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EMPIRICAL TEST OF THE STRUCTURE-CONDUCT-PERFORMANCE (S-C-P) PARADIGM AND EFFICIENT STRUCTURE HYPOTHESIS ON THE PHILIPPINE COMMERCIAL BANKING INDUSTRY, 1990 - 2001

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This paper validates the structure-conduct-performance (S-C-P) paradigm and the efficient structure (relative efficiency) hypothesis by estimating the banks' profit function that takes both market share and concentration measure. Drawing on Philippine bank-specific and industry-level data from 1990 to 2001, this paper provides evidence that market share positively influences banks' profitability while industry concentration is not significant in determining the banks' profit function. Market share, though, is not entirely due to differential efficiency, as regulation-driven mergers preserved the rankings and profit levels of the top banks. Profitability is also positively and significantly explained by the banks' capital asset and demand deposit-to-total deposit ratios, and the growth of the market deposit level. The data support the general finding in the literature that banks do not have scale economies. The study, though, finds that banks have scope economies, proxied by the banks' ability to engage in universal banking activities as opposed to plain commercial banking functions. Foreign bank entry is also not significant in affecting profit, but the Asian financial crisis did, albeit with slight significance.

I. INTRODUCTION

Objectives and Significance of the Study

The intent of Republic Act No. 7721, otherwise known as the Foreign Bank Liberalization Act passed in May 1994, was to change the competitive panorama of the Philippine banking sector through the entry of more foreign banks.[1] One way of examining the impact of liberation on market structure is to employ two competing hypotheses, namely the traditional structure-conduct-performance (S-C-P) paradigm and the efficient structure hypothesis. The study estimates the banks' profit function that takes both market share and concentration measure, and endeavors to ascertain whether profitability is due to either. A confirmation of the S-C-P hypothesis provides a case for reducing monopoly power and concentration via antitrust laws and further liberalization. However, if the relative efficiency model is found to hold, it would suggest that markets are best left alone.

Limitations of the Study

The study's limitations basically stem from data collection. Lack of cooperation of the respondent banks severely limited our panels to 12 instead of 17 surviving banks. Aside from this, survival bias is a problem because the number of commercial banks changed from 31 in 1990 to 44 in 2001, though only 17 of them have been in existence all throughout the 12-year study period. Since the panels involve annual data, increasing the time span of the panel increases the chances of attrition. Thus, it became a trade-off between having more bank samples in a shorter time span versus having a lesser number of bank samples in a longer time frame.

Another limitation of the study is the "mis-measurement" of industry output by focusing only on the on-balance sheet activities of banks. Off-balance sheet (OBS)

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activities of banks include trust accounts, derivative instruments, standby commercial letters of credit, etc., and they are rapidly expanding.[2] Though OBS activities are monitored by the Bangko Sentral ng Pilipinas (BSP) and their impact captured in the banks' income statements, they are not included in the banks' balance sheets (hence the term OBS), as their addition is not justified by the study's model and not warranted by accounting conventions.[3] Zingapan, Lamberte and Yap (1990) examined the implications of OBS on capital adequacy regulations in the Philippines, but fell short of proposing methodology for incorporating OBS into financial statement-based ratios. Clark and Siems (2002) investigated the impact of OBS activities and found that the composition of banks' OBS activities appears to help explain interbank differences in cost and profit X-efficiency estimates.[4] According to the same study, omitting OBS activities could seriously understate actual bank output and seriously bias empirical estimates between bank size and both cost and profit efficiency.[5]

