THE IMPACT OF MARKET STRUCTURES ON FINANCIAL INSTITUTION PERFORMANCE

Doyran, Mine A.
Lehman College/City University of New York (CUNY)

ABSTRACT
During 2000-2010 cyclical crises, reforms in the banking sector and global expansion of firms drastically transformed the US financial-services market. This paper investigates firm-specific, industry-specific (microeconomic) and macroeconomic determinants of financial institution performance. It reviews the manner in which market structures and firm characteristics affect the overall firm performance in terms of profitability by using the industrial organization literature. To this end, we construct a panel of year-end, firm-level data for a sample of insured and regulated savings and loan associations (S&Ls) in 2000-2010. The study suggests that with the exception of leverage, liquidity risk and market share (relative market power), all firm-specific determinants have significant associations with bank profitability. Neither market power of individual firms nor concentration, however, affects profitability as anticipated by the traditional market structure hypotheses. Since some support is found for managerial (X) efficiency (ESH) but also credit riskiness of the banking units, public authorities should focus on identification and implementation of policies leading to strengthened risk management. Furthermore, prudential supervision aimed at balancing market forces and credit riskiness can enhance the soundness and stability of institutions in this sector.

INTRODUCTION AND BACKGROUND

Savings and Loan Associations, also known as S&Ls or thrifts, have been the epicenter of cyclical financial crises as well as others caused by inept supervision and flaws in financial regulatory policies. For decades, S&Ls served as specialized banks making mortgage loans and savings accounts at low-interest and federally insured accounts. In what became known as the S&L crisis of the late 1980s, however, hundreds of S&Ls made a stream of bad loans, ending in a government takeover and bailout that ultimately cost taxpayers somewhere around $100 billion to $500 billion (Curry and Shibut, 2000:26). Since the beginning of the subprime crisis in 2008, a large number of S&Ls have also failed, while customer default on mortgages and non-performing loans are on the increase to a degree not seen since the early 1990s (US Treasury Department, 2010).

The US financial services industry has undergone a fundamental transformation since the savings and loan debacle in the 1980s Deregulatory reform aimed to enhance competition by giving greater freedoms to the private sector and encouraging new entrants into the financial services market. Firms are generally fewer and bigger today and offer a wide range of goods and services, but operate in increasingly concentrated markets. Larger institutions emerged through mergers and acquisitions, often motivated by the need to achieve greater efficiency and an insurance against risk. As argued elsewhere, this transformation has been the result of product and geographic diversification (ie., deregulation; removal of branch restrictions) and advances in financial technology, ideally promoting competition and improving the overall productivity and efficiency of the market. However, the rising wave of concentration and a decreasing number of

S&Ls raise concerns about an increase in market power and its potential affect on consumer welfare and competition in the sector.

Since the mid-1990s and earlier, a voluminous literature has emerged examining the impact of market structures and consolidation on S&Ls and other types of financial service providers (credit unions, savings banks, insurance companies, etc). In depth and original analyses of this topic included deregulation, re-regulation, S&L insolvency risks, and the impact of change in equity ownership composition on efficiency and cost structure of firms (Balderston 1985; Benston, 1986; Kane, 1989; Barth, 1991; Mester, 1993; Cebenoyan, Cooperman and Register, 1995; Fraser and Zardkoohi, 1996; Curry and Shibut, 2000; Frame and Coelli, 2001). One earlier line of research—especially those conducted by Berger (1995b) and Berger, Hunter and Timme (1993)—developed criteria that distinguished "cost efficiency" from "profit efficiency" and classified extensive literature related to market power and efficient structure hypotheses.

Although market structure-performance hypotheses are frequently applied to commercial banks, there are a limited number of applications to savings and loan associations in the most recent period. S&Ls are important in that they might reveal certain structural and performance features of non-bank financial institutions. This paper examines a particular class of financial institutions—savings and loan associations—in order to analyze the dynamics of profitability, with an interest in examining the impact of market structures and the level of efficiency of the firms on the overall performance of sample firms. To this end, we use firm-level data for active and insured savings associations between December 1, 2000 and December 31, 2010.

Using ROA (return on assets) as a proxy for profitability, the study highlights that, with the exception of leverage, liquidity risk and market share (relative market power), all firm-specific determinants significantly affect profitability. Therefore, we reject the traditional market power (SCP, RMPH) hypotheses and conclude that neither market power/ share of individual firms nor market concentration have meaningful associations with banks' profitability. At the same time, the SCP hypothesis requires further exploration while the findings regarding size (scale efficiency) illustrate the "diseconomies" of scale. Since some support is found for managerial (X) efficiency (ESH) but also credit risks of the banking units, public authorities should focus on identification and implementation of policies leading to strengthened risk management in this sector.

The rest of the article is organized as follows. Section 2 provides a brief overview of the main developments in the Savings and Loan Industry as background to the empirical work. A review of the relevant literature on market-structures and performance is presented in Section 3. The variables in previous studies are of greater importance to understand the theory behind the market structure. Section 4 presents the empirical model along with a description of the data and variables used in the study. Section 5 yields the results of the empirical analysis. Section 6 presents the policy implications of the analysis and discusses what policy option is appropriate to the S&L industry. Section 7 presents the conclusion and draws strategic lessons from this analysis for future researchers and practitioners in the field of risk management.

MARKET STRUCTURE-PERFORMANCE RELATIONSHIP IN FINANCIAL INSITUTIONS

With the decline of the number of institutions, there are concerns that the individual organizations are getting larger and the financial industry is becoming more concentrated. The resulting consolidation weakens competition (and thus consumer welfare) by fostering "collusive" behavior among firms and encouraging monopolistic price setting. Experts are divided over whether such collusion exists, and in cases where they agree that it does, differ over the policy interventions necessary to prevent it. **T**he debate is around whether market structures (concentration) are directly responsible for explaining firm's performance or there are other factors. The following section from financial performance studies highlight the debate around the underlying causes of firm behavior and its relationship to market structures.

