable is found extremely small. Consequently, the impact of this ratio on bank's profitability appears rather trivial. In addition, the estimated coefficient of the concentration ratio is found positive, but statistically insignificant. This finding implies that the concentration ratio has no impact on banks' profitability.

The value of the F – test for the hypothesis of equal slope is 1.3535, which is less than the critical value provided by the tables. Thus, we accept the null hypothesis of common slope. The value of the joint hypothesis that there is a common slope and a common intercept is 10.482, which is greater than the critical value provided by the tables. Therefore, we accept the null hypothesis of common slope and intercepts variability across banks. To the extent that the estimated influence of the productivity ratio on bank's return on equity appears rather trivial, inter-bank variability suggests that the impact of asset utilization on bank's profitability is not the same. This may occur due to the different asset utilization that the sample banks employ. Examination of the individual bank data tends to verify the failure of some sample banks to earn as much gross yield on assets as some of their competitors.

The computed value of the Hausman test is 2.2211, which is less than the critical value given by the tables. Thus, we accept the null hypothesis of no correlation between the cross-sectional characteristic and the included explanatory variables of the random effect model.

5. Conclusions

This study investigates the impact of financial variables and concentration on the return on equity of Greek banks. Financial variables proved to be a very important determinant of banks' profitability. However, their impact appears to differ across banks. This finding reveals the different importance that banks place to financial factors. This argument seems to reinforce the indication that appears in Vasiliou (1997b) that Greek banks have different balance sheet composition that reflects the preferences of its customers. Some banks (mainly private owned) are focused more on wholesale banking, while other banks (mainly

[11] This argument is also found in Vasiliou (1997b).

state controlled) deal primarily with retail banking. This distinction is based upon their target customers. This difference in portfolio composition, in turn, produces different yields on earning assets and costs of liabilities. In consequence, the former banking group experiences greater asset utilization and needs to use relatively low financial leverage to accomplish an acceptable return on equity. On the other hand, the latter banking group experiences smaller asset utilization and needs to undertake relatively high financial leverage in order to produce an adequate profitability ratio.

In addition, market structure is found to have no influence on banks' performance. This seems rational for this banking sector since its important entry barriers make banks to be more sensitive to actual competitors than to potential entrants.

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Table 1: *Regression results of equation (1)*

Dependent variable: ROE

Variables	Total model Coefficients	Fixed effect model Coefficients	Random effects model Coefficients
Constant	199.442	---	209.375
	(0.962032)		(1.63424)
LM	1.15823	0.820141	0.957171
	(3.24342)	(1.73432)	(2.44367)
EXP	-0.00311	-0.003183	(-0.003123
	(-2.86575)	(-2.9246)	(-3.1382)
CR_4	-2.01041	-2.18346	-2.0848
	(-0.824831)	(-1.4225)	(-1.40921)
R^2	0.35	0.81	0.76
SER	16.8512	9.01208	10.0909
n	60	60	60

Note: *SER is the standard error of the regression, n is the number of observations, and the values in parentheses are the t - Statistics.*

Table 2: *Regression results of equation (2)*

Dependent variable: ROE

Variables	Total model Coefficients	Fixed effect model Coefficients	Random effects model Coefficients
Constant	-245.273	---	-140.567
	(-1.40015)		(-1.1396)
AU	5.84870	3.96423	4.62353
	(5.08122)	(3.77091)	(4.86674)
PRO	0.0001304	0.000067	0.0000925
	(6.12506)	(2.311621)	(3.86379)
CR_4	1.65776	0.07547	0.791348
	(0.744875)	(0.05084)	(0.57004)
R^2	0.40	0.83	0.78
SER	14.3321	8.47089	9.60263
n	60	60	60

Note: *SER is the standard error of the regression, n is the number of observations, and the values in parentheses are the t - Statistics.*