Literature Review

Pioneering studies in regulating the entry of banks in the United States include Peltzman (1965) as extended by Ladenson and Bombara (1984). Other studies investigating the effect of liberalization for particular countries include Denizer (1997) and Denizer and Tarimcilar (2000) in Turkey; Spiller and Favaro (1984) in Uruguay; and, Jeong and Masson (1990) in Korea. Various facets of liberalization such as foreign ownership share in the domestic banking market (Claessens, et al., 1998); banking crisis and financial liberalization (Demirgüç-Kunt and Detragiache, 1998); liberalization, transparency and banking crisis (Mehrez and Kaufman, 2000); interest rate changes under liberalization (Honohan, 2001); liberalization impact on small and large firms (Laeven, 2001); and, bank lending to small business (Clark, et al., 2002) have likewise been investigated. Studies in financial liberalization in the Philippines include Milo (2000) on competition and efficiency; Sullivan (2001) on foreign entry effect on domestic banks; and Manzano and Neri (2001) on deconcentration, bank spread and macroeconomic implication of liberalization.

The two hypotheses employed in the study draw from the rich tradition and methods of industrial organization. The S-C-P paradigm attributed to Mason (1939) and Bain (1951) paved the way for early researchers to attribute differential firm performance on the nature of the industry. S-C-P states that a change in the market structure or concentration of banking firms affects the way banks behave (conduct) and perform. Market structure is determined by the interaction of cost (supply) and demand in a particular industry. Conduct is a function of the numbers of sellers and buyers, barriers to entry and the cost structure. Performance will depend on pricing behavior, the outcome of which is normally measured by profitability. Hannan (1991) employed an explicit model of the banking firm to derive and critically assess the relationship between bank conduct and market structure implied in the S-C-P paradigm.

The efficient markets model challenges the S-C-P model (Demsetz, 1979; Peltzman, 1977). It argues that some firms earn super-normal profits because they are more efficient than others. This firm-specific efficiency is exogenous and is reflected in high market share. Therefore, it is market share, rather than concentration, which should be correlated with profit. The relative efficiency model predicts the same positive profits-concentration relationship as the S-C-P model. However, the positive relationship is explained by collusive behavior in the S-C-P case, but in the relative efficiency model, greater efficiency and higher market share (and concentration) are determinants. According to S-C-P, concentration is exogenous, resulting in higher price for consumers and higher firm profitability. In the efficient structure or relative efficiency

model, exogenous firm-specific efficiencies result in more concentrated markets because of market dominance of relatively efficient firms.

II. MODEL SPECIFICATION, ASSUMPTIONS AND VARIABLE DEFINITION

Model Specification and Assumptions

Following Smirlock (1985), Evanoff and Fortier (1988), and Molyneux (1992), a cross-sectional profit equation including both firm-specific market share, proxying for firm efficiency, and concentration variables is specified:

$$(1)\ ROA_{it} = \alpha_0 + \beta_1 CR3_t + \beta_2 MS_{it} + \beta_3 CA_{it} + \beta_4 \ln TA_{it} + \beta_5 LA_{it} + \beta_6 DT_{it} + \beta_7 OEA_{it} + \beta_8 MDG_t + \eta_{it}$$

For the sample banks, the variance for each panel or cross-section differs, hence a heteroskedastic error structure with no cross-sectional serial correlation is specified. This specification controls for individual bank's heterogeneity as manifested by the variation in scale in the data, and in addition, assumes that the error terms of panels are uncorrelated, i.e., $E(\varepsilon_i\ \varepsilon_j)=0$. It is further specified that within panels, there is autocorrelation of the first order, AR(1).

Equation 1 is an expansion of the simple model $y_{it}=\mathbf{X}_{it}\boldsymbol{\beta} +\varepsilon_{it}$. The error structure for the disturbance term is specified $\varepsilon_{it}=\alpha_i +\eta_{it}$ where we assume that η_{it} is uncorrelated with $\mathbf{X}_{it}$, the exogenous variables. The first part of the decomposition, α_i, is called an individual effect, but firm-specific differences are not the object of the study. Hence, the model assumes a common intercept, α_0, which means that it is an identical intercept for all pool members: $\alpha i_t = \alpha_0$, which may or may not be correlated with the explanatory variables. The second part, η_{it}, varies unsystematically or independently across time and cross-sections. The subscripts i pertain to cross-sections or sample banks, i=1 to 12, and t to time period, t=1 to12, with the year 1990 as t=1.