Previous studies revealed the impact of bank-specific (firm-level), industry-specific and macro-economic determinants of banking sector performance (Bourke, 1989; Berger et al, 1993; Berger, 1995a; 1995b; Goldberg and Rai, 1996; Demirguc-Kunt and Huizinga, 2000; Molyneux et al, 2004). Since the early 1980s, research has helped to interpret different sources of S&L performance and efficiency gains or losses, drawing from broader research across the entire banking industry. However, the performance of nonbank financial institutions has been studied far less frequently than that of commercial banks (Brigham, 1964; Benston, 1972; Verbrugge et al., 1976; Geehan and Allen, 1978; Mester, 1993; Bradley, Gabriel and Wohar, 1995; Cebenoyan et al., 1995; Kaushik and Lopez, 1996; Jahere, Page and Hudson, 2006). A key ratio put forward to proxy the firm performance includes profitability; measured in terms of as return on assets (ROA), return on equity (ROE) and net interest margin (NIM). While selecting the proper criterion to represent a firm's performance is difficult, overall determinants of profitability include a bank's management decision and financial objectives, such as bank size, capital adequacy, operating expenses, liquidity levels, financial leverage and loan loss provisions (Rasiah, 2010:1-2; Athasanoglu et al., 2006:8).

Especially within performance studies, there is a growing body of research focusing on market structures as the basis for analyzing firm behavior. Led by structural approaches and derived from the theory of Industrial Organization, this research focuses on the Structure-Conduct-Performance (SCP) and Efficient Structure Hypothesis (ESH) (Seelanatha, 2010:21). As Molyneux et al (2004) note, SCP paradigm flows from the oligopolistic theory of banking and "collusive" behavior of firms. It argues that market concentration weakens competition by fostering collusion among few firms and resulting in above-normal profits. The sources of monopolistic profits lie in non-competitive behavior including the charging of higher interest on loans, lower rates on deposits and higher fees, and so forth. The degree of concentration negatively impacts competition but is positively associated with profits—the larger the market concentration, the less the degree of competition and higher the profits. Therefore, banks in more concentrated markets earn higher profits (because of collusive/non-competitive behavior) than banks in more competitive markets. The "measures of performance used as indicators of the degree of competition among banks, include bank profit rates, interest rates banks charge on loans, interest rates they pay on deposits" (Gilbert, 1984:618). For practical purposes, this type of research provides regulators with an empirical basis for evaluating the influence of mergers competition (and consumer welfare) and suggesting interventions to limit the size of banks (Gilbert, 1984).

The SCP hypothesis finds strong confirmation in studies where concentration ratios are significant in explaining bank profits, regardless of firm-specific efficiencies (Loyd-Williams *et* *al*, 1994:437). For example, Bourke's (1989) classical study of commercial banking in North America, European and Australia shows that market concentration is positively associated with banks' profits. His findings provide some support for the Edwards-Heggestad-Mingo theory of risk avoidance that banks in concentrated markets modify their behavior by holding less risky assets on their loan books. Similarly, a study by Loyd-Williams et al (1994) supports the SCP hypothesis as an explanation for the "collusive behavior" of Spanish banks and high level of concentration in the Spanish banking market over the period 1986-1989. Using survey data from 1984-88, Ruthenberg (1994) concludes that factors in addition to market structure and concentration may affect profitability, such as entry/exit barriers and competitive behavior of firms. Yet, as Goldberg and Rai (1996) noted very few studies on market structures included direct efficiency measures in their estimations of performance, except for Vennet's (1993) confirming concentration in some EC banking markets-- Belgium, Ireland, Portugal, and Spain.

Related theories of market structures are summarized in greater length in the works of Berger (1995b) and Golberg and Rai (1996): Relative market power hypothesis (RMPH) and Efficient Structure Hypothesis (ESH). RMPH, which is a special case of SCP, uses "market share" as a proxy for "market power" and posits that only firms with large market shares can earn "super-normal profits". Firms with "well-differentiated products" are able to exercise market power that enables them to earn "super-normal profits" on non-competitive price setting (Berger, 1995b: 404). In RMPH, profits do not need to occur in concentrated markets as market share" becomes a source of "market power" rather than concentration (Goldberg and Rai, 1995:749). The positive relationship between market share and profitability in Smirlock's study (1985) rejects the collusion (SCP) hypothesis by showing that there is no relationship between concentration and profitability. His findings highlight that firm-specific (managerial) efficiencies contribute to profitability by the inclusion of a market share variable. On other hand, a similar conclusion in Rhoades' work (1985) indicates that market power in price setting arises from well-differentiated product lines rather than efficiency of individual banking units.

In contrast to the two market-power theories (SCP and RMPH), Efficient-Structure-Hypothesis (ESH) puts "firm-efficiency" at the heart of the performance analysis. It argues that when efficient firms behave aggressively it leads to an increase in their size and market share. Such efficiencies facilitate higher profits and thus concentration through an increased market share (Seelanatha, 2010:21). Larger market share results from the efficient operation of firms, which is broken into two components. Under the X-Efficiency (ESX) hypothesis, firm-specific efficiency explains both profits and market structures. There is a positive relationship between concentration and profits that results from firms with superior management and efficient production techniques. Since efficient firms operate at lower costs, they can capture higher market shares and thus maximize profits. It is very likely that resulting market share leads to higher market concentration. Under the scale efficiency (ESS) hypothesis, on the other hand, it is assumed that there are cost advantages associated with greater bank size, which is the driving force of profits and market structures. It is argued that firms "operating with optimal economies of scale will have the lowest costs and the resulting higher profits will lead to higher market concentrations" (Goldberg and Rai, 1996:749). Berger's (1995a) study of the relationship between bank capital and earnings finds evidence in support of the ESH. The ESX hypothesis that bank profitability is positively related to X-efficiency holds especially in US banking. Efficiency differences among banks result in high levels of concentration, which, in return, makes it easier to gain greater than average profits. On the other hand, Papadopoulou's analysis (2004) of European banking performance does not provide any support for the two efficient structure hypothesis. ariations in bank profitability is based on bank size as firm-specific variable (ie., "big banks are more X efficient than small banks"). This seems to suggest there are cost advantages associated with greater size.