Variable Definition

The dependent variable or performance measure is bank profits measured as the return on assets (ROA). Affirmed statistically by Hall and Weiss (1976) as preferable to other measures, ROA is likewise a more comparable measure across banks due to its common denominator which is bank assets (Evanoff and Fortier, 1988). Rhoades (1981) also suggests that ROA is the single best performance measure for banks (Table 1).

The independent variables include both firm and market-specific variables. Concentration ratio as proxy for market structure is defined as the sum of shares of the leading banks in total deposits, CR3. As noted by Evanoff and Fortier (1988), theory offers no information on the absolute number or size distribution of firms necessary to exercise market power. However, theory also suggests that there is a relationship between the level of output controlled by a small number of large firms, and performance, and probably because of this reason an overwhelming number of researchers have used concentration ratio despite its limitations (Bain, 1951; Bourke, 1989; Denizer, 1997).

The market share variable is assumed to be a proxy for firm-specific effects, and is defined as bank deposits divided by total market deposits. There are also a number of control variables similar to those that can be found in earlier S-C-P studies (for e.g., Shepherd, 1972). They are included to take into account factors like risk, costs and demand, that influence profitability. Given the fact that ROA is not risk-adjusted, a capital asset (CA) ratio is included to account for the unequal risk levels between banks, with low ratios indicating relatively risky positions. Banks with low capital ratios may be more aggressive and take risks expecting

high returns. On the other hand, highly capitalized banks might play it safe and hold less risky assets (loans) and remain profitable. Therefore, the expected sign of CA is indeterminate. CA was operationalized by dividing the bank's capital with total assets.

Another control variable coming from the liability side of the banks' balance sheet is the amount of demand deposits relative to total deposits (DT). This ratio gives a bank's relative cost of funds and should be positively related to profitability given the fact that demand deposits are a relatively cheap source of funds. If this ratio is high, then banks do not need to purchase funds, which are expensive. From the asset side of the banks' balance sheet, we have the ratio of total loans to total assets (LA). This ratio is of particular interest because loans usually represent the major category of income-earning assets, generating more income than the main alternative assets, government securities, in addition to providing some idea about bank's risks. A high ratio may reflect aggressive loan marketing, which could increase profits. On the other hand, large loan portfolios may be costly to manage and could result in substantial loan losses, which decrease profits. Therefore, the coefficient of this portfolio variable could be positive or negative.

To control for bank size, total assets of each bank is included in the sample. The variable has been transformed into its natural logarithmic form, hence lnTA. In this way, the possibility of scale economies that could arise from size, and the possibility that larger banks have greater loan and product diversification potential is taken into account. As pointed out by Smirlock (1985) and Evanoff and Fortier (1988), diversification reduces risks and therefore the required rate of return. Hence the sign of this coefficient is indeterminate. Operating expenses to total assets (OEA) ratio is included in the model to account for the negative impact of non-interest operating expense on bank profits and it is included in the analysis as a proportion of total assets. Operating expense to income ratio was not used because the model is based on the bank's income statements divided by total assets, hence ROA on the left-hand side of the equation, and the three explanatory variables with total assets as divisor (CA, LA and OEA) on the right-hand side. We account for market demand by including the market deposits growth rate (MDG). Markets with high growth rates are likely to increase the bank's deposits base but the contribution of deposits to profits will depend upon a number of factors. First, it will depend on the bank's ability to convert deposit liabilities into income-earning assets, which are related to macroeconomic factors such as the GNP growth rate, the level of interest rates, etc. In addition, high growth rates attract additional competitors which reduce profits for all market participants. Therefore, the sign of the MDG is also indeterminate.

The pair-wise correlation of exogenous variables is given in Table 2. The variable CR3 is negatively and significantly correlated with lnTA, LA and MDG. The variable MS is likewise negatively and significantly correlated with CA and LA, and positively and highly correlated with lnTA. CA has strong negative correlations with MS and lnTA, and strong positive correlation with DT. OEA is not correlated with any of the other variables, and its exclusion from the model when it is theoretically sound, may lead to specification error.

III. HYPOTHESIS TESTING, DATA DESCRIPTION AND METHODOLOGY

Test of Hypothesis

The data are pooled and three equations are estimated. Equation 2 tests the traditional S-C-P hypothesis, and is performed by estimating Equation 1 without the market share (MS) variable, but with the market

structure measure (CR3). The market structure variable is expected to be positively related to return on assets.

Hypothesis 1: $\beta_1 > 0$; S-C-P Paradigm is supported

(2) [restricted model, $\beta_2 = 0$]

$$ROA_{it} = \alpha_i + \beta_1 CR3_t + \beta_3 CA_{it} + \beta_4 \ln TA_{it} + \beta_5 LA_{it} + \beta_6 DT_{it} + \beta_7 OEA_{it} + \beta_8 MDG_t + \eta_{it}$$

Equation 3 is estimated with both market share and market structure variables. By doing so, the validity of the two competing hypotheses in explaining bank profitability is tested.

Hypothesis 2: $\beta_1 > 0$ and $\beta_2 = 0$; S-C-P Paradigm is supported

$\beta_1 = 0$ and $\beta_2 > 0$; ES Hypothesis is supported

(3) [unrestricted model]

$$ROA_{it} = \alpha_i + \beta_1 CR3_t + \beta_2 MS_{it} + \beta_3 CA_{it} + \beta_4 \ln TA_{it} + \beta_5 LA_{it} + \beta_6 DT_{it} + \beta_7 OEA_{it} + \beta_8 MDG_t + \eta_{it}$$

Equation 4 is estimated with the market share variable but without the market structure variable. This is done to look into the possible effect of market share on bank profitability because the two hypotheses would interpret the results differently. The S-C-P school would regard market share as proxying for market power, hence the ability to earn supranormal profits. The efficient market school would argue that high market share is an indication of superior efficiency.

Hypothesis 3: $\beta_2 > 0$; ES Hypothesis is supported

$\beta_2 = 0$; S-C-P Paradigm is supported

(4) [restricted model, $\beta_1 = 0$]

$$ROA_{it} = \alpha_i + \beta_2 MS_{it} + \beta_3 CA_{it} + \beta_4 \ln TA_{it} + \beta_5 LA_{it} + \beta_6 DT_{it} + \beta_7 OEA_{it} + \beta_8 MDG_t + \eta_{it}$$

Data Description

The longitudinal data sets or panel data used in this study contain observations on commercial banks, each observed at several points in time. The estimation procedure is restricted with balanced panels, that is, the same number of observations on each cross-section unit, so that the total number of observations is *N*, number of banks, times *T*, time period (Johnston and DiNardo, 1997).

This study is limited to the commercial banking industry, and for these purposes, it includes both commercial and expanded commercial (universal) banks.[6] The period of the study takes into consideration a government policy shift which has hypothesized effects on the dependent variable. Structural changes were posited after the foreign bank liberalization act came into effect in 1995. Another historical occurrence that had a profound effect on the industry in particular and the economy in general is the Asian financial crisis in 1997, whose impact during the last quarter of 1997 and the succeeding years led the BSP to implement stricter prudential regulations.