Selecting empirical criteria for resolving the conflict between SCP and two versions of Efficient-Structure hypothesis (ESH) presents challenges. Studies employed different methodologies to test the SCP and ESH paradigm but shared similar observations on the relationship between concentration and profitability. While these theories are not mutually exclusive, they have contrasting implications for anti-trust policy and government regulation of mergers and acquisitions. The SCP hypothesis cautions against mergers and proposes interventions to minimize the size of banks and promote de-concentration. By contrast, EFH sees no role for government intervention in mergers since it is assumed that efficient banks can "improve their markets share by providing more economical banking services in the market" (Seelanatha, 2010: 20). Given that more efficient firms are expected to gain a higher share of the market, one way of distinguishing between market power and efficient structure theories is to include market shares, efficiency and concentration measures (CR, HHI) in the profitability equation. The efficiency hypothesis is supported if bank performance (as measured by profitability) depends on market share (and other X-efficiency measures) regardless of the degree of concentration in the market (Loyd-Williams et al, 1994:437).

The remaining empirical research on financial institution performance analyzed Savings and Loan association efficiency. Although S&L performance is less studied than commercial banks, the test of market structure hypotheses (SCP, RMPH, ESH) is given less attention. Furthermore, much of the previous research that examined the S&L performance in the 1970s, 1980s and 1990s when financial services markets were very different from today. The poor performance of the thrift industry in the early 1990s led researchers to investigate S&L insolvency risk, failure, and mergers as well asthe efficiency-ownership relationship and cost structure of the thrift industry. Goldstein et al (1987) used "translog cost function" from all insured S&Ls of different sizes in 1978 and 1981 to examine the impact of size on cost structure prior to deregulation. He reported economies of scale (variations in cost elasticity) for all size classes. Applying a stochastic cost frontier approach to a sample of 559 S&Ls in Atlanta district, Cebenoyan et al (1993) investigated the relationship between firm inefficiency and ownership (organizational) form. They reported little variation in the efficiency of stock versus mutual S&Ls. Mester (1993), on the other hand, combined stochastic frontier method with multiproduct cost function and found increasing returns to scale for mutual S&Ls and constant returns to scale for stock-owned S&Ls. While her research did not include "estimates of technical progress" due to use of "single-cross section, it indicated that stock-owned S&Ls are on average more efficient than mutual S&Ls (Stiroh, 1997:1379).

In another study, Fraser and Zardkoohi (1996) tested both the ownership and deregulation hypothesis and reported greater risk taking in stockholder owned S&Ls than for mutual ownership. Their analysis highlighted the decline in corporate accounting standards, a function of organizational deregulation. In research into the effect of executive pay structure on S&L performance using agency theory, Hermalin and Wallace (2001) reported a positive pay-performance relationship in S&Ls not anticipated by previous research. The primary focus is the "inter-firm heterogeneity" in compensation packages of firms, "firm size" (scale economies), "managerial ability" and firm information about "managerial performance".

Most of the studies do not inclusively measure performance in a multi-product industry. This stems from the diversity of output and individual characteristics of banking units. Therefore significant relationships may appear because of the researchers' use of aggregate data, which may downplay cross-sectional differences. In addition, focusing on market structures alone downplays firm-specific differences and non-structural factors such as regulations (entry/exit barriers), which may have a significant impact on market behavior. The S&L industry is rapidly changing and is much different in 2011 than in 1990s. Although there is no conclusive evidence on the impact of market competition and consolidation on the efficiency and stability of institutions, it is worthwhile looking how banks, albeit limited sample such as this, respond to market forces. The remainder of this paper looks at how market structures and other variables contribute to the performance of S&Ls in our sample for the period 2000-2010. The methodology used in this analysis incorporates some of the recent developments in econometrics, namely panel unit root and correlated-random effect tests, which may uncover the nature and performance of the thrift institutions in this sample.

METHODOLOGY AND SAMPLE DATA

In our empirical study, we use panel data that combines time-series data and cross-sectional data, particularly annual data. We have collected balance sheet data from federal savings and loan associations for the 10-year period 2000-2010. The firm-level data, including the number of banking firms and all proxies, come from the Federal Deposit Insurance Corporation (FDIC) database. We use a sample of up to 25 active institutions and focus on the most recent period between December 1, 2000 and December 31, 2010. This sample includes charter type as insured savings institutions and bank charter class as regulated savings associations (SA) holding approximately sixty percent of total industry assets. Sample firms include those ranked by total assets and specialized in commercial lending, consumer lending (credit card especially) and mortgage lending that have provided information to the FDIC during the period under study (for example, financial statements or balance sheet reports were missing for some banks). In the interest of representing a diverse sample, the total assets of institutions are selected from a variety of asset sizes: $3-4 billion, $5-6 billion, $8-10 billion to $11-16 billion, $23-27 billion, $39-50 billion and, $60-91 billion. Time-series for financial structure and macroeconomic variables are obtained from World Development Indicators & Global Development Finance of the World Bank database. While the total number of bank-level observations is 300, there are missing values for certain variables, such as credit risk, liquidity risk, and provision for loan losses. Thus we will use in our empirical work unbalanced panel data.

The empirical test is concerned with the determinants of S&L association performance measured by profitability (ROA)—ratio of net income to total assets. The independent variables include bank-specific, market structure (industry-related), financial structure and macroeconomic variables. The proxies for bank profitability are similar to those used in previous studies (Bourke, 1989; Goldberg and Rai, 1996; Demirguc-Kunt, 2000; Pervan et al, 2009). ROA measures the profitability of a company relative to its total assets—the sum of total assets including cash, loan, securities, bank premises and other assets and excluding off-balance sheet accounts. Although ROA can be biased because it excludes off-balance sheet activities, it is the widely used performance measure. Entering the regression analysis as a dependent variable, it reflects how efficiently bank management uses its real investments (assets) to generate higher profits.

On the other hand, we use efficiency, market share, leverage, credit risk, liquidity risk, logarithm of total assets (bank size) and non-interest income to earning assets as firm-specific proxies for performance. Earlier researchers like Lloyd-Williams et al (1994) used market share as a proxy for profitability and efficiency level of firms. Following Lloyd-Williams et al (1994), Gilbert's review (1984) and Pervan et al (2009), we use HHI index and market growth as a measure of market structure. This study uses HHI as proxy for concentration because it considers the market share of all banks in the sample, as opposed to CR4, which gives more preference to top 4 banks' market share. Following Demirguc-Kunt and Huizinga (2000; 1998), macroeconomic and financial market variables are intended to control for external (cyclical) factors that might impact bank profitability. Instead of real GDP as a proxy for performance, we used GDP per capita income, which is a better measure of total demand for banking businesses, for example the extension of loans of growing banking activities, supply of funds such as deposits from customers.

$$PROFIT_{it} = f(B_{it} + I_t + FS_t + M_t)$$

Above is a list of the *cateris paribus* variables accompanied by a brief description of their relationship to bank performance and null hypotheses for their inclusion in the model. A linear equation relating the performance measure to a vector of indicators is displayed in the next section. The performance function is displayed as follows, where $PROFIT_{it}$ represents performance measure (ROA) for the firm *i* during the period *t*; B_{it} are bank specific variables for bank *i* at time *t*; M_t are macroeconomic variables, I_t are industry-related variables, and FS_t are financial structure variables.

ECONOMETRIC SPECIFICATION

In this paper, we employ a multivariate regression analysis to examine the relationship between S&L performance and the firm-specific, industry-specific and macroeconomic determinants described above. A panel data analysis is employed to evaluate the impact of specified ratios on financial institution performance. The dependent variable of performance represents profitability measured by return on assets (ROA). Within a panel data setting, 12 variables (financial ratios) are observed among organizations of different sizes over the period 2000-2010. Our data have temporal and cross-sectional reference, *i,* in this case*,* is the profitability of bank *i* at time *t*, with *i*=,….., *N* ; *t*=1,……,*T*; *c* is a constant term, the *X* are explanatory variables grouped into bank-specific, industry-related (microeconomic), financial structure and macroeconomic determinants, *j*, *l*, *m*, *n*, respectively; ε_t captures the random error or disturbance in time denoted by *white noise* (residual), with α_i capturing the unobserved individual (bank-specific or "entity fixed effect") and u_{it} the remainder of the disturbance or error term. Z_i is an unobserved variable that varies from one bank to the other but is constant over time. We want to estimate profitability, the effect on Y of X holding constant unobserved bank characteristics Z_i. In the fixed-effect model, this can be interpreted as having *n* intercepts one for each entity with the constant slope for all entities: $\alpha_i = c + \beta_2 Z_i$ (Stock and Watson, 2011:354). A linear regression model of the following form is designed to test the relationship between profitability and the above variables. In addition, the profit equation as displayed below is aimed at testing the SCP and ESH hypotheses.

$$Y_{ROA} = C + \sum_{j=1}^{J} \beta_J X_{it}^{j} + \sum_{l=1}^{L} \beta_l X_t^{l} + \sum_{m=1}^{M} \beta_m X_t^{m} + \sum_{n=1}^{N} \beta_n X_t^{n} + \varepsilon_{it}$$

$$\varepsilon_{it} = \alpha_i + u_{it}$$

TESTING PROCEDURE

In particular, this research applies a panel data analysis with both the Panel Least Squares (PLS) method of fixed effects (FE) and Panel Estimated Generalized Least Square (PEGLS) method of random effects. Panel data analysis is a type of longitudinal analysis that allows for both the cross-sectional and time series effects (Baltagi, 2001). Given its inclusion of unit-level data, however, this analysis highlights individual firms through the heterogeneity in units of observation. In the pooled regression model, also known as constant coefficient model, it assumed that all firms have the same characteristics. In other words, both intercepts and slopes have constant coefficients—meaning that there are no individual-specific (unique characteristics of units) and time-variant effects. Therefore, this type of panel analysis excludes the possibility of any form of heterogeneity, which is, in reality difficult to identify. In order to account for differences between units of observation, this study incorporates the fixed and random effects model. Fixed effects regression (FE), also known as "covariance model" or "within estimator", "is a method for controlling for omitted variables in panel data when the omitted variables vary across entities (states) but do not change over time" (Stock and Watson, 2011:354) While the intercept is cross-section specific and differs from bank to bank in FE, those characteristics are unique to banks and do not vary across time (constant slope). In the random effects model, on the other hand, intercept is a random outcome variable; the variation across entities (cross-sectional error term or unobserved individual heterogeneity) is assumed to be random and must be uncorrelated with the predictor or independent variables (Yaffe, 2006). If we assume fixed effects, we impose time independent, in other words, invariant errors for each firm, which are correlated with the explanatory variables. If we use random effects, however, we assume no fixed or individual effects. The advantage of using RE is the generalization of inferences beyond the limited sample used in the model. Following a procedure in the literature, this study uses the Hausman test to determine which effect to use.

Table 1: Hausman Test Results

	Chi-Sq. Statistic
Cross Section Random (Regression 3)	10.273 (0.506)
Cross Section Random (Regression 2)	10.509 (0.310)
Cross Section Random (Regression 1)	10.219 (0.176)

Hausman indicates the Hausman (1978) specification test for correlated random effects. This test examines the null hypothesis of no misspecification against the alternative of specification at 5% critical value. The figures in parenthesis are the p-values.