Due to bankruptcies, mergers and acquisitions, and new domestic and foreign entrants, the number of banks changed from 31 in 1990 to 44 in 2001. Thus, with the reckoning period 1990 to 2001, only banks with complete data points are included. Only seventeen banks that were in existence in 1990 remained operating in 2001, four of which are the "old" foreign banks which have had licenses to operate since 1948. The industry under investigation is likewise composed of government, private domestic and foreign expanded (or universal) and non-expanded commercial banks, hence consideration for the representation of such categories are warranted. Bank-level data were sourced from the individual firm's audited financial statements, and only twelve out of the targeted population of seventeen banks positively responded to our request.[7] The industry-level variables were sourced

from the BSP and National Statistics Coordination Board (NSCB).[8]

Methodology

The equations were estimated using the Generalized Least Squares (GLS) procedure, with the data run in STATA software. As in many cross-sectional data sets, the variance of each of the panels differs. Bank ROAs have high variability, hence the heteroskedastic error structure with no cross-sectional serial correlation was specified. Within panels, there is autocorrelation of the first order, hence the additional specification AR(1)—because the time-series is an annual data and the previous year influences the profit level in the next.[9] The restriction of a common autocorrelation parameter is reasonable when the individual correlations are nearly equal and the time series are short. The restriction of a common autocorrelation parameter produces a more reasonable estimate of the regression coefficient.

The model assumes a common intercept, and the possible criticism includes the enhancement of explanatory power by allowing for individual fixed or random effects. Theory (Greene, 2000) provides little guide in determining whether a fixed or random effects model is more appropriate, and in this case the "rule of thumb" would have been that the fixed effects model is an appropriate specification since the study focuses on a specific set of firms (n=12), and inference is conditional on the particular *n* banks (Baltagi, 2001). However, the bank-specific fixed effects are not the main interest of the study (it is concentration ratio and market share variables that are the focus of the empirical investigation). A problem with using the fixed effects model is that there are two regressors in the equations (CR3 and MDG) that do not vary with the individual banks. Greene (2000) cites that in such cases, any of these industry-level regressors could be perfectly collinear with the fixed effects dummy variable for that bank, which would prevent computation of the fixed effect estimator. The extension of the empirical model with the inclusion of the dummy variable EKB (expanded commercial bank) already reflects in some ways the individual bank's behavior, hence the fixed effects model may no longer be warranted. Variable interaction effects and dummy variable inclusions are discussed in the next section.

IV. RESULTS AND DISCUSSION

The results of Equations 2 to 4 estimated using the GLS procedure are given in Table 3. The *z*-statistics of individual coefficients are for the significance of particular coefficients. The bank-specific variables, LA and OEA, though following their a priori signs, are not statistically significant in Equations 2 to 4. The market share variable (MS) follows its expected sign and is significant at $p<0.01$ level in both Equations 2 and 3. *Ceteris paribus*, an 11 percent increase in bank market share leads to a 1 percent increase in ROA. Another variable found to be significant is the Capital-Asset (CA) ratio, a risk-adjusted ROA measure, suggesting, *ceteris paribus*, that a 4.5 percent increase in CA leads to a percentage increase in the dependent variable. Since Equations 3 and 4 both yield a highly significant CA ratio (at $p<0.01$), it is worth noting that only one-third of the sample banks have average CA ratios above the sample median of 0.13 which means that the rest have relatively risky positions.[10] This is consistent with the finding of Peltzman (1984) that if larger banks have a lower capital-asset ratio than small banks, their return on assets is lower *ceteris paribus*.[11] The variable lnTA is likewise highly significant and has a negative sign in Equations 2 to 4. Representing size differences between banks, the highly significant, negative and relatively small-sized coefficient of lnTA seems to support the

general finding that there are no scale economies in banking (for survey see Berger et al., 1993). The last bank-specific variable that is statistically significant in all three equations and follows its expected positive sign is the demand to total deposit (DT) ratio. All things constant, a 2 percent increase in DT leads to 1 percent increase in ROA. Only a third of the sample banks have average DT ratios above the median. This seems to suggest that the majority of the banks are not taking advantage of low-cost demand deposits as source of funds. The sample can be dichotomized into those who have between 4 to 7 percent of their deposit portfolio comprising demand deposits (a total of 8 banks), and those who have about 11 to 15 percent (exhibited by only 4 banks). [12] (See Table 3).