Secondly, a common unit root test is applied using a procedure proposed by Breitung (2000) and Breitung and Paseran (2008). In regression analysis, variables with unit root exhibit trending or non-stationary behavior leading to spurious relationships between the predictor and outcome variables. When data is observed over a defined time frame, autocorrelation may occur where the preceding and successive values of time-series are highly correlated and display trending behavior (Cromwell, Labys & Terraza, 1994:23). Conventional econometric methodologies, however, assume that time-series values are stationary while they are, in real world, can be non-stationary. Therefore, it is important to check whether the variables included in our models contain a unit root. While several panel unit root tests are available—for example, Im Pesaran and

Shin (2003)—this study uses the test developed by Breitung (2000) and Breitung and Paseran (2008). The Breitung test assumes that there is a common unit root process, $\alpha = \rho - 1$, where the lag orders for the difference terms (ρ_i) are identical across sections. This assumes a null hypothesis of unit root for the common process, $H_0 : \alpha = 0$, tested against the alternative hypothesis of no unit root, $H : \alpha < 0$. A unit root test renders the data stationary by including the lagged values of a time-series and applying first or second difference operator to each data series.

Table 2: Breitung Panel Unit Root Test Results

Variables	Level	Variables	First Difference	Second Difference
ROA	-0.025(0.510)	D((ROA))	0.626 (0.734)	-2.031**(0.021)
EFF	1.324 (0.900)	D((EFF))	-0.340 (0.366)	-4.817*** (0.000)
LEV	3.072 (0.998)	D (LEV)	-2.279** (0.011)	
CRIS (ADF Fisher)	-1.123 (0.130)	D (CRIS)	-1.587* (0.056)	
LIQ	0.651 (0.742)	D(LIQ)	-3.872*** (0.000)	
TA	5.170 (1.000)	D((TA))	1.098 (0.863)	-1.750** (0.040)
NONIXEA	3.123 (0.999)	D((NONIXEA))	-1.066 (0.143)	-1.865**(0.031)
MS	3.543 (0.999)	D((MS))	-0.687 (0.245)	-2.364*** (0.009)
HHI	-13.134 (0.000)			
MG	13.512*** (1.000)	D(MG)	-4.453*** (0.000)	
MCAPGDP	-7.109*** (0.000)			
GDPERC	-5.912*** (0.0000)			

*Breitung indicates the Breitung and Paseran (2008) Breitung t-test for panel unit root tests. This test examines the null hypothesis of unit root (non-stationary) at 5% critical value using the Schwarz criterion for the lag differences and including in test equation individual intercept and trend. The figures in parenthesis are the p-values, ***Significant at 1% or 0.01 level; ** Significant at 5% or 0.05 level; *Significant at 10% or 0.1 level. CRIS passes the ADF Fisher Unit Root test in first difference.*

Following a procedure advanced by Breitung and Paseran (2008), we de-trend the data with a proper statistical technique. The Breitung method tests the existence of a common unit root in a time-series, panel data, before undertaking any estimation. This test confirmed that first and second levels were required for some variables in order to induce stationary. In a series of unit root tests, the coefficients did not show the expected sign in the level. Accordingly, it was proven that our data were non-stationary and required transformation. The re-estimated variables are presented in Table 2, where D (X) stands for the first difference operator and D ((X)) for the second difference operator.

Table 1 and Table 2 show Hausman misspecification and Breitung common unit root test results. By and large, the Breitung test indicates that all the variables in the model are integrated of order one and thus rendered stationary. We have run the Hausman (1978) test to determine whether our models are appropriate for panel data analysis and they are free of misspecification. The null hypothesis of no misspecification is tested against the alternative of misspecification. The results indicate no evidence to reject the null hypothesis (that there is no correlation between unobserved random error and independent variables). In other words, with the test probability (p value) greater than the critical value of 0.05 in all three equations (0.17, 0.31, 0.50), it is appropriate to use the random effect model instead of the fixed effect model.

INFERENTIAL STATISTICS OF TEST DATA

This section presents the empirical analysis. First, it reviews the inferential statistics of variables used in the analysis. Next it evaluates the statistics in order to reject or accept the validity of market structure hypotheses (SCP, RMPH, ESH) discussed in the previous section. The main research question raised in this paper is whether market structures (resulting from market concentration), banks' relative market share and bank-specific characteristics are important in explaining firm performance. All ROA based regressions have given consistent evidence for the impact of market structure on the firms' performance. The estimated coefficients for market share and concentration in the third regression are not statistically different from zero. Our empirical results seem to suggest that firm-specific variables have a significant influence on overall performance in this sample of S&Ls. Therefore, we reject the two market power hypotheses (SCP, RMPH) hypotheses and conclude that neither market power/ share of individual firms nor market concentration have meaningful associations with profitability.

Table 3 summarizes the results of the Panel EGLS (Panel Estimated Generalized Least Square), which were based on 227, 205 and 205 bank-year observations. We have run three regressions in order to control the effects of profitability components and see the impact of controlling on ROA. Regression 3 includes all the variables for the final estimation. In the random effect (RE) model, there is a low level of negative serial correlation (autocorrelation) with Durbin-Watson statistic of 2.26. The regression model, however, is significant at p value based on Probability (F Statistic). Overall, Probability (F Statistic) measures the significance of the relationship between the control variables and dependent variable. Based on R (0.39) and Adjusted R-Squared (0.35) values, the right hand side variables explain the dependent variable by almost 39% and the F statistic supports the regression. Probability (F-Statistic) suggests that our regression model is significant at a level lower than 5% (critical value), so we can be reasonably confident that the good fit of the equation is not due to chance.

Table 3: Estimated Regression Coefficients

Independent Variables	Profitability		
Efficiency	-0.014*** (-6.174)	-0.013*** (-4.481)	-0.012383*** (-4.171)
Leverage (Bank Risk)	0.000*** (0.042)	0.004 (0.218)	0.006048 (0.291)
Credit Risk	-0.347 (-8.212)	-0.324*** (-7.434)	-0.330720*** (-7.094)
Liquidity Risk	-0.008 (-0.725)	-0.011 (-0.858)	-0.007525 (-0.578)
Bank Size	-0.000** (-2.194)	-0.000* (-1.788)	-0.000 (-1.694)
Overhead Expenses	-0.147** (-2.518)	-0.137** (-2.155)	-0.141644** (-2.210)
Market Power	-0.026 (-0.372)	-0.044 (-0.549)	-0.039806 (-0.493)
Concentration ratio		-0.157* (-1.858)	0.117652 (0.637)
Market Growth		0.002882 (0.235)	0.006111 (0.479)
Stock Market Development			-0.002304 (-0.702)
Economic Growth			-0.000 (-1.477)
Intercept	0.000	0.014	0.063
Observations	227	205	205
R-Squared	0.411	0.376	0.386
S.E. of regression	0.008	0.008	0.008
F. Statistic	21.905	13.096	11.072
P (F. Statistic)	0.000	0.000	0.000

****Significant at 1% level or 0.01; ** Significant at 5% level or 0.05; *Significant at 10% level or 0.1. The figures in parenthesis are values of t-statistics.*

The third regression provides statistical evidence that the main sources of bank performance are efficiency, credit risk, firm size and overhead expenses (as a cost-saving variable). Furthermore, size variable has shown a statistically significant but weak negative relationship with the performance (p value of 0.09). This invalidates the scale efficiency version of ESH, which says that firms in “optimum scale” that profitable banks produce goods and services at relatively lower cost. Diseconomies of scale can be the most convincing explanation for such a finding suggesting that larger firms are not necessarily more profitable. Overall, the scale inefficiency indicates that S&Ls are producing goods and services at increased per-unit costs, which negatively impacts their profitability. This is consistent with negative and significant coefficient sign of overhead expenses (NONIXEA). As seen in Table 4, higher ratio of noninterest expense to earning assets is associated with less profitability. Likewise, profits decline with a greater proportion of efficiency ratio (operating costs/total assets), supporting the ESH that profitable banks enjoy cost saving advantages from firm-specific/managerial efficiencies.

In traditional market structure theories, the role of credit risk (CRIS) is generally secondary. However, estimated parameters for all equations suggest a relationship between credit risk and bank performance. The regression results point to a statistically significant and negative relationship between CRIS and ROA. They show that riskier banks can gain lower ROA, supporting the conclusion that risk as measured by loan quality (loan loss provisions/total assets) has a meaningful impact on firm performance. Unexpectedly, leverage (LEV) and liquidity risk (LIQ) has no impact on profitability in any of the regressions.

The last bank specific variable, market share (MS), for which we have expected a positive and significant impact on profitability, has an insignificant coefficient in all regressions and fails to support the Relative Market Power Hypothesis (RMPH) as an explanation for market structure-performance relationship. Given that market power (MS) is insignificant in all regressions, it also fails to support the EFH that higher profit is the result of higher market share related to firm-specific efficiencies rather than concentration. On the other hand, efficiency influences overall performance regardless of market share, lending partial support to the ESH.

The coefficient of HHI seems to be mixed with the results of final regression. When macroeconomic and financial structure variables are included, market concentration (HHI) is insignificant; therefore classical SCP hypothesis is rejected. In other words, bank profitability is not the result of higher concentration or collusive power of large banks operating in oligopolistic markets. When external variables are controlled, however, HHI is significant at a 10% level but is negatively associated with profitability. This result invalidates the SCP hypothesis as an explanation of "positive" relationship between market structure and performance.

GDP per capita income and market capitalization have been included to the regression model to control for the effects of macroeconomic environment. Both variables were not able to provide statistical evidence to prove that firm profitability is the result of economic growth or financial market development. This is expected given that all banks operate in the same macroeconomic environment. By contrast, variations in profitability could be revealed if we were to do a comparative analysis of macroeconomic performance.

POLICY IMPLICATION OF EMPIRICAL FINDINGS

This section discusses the effects of contemporary regulations on S&L performance and market structures. Efficiency, credit risk and operating expenses are important factors since they were found to be complementary with financial institution performance. While efficiency is important, the results confirm that credit riskiness is one the main factors influencing profitability. One possible way to maintain S&L safety and soundness is to increase loan loss reserves in interest bearing assets, especially high-risk assets like subprime mortgage loans. Keeping reserves higher than average can cushion the effect of risky assets on performance. Gaining better risk management banks can minimize risky assets and enjoy higher profits under the surveillance of prudential regulations. Therefore, the results suggest policy makers to focus on policy reforms, such as development of early warning systems, which can enhance the banks' risk management.

SUMMARY AND CONCLUSIONS

Persistent mortgage defaults and massive loan losses have become a regular feature of the S&L industry since the 1980s. This paper has investigated the main structural and performance characteristics of a sample of S&L associations over the period 2000-2010. In particular, it aimed to examine the traditional market power hypotheses (SCP, RMPH, ESH) proposed by Berger (1995b) and Goldberg and Rai (1995) regarding the market structure-performance relationship in financial institutions.

Using one performance measure, namely ROA (profitability), the empirical analysis indicated that, with the expectation of leverage, liquidity risk and market share, all firm-specific features significantly affect profitability. Given the insignificant coefficient of market power and negative significant coefficient of HHI (only in second regression), empirical results are not consistent with both the RMPH and SCP hypotheses. A key finding is that efficient operation of S&L firms are vital for having higher profitability with higher credit risks, which provides partial evidence for the ESH. Since important support is found for credit riskiness of efficient banking units, we can conclude that any policy promoting risk management and prudential controls can be more beneficial to the S&Ls than purely efficiency measures. Another implication is that there is no need to encourage mergers and acquisition in the name of efficiency since efficient banks can improve their profits on their own (rather than collectively) by offering economical financial services.