For the industry-level variables, market deposits growth rate (MDG), is highly significant (at $p<0.01$) and takes a positive sign in all three equations. The positive coefficient of the MDG variable appears to show that banks have the ability to convert deposit liabilities into income-earning assets. All things constant, a 2.4 percent increase in MDG leads to a percentage increase in ROA. The other industry-level variable, CR3, is not significant in Equations 2 and 3.

For hypothesis testing of Equation 2, the result leads to the conclusion that the coefficient of CR3 is not significantly different from zero. Thus, the null hypothesis that $\beta_1>0$ is rejected. This means that the data cannot support the S-C-P paradigm. In Equation 2, which is the same as the empirical model (unrestricted model), the results indicate that the coefficient of the MS variable follows its expected sign and is highly significant (at $p<0.01$). However, the coefficient of CR3 variable is still not significant and, in addition, reverses its sign. Thus, the joint hypothesis that $\beta_1>0$ and $\beta_2=0$ is rejected in favor of the alternative that $\beta_1=0$ and $\beta_2>0$, lending support to the efficient structure hypothesis. The estimation results of Equation 3 likewise address the issue on whether the excluded variable MS in Equation 2 has significant effect on ROA. First, the log likelihood statistics improved by more than 10 points as a result of the variable MS' inclusion in Equation 3. The variable MS was found to be highly significant with a very high coefficient of 0.11 for both Equations 3 and 4. Second, the Wald (chi-square type 2) statistic of Equation 3 jumped by more than 47 points from Equation 2. All these indicate that the inclusion of the variable MS in terms of fit and specification are supported. For Equation 4, the test results appear to show that MS is significantly different from zero, hence the null hypothesis that $\beta_2>0$ cannot be rejected. This supports the efficient structure hypothesis. Equation 4, which excludes the market structure variable, CR3, also yields slightly lower Wald (chi-square type 2) statistics compared to Equation 2, but the log likelihood statistic remained unchanged.

The interaction of market share and concentration variables as predicted by the S-C-P paradigm should have a coefficient that is opposite in sign to the ones predicted for the two variables. It follows that as MS approaches 1, CR3 has no influence on the elasticity of loans or the loan rate. Conversely, if concentration is high enough to produce perfect collusion, it follows that market share has no role in determining the elasticity of loans or the loan rate. The GLS estimation result for the CR3*MS interaction is given in column *a* of Table 4. The interaction term CR3*MS does not follow the expected negative sign as predicted in the S-C-P paradigm. Its coefficient is positive and highly significant, leading us to conclude that the data does not support the S-C-P hypothesis.

Another extension of the basic model focuses on the analysis of the differential effect of market deposit growth rate (MDG), a proxy for macroeconomic conditions into first, industry-wide effect, captured by the interaction term MDG*CR3, and second, bank-specific effect, represented by the interaction term MDG*MS. The use of

industry-level information (both MDG and CR3 are cross-section invariant) in the model yields a deeper exploration and understanding of the role played by the economy in general (growth) for the banking market which is positive and highly significant (given in column *b* of Table 4). In the second extension where we have the interaction term MDG*MS, industry-level (and economy-wide) growth is decomposed into bank-specific effect. The results show that the interaction is both positive and highly significant. Column *c* of Table 4 reproduces such result. The common variables CA, lnTA and DT in the three interaction effects models are all significant as in the basic empirical mode (see Tables 4 and 5).

To avoid the dummy variable trap or perfect multicollinearity (Suits, 1984), dummy variables are introduced as extensions of the empirical model one at a time. In column *a* of Table 5, the results are given with the inclusion of the dummy variable for universal or expanded commercial bank, EKB, which takes a value of 1 if EKB, and 0, otherwise. EKB in this case is both cross-section and time-varying dummy.[13] The results show that the dummy variable EKB is highly significant, though its inclusion as an extension of the basic empirical model made the variable DT lose its significance. This result is consistent with Okuda (1999) that found scope efficiencies in Philippine banks. There appears to be economies of scope especially for expanded commercial banks since there are complementarities in the production of bank services (e.g., investment house functions are prohibited for plain commercial banks). The positive and highly significant coefficient of EKB is likewise consistent with Steinherr and Huveneers' (1994) findings that universal banks have higher efficiency, lower loss performance and superior profitability compared to plain commercial banks.