The main limitations of the study are limited sample size and existence of little dispersion in cross-sectional variance of firms. This indicates the necessity of expanding the data set or variables. In addition, future research can benefit from the correction of endogeneity problem--"omitted variables" bias, such as legal, political and structural variables that can enhance the long-run performance of the S&L industry. Industrial organization theory highlights the contribution of market structures to financial institution performance. It has led to useful modeling of structural and performance features of banking industry and analysis of market power. The contemporary policy can benefit from the IQ literature in order to design long-term policies that can enhance the soundness and stability of US financial institutions.

REFERENCES

Athasanoglu, P.P., Delis, M.D. and Staikouras, C.K. 2006. Determinants of Bank Profitability in the South Eastern European Region. *Working Paper*, Bank of Greece, Economic Research Department, No.47, September.

Balderston, F. E. 1985. Thrifts in Crisis: Structural Transformation of the Savings and Loan Industry. *Real Estate Economics,* Volume 14, Issue 1, pp.165-168, March.

Barth, James R. 1991. *The Great Savings and Loan Debacle*. American Enterprise Institute Press.

Baltagi, B. 2001. *Econometric Analysis of Panel Data*. John Wiley and Sons: Chichester.

Benston, G.J. 1972. Economies of Scale of Financial Institutions. *Journal of Money, Credit and Banking*, Vol.4, No.2, pp.312-341.

Benston, G.J.1986. Federal Regulation of Banking: Historical Overview, in *Deregulating Financial Services: Public Policy in Flux*, edited by George G. Kaufman and Roger C. Kormendi. Ballinger Publishing Company: Cambridge, Mass.

Berger, A. N. 1995a. The relationship between capital and earnings in banking. *Journal of Money, Credit and Banking*, Volume 27, Issue 2, pp.432-456.

Berger, A. N. and Mester, L.J.2003. Explaining the dramatic changes in performance of US Banks: Technological change, deregulation, and dynamic changes in competition. *Journal of Financial Intermediation* 12, 57-95.

Berger, A.N., Bonime, S.D., Covitz, D.M. and Hancock, D. 2000. Why are bank profits so persistent? The roles of product market competition, information opacity and regional macroeconomic shocks. *Journal Banking and Finance,* Vol. 24, no.7, pp. 1203-1235.

Berger,A. N. 1995b. The profit-structure relationship in banking: Tests of market power and efficient structure hypotheses. *Journal of Money, Credit and Banking*Vol. 27, No. 2 (May, 1995), pp. 404-431.

Berger, A.N., Hunter, W.C. and Timme, S.G. 1993. The Efficiency of Financial Institutions; A Review and Preview of Research Past, Present and Future. *Journal of Banking and Finance*, 17, pp.221-249.

Bourke, P. 1989. Concentration and Other Determinants of Bank Profitability in Europe, North American and Australia. *Journal of Banking and Finance* 13, 65-79.

Bradley, M.G., Gabriel, S.A. and Wohar, M.E.1995. The Thrift Crisis, Mortgage-Credit Intermediation, and Housing Activity. *Journal of Money, Credit and Banking*, Vol.27, No.2, pp.476-497.

Breitung, J. and M. Pesaran (2008) Unit Roots and Cointegration in Panels, in: L. Matyas and P. Sevestre (eds), *The Econometrics of Panel Data: Fundamentals and Recent Developments in Theory and Practice*, Kluwer Academic Publishers, 279-322.

Breitung, J.2000. The local power of some unit root tests for panel data. In B. H. Baltagi (ed.), *Nonstationary Panels, Panel Cointegration, and Dynamic Panels*, Advances in Econometrics, Vol 15, 161–17, JAI

Brigham, E. 1964. Economies of Scale in the Savings and Loan Industry. *Economic Inquiry*, Volume 3, Issue 1, September, pp.7-20.

Cebenoyan, A.S., Cooperman, E.S. and Register, C.A., Hudgins, S.C. 1993. The relative efficiency of stock versus mutual S&Ls: A stochastic cost frontier approach. *Journal of Financial Services Research* 7 (2), 151-170.

Cebenoyan, A.S., Cooperman, E.S. and Register, C.A. 1995. Deregulation, Reregulation, Equity Ownership, and S&L Risk-Taking. *Financial Management*, Vol.24, No.3, Autumn 1995, pp.63-76.

CNN. 2007. New Century files for Chapter 11 Bankruptcy, April 3.

Cromwell, Jeff B., Labys, W.C. and Hannan, M.J. 1994. *Multivariate Tests for Time- Series Models*. Sage Publications.

Curry, T. and Shibut, L.2000. The Cost of the Savings and Loan Crisis: Truth and Consequences. *FDIC Banking Review*, (12), 26–35.

Demirguc-Kunt, A. and Huizinga, H. 1998. Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence. *World Bank Economic Review*, Volume 13, Issue 2 (May), pp. 379-408 [On line] Available at http://ideas.repec.org/a/oup/wbecrv/v13y1999i2p379-408.html [accessed: June 27, 2011].

Demirguc-Kunt, A. and Huizinga, H. 2000. Financial Structure and Bank Profitability. The World Bank in its series Policy Research Working Paper Series with number 2430 [On line August 31, 2000] Available at http://ideas.repec.org/p/wbk/wbrwps/2430.html [accessed: March 5, 2011].

Ely, Bert. 2008. Savings and Loan Crisis. *The Concise Encyclopedia of Economics*. Also available at http://www.econlib.org/library/Enc/SavingsandLoanCrisis.html

Frame, W.S. and Coelli, T.J. 2001. US Financial Services Consolidation: The Case of Corporate Credit Unions. *Review of Industrial Organization* 18:229-242

GAO. 2009. *Loan Performance and Negative Home Equity in the Non-Prime Mortgage Market*. US Government Accountability Office [On line, December 16] Available at www.gao.gov/new.items/d10146r.pdf [accessed: April 20, 2011).