To account for the effect of financial liberalization, a dummy variable is included. ENT equals 0 prior to 1995, and 1 for 1995 and beyond.[14] Column *b* of Table 5 shows the results. The variable DT regained its significance when the dummy variable ENT was included. The dummy ENT is cross-section but not time invariant, making it the third variable in the model which is uniform across banks (the other two are the industry-level regressors CR3 and MDG). The positive but not significant coefficient of ENT suggests that the structure of the banking sector hardly changed as a result of liberalization. This is consistent with Unite and Sullivan's (2001) study that found evidence that increased foreign bank entry and accompanying increase in foreign bank penetration act to reduce interest rate spreads but does not affect profits due to corresponding improvement in bank efficiencies.

The third dummy variable introduced is CRI, referring to the Asian financial crisis in 1997. CRI takes the value 1 for the years 1997 to 2001 (crisis to post-crisis period) and 0 otherwise. The results are similar to the dummy variable EKB extension model where the variable DT lost its significance. The negative and slightly significant (at $p<0.10$) coefficient of the dummy variable CRI suggests the dampening of industry profitability as a result of the crisis. Doliente (2003) finds evidence that bank spreads declined after the Asian financial crisis, indicating some efficiency gains in the intermediation process. The crisis also pushed the BSP, for prudential reasons, to increase the minimum capitalization requirements for EKBs and KBs, that appears to have led to bank mergers.[15] The General Banking Law of 2000 also imposed a moratorium on the establishment of new banks from 2000 to 2003.

The GLS estimation procedure, corrected for cross-sectional heteroskedasticity and autocorrelation, yields unbiased estimates. The common AR(1) coefficient for all panels in Tables 3 to 5 play in the neighborhood of 0.60. Since the specification of the model is correct, dropping the AR(1) specification and

any of the variables found to be not significant (OEA for one is not significantly correlated with any of the other regressors) that is theoretically appropriate could lead to specification error, resulting in biased estimates of the retained coefficients. Hence, it is prudent to stick with the model whose significance (of the coefficients jointly) has been upheld—evidenced by the Wald (Chi-square statistic, type 2) being significant at any level (the *p*-value is close to 0).

V. CONCLUSION

The results of the GLS estimation for Equations 2, 3 and 4 overwhelmingly reject the S-C-P Paradigm. The support for the efficient structure hypothesis primarily rests on the significance of the market share (MS) variable, proxying for firm efficiency, in explaining bank profitability. The existence of market power as posited by the S-C-P paradigm and measured by the concentration ratio, is not supported. This is consistent with Cetorelli and Gambera (2001) who showed that the average 3-firm and 5-firm deposit concentration ratio for the Philippines from 1989 to 1996 is 0.40 and 0.56, respectively—relatively low in a cross-country panel of 42 with 0.70 considered high. Thus, the case for antitrust laws and further liberalization of the Philippine banking industry is not warranted.

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NOTES

[1] Prior to R.A. 7721, only four foreign banks had licenses to operate since 1948: Citibank, N.A., Standard Chartered, Bank of America, and Hong Kong Shanghai Banking Corporation (HSBC).

[2] By the end of 2002 and 2003, OBS to Total Resources of the universal and commercial banking system was 18.27 percent and 20.65 percent, respectively, and the number could have gone as high as 40 percent for some banks. To illustrate such expansion, total resources of the banking system grew only by 4.96 percent against the 18.63 percent growth registered for OBS activities, for the period 2002-2003.