Geehan, R. and Allen, L. 1978. Measuring the real output and productivity of savings and credit institutions. *The Canadian Journal of Economics*, Vol.11, No.4, November, pp.669-679.

Gilbert, R.A. 1984. Bank Market Structure and Competition: A Survey. *Journal of Money, Credit and Banking*, Volume 16, Issue 4, pp.650-656.

Golderberg, L.G. and Rai, A. 1996. The structure-performance relationship for European banking. *Journal of Banking & Finance*, Volume 20, October, Issue 4, pp. 745-771.

Goldstein, S.J., McNulty, J.E. and Verbrugge, J.A.1987. Scale Economies in the Savings and Loan Industry Before Diversification. *Journal of Economics and Business*, Volume 39, Issue 3, August, pp.199-207.

Hausman, J.A. 1978. "Speficiation Tests in Econometrics". *Econometrica*, 46 (6), 1251-1271.

Hudson, Mike. 2008. IndyMac: What Went Wrong? How An Alt-A Leader Fueled its Growth With Unsound and Abusive Mortgage Lending, Center for Responsible Lending, *CRL Report*, June 30.

Im, K.S., Pesaran, M.H., and Y. Shin (2003), Testing for Unit Roots in Heterogenous Panels, *Journal of Econometrics*, 115, 53-74.

Jahera, J.S., Page, D.E. and Hudson, C.D. 2006. Financial Condition and Performance of Savings and Loans: A Retrospective Look at Mutual to Stock Conversions. *Investment Management and Financial Innovations*, Volume 3, Issue 2, 2006, pp.77-87.

Kane, Edward J. 1989. *The S&L Insurance Mess: How Did it Happen?* Urban Institute Press.

Kaushik, S.K. and Lopez, R.H. 1996. Profitability of Credit Unions, Commercial Banks and Savings Banks: A Comparative Analysis. *The American Economist*, Vol.40, No.1, Spring, pp.66-78.

Lloyd-Williams, D.M., Molyneux, P. and Thornton, J. 1994. Market Structure and Performance in Spanish Banking. *Journal of Banking and Finance*, 433-443.

Mester. L.J. 1993. Efficiency in the Savings and Loan Industry. *Journal of Banking and Finance*. Vol.17, No. 2-3, pp.267-286.

Mildenberg, D. 2008. Bank of America to Acquire Countrywide for $4 billion, *Bloomberg*, January 11.

Molyneux, P. and Thornton, J. 1992. Determinants of European Bank Profitability: A note. *Journal of Banking and Finance*. Vol. 16, No.6, pp. 1173-1178.

Molyneux, P., Goddard, J. and Wilson, J.O.S. 2004. The Profitability of European Banks: A Cross-Sectional and Dynamic Panel Analysis. *The Manchester School*, Vol. 72, No.3, June, 363-381.

Morgenson, G. 2007. Inside the Countrywide Lending Sphere, *New York Times*, August 26.

Stiroh, K.J. 1997. The Evolution of an Industry: US thrifts in the 1990s. *Journal of Banking and Finance* 21, 1375-1394.

Paletta, D. and Enrich, D. 2008. Crisis Deepens as Big Bank Fails, *Wall Street Journal*, July 12.

Papadopoulos, S. 2004. Market Structure, Performance and Efficiency in European Banking. *International Journal of Commerce and Management*, Vol.14, Issue.1, pp.79-100.

Pervan, M., Pervan, I. and Guadagnino, A. 2009. Market Structure and Performance of Croatian

Commercial Banks. Paper presented at July 2009 Business and Economics Society International Conference, July 15-18, Kona-Hawaii, USA.

Rasiah, D.2010. Review of Literature and Theories on Determinants of Commercial Bank Profitability. *Journal of Performance Management* 23.1, 23-49.

Rhoades, S.A. 1985. Market Share as a Source of Market Power: Implications and Some Evidence. Journal of Economics and Business, Vol. 37, No.4, pp.343-363.

Ruthenberg, D. 1994. Structure-performance and economies of scale in banking in a unified Europe. *Banking Review* 4, Bank of Israel (June), 95-114.

Seelanatha, Lalith. 2010. Market Structure, Efficiency and Performance of Banking Industry in Sri Lanka. *Banks and Bank Systems*, Volume 5, Issue 1.

Short, B.K. 1979. The Relation Between Commercial Bank Profit Rates and Banking Concentration in Canada, Western Europe and Japan. *Journal of Banking and Finance* 3, 209-219.

Smirlock, M. 1985. Evidence of the non-relationship between concentration and profitability in Banking. *Journal of Money, Credit and Banking*, Vol. 17, No.1, pp.69-93.

US Treasury Department. 2010. *Overview of OTS-Regulated Mutual Thrifts*. Available at files.ots.treas.gov/upload/files/49005.pdf [accessed: April 6, 2011].

Vander, V.R. 1993. Concentration, efficiency and entry barriers as determinants of EC bank profitability, *Working Paper*, University of Ghent, July.

Verbrugge, J.A., Shick, R.A. and Thygerson, K.J. 1976. An Analysis of Savings and Loan Profit Performance. *The Journal of Finance*, Vol.31, No.5, December, pp.1427-1442.

Watson, M.W. and Stock, J.H. 2011. *Introduction to Econometrics*. Pearson.

World Data Bank. 2010. World Development Indicators & Global Development Finance [On line] Available at http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2 [accessed: March 13, 2011].

Yaffe, R. 2006. A Primer for Panel Data Analysis. Available at http://www.nyu.edu/its/pubs/connect/fall03/yaffee_primer.html (accessed: October 6, 2011)