[3] The General Banking Law of 1946 and its successor R.A. No. 8791 (General Banking Law of 2000) explicitly disallow the inclusion of securities and other properties held by banks in fiduciary or agency capacities in the statement of condition since these are not genuine resources of the company. International Accounting Standards (IAS) No. 30 (Disclosure in the Financial Statements of Banks and Similar Financial Institutions), No. 32 (Financial Instruments: Disclosure and Presentation) and 39 (Financial Instruments: Recognition and Measurement) took effect on January 1, 2004, and superseded Statement of Financial Accounting Standards (SFAS) Nos. 10, 18 and 19A. The various IASs/SFASs prescribe the valuation and recording of accounts with off-balance sheet (unrecognized) risk in contingent accounts and their inclusion in the notes to financial statements. For discussion of IASs challenges for banks, see Tan and Lee-Salas (2003).

[4] Interbank differences are beyond the scope of the research as the model used is restricted to a common intercept (discussed in Section 2), hence an industry-level result, and fixed effects is not specified due to sample limitations. Discussion of results, however, includes bank sample comparison and identification, which are in notes.

[5] Two independent variables in the study's model captures or factors in OBS operations, albeit limitedly, aside from the dependent variable ROA. Operating expense to total assets ratio reflects the non-interest, non-intermediary and other expenses of banks which includes expenses incurred from OBS activities. Capital funds include up to 20 percent of the bank's capital stock as reserves income from trust operations. This is captured by the capital asset ratio.

[6] The BSP classifies banks based on R.A. No. 8791 (General Banking Law of 2000). The classification has not substantially changed since the General Banking Act of 1948. A commercial bank (KB) possesses, in addition to the general powers incident to corporations, all such powers as may be necessary to carry out the business of commercial banking while a universal or expanded commercial bank (EKB) has the authority to exercise in addition the powers of an investment house.

[7] Bank-specific ratios are computed from the audited financial statements of the sample banks, which are sourced from their annual reports, downloaded from their websites, and/or generously provided by banks themselves upon request of the author.

[8] The 3-firm concentration ratio, CR3, is the sum of the deposit liabilities of the top three banks as sourced from various annual reports divided by the total deposit liabilities of the universal and commercial banking system reported by BSP. Market deposit growth rate (MDG) is computed by the year-to-year deposit liabilities changes as reported by BSP and NSCB.

[9] The panel data was initially run using ordinary least squares (OLS) in eViews software and the Durbin-Watson statistic result, though failing in the region of indeterminancy, may have indicated first order serial correlation due to its low number. Hence, GLS was chosen instead for the reason that the method transforms the equation with serially correlated error terms into one whose error terms are not.

[10] The four banks, which are a third of the sample, with above median CA ratio of 0.13 are China Bank, Union Bank, PB Com, and Standard Chartered Bank.

[11] Union Bank and China Bank have the highest average ROAs. PB Com has a ROA above the median while Standard Chartered has the lowest average ROA owing to capital and other operational restrictions imposed on it as a foreign bank. These four banks belong to the lowest five banks in terms of average total assets.

[12] Those with above median DT ratios are PNB, Allied Bank, Union Bank and Standard Chartered Bank.

[13] There are seven (7) banks which are EKBs all throughout the study period. They are PNB, Allied Bank, BPI, Equitable PCI, Metrobank, RCBC and UCPB. The five other banks in the sample progressed from KB to EKB status. China Bank became an EKB in 1991, Union Bank in 1992, Security Bank in 1995, and Standard Chartered in 2001. PB Com became an EKB in 1995 only to revert back to KB status in 2000 for failure to meet the minimum capital requirements of an EKB. The sample profile is also given in Appendix A.

[14] Though R.A. No. 7721 or the Foreign Bank Liberalization Act was signed into law in May 1994, it was only in February 1995 that the BSP authorized ten (10) new foreign banks to operate with full banking powers as local branches.

[15] The minimum capital requirements respectively for universal and plain commercial banks increased from Php500 million and Php100 million in 1980 to Php1 billion and Php500 million in 1990; Php2.5 billion and Php1.25 billion in 1995; and, Php4.95 billion and Php2.4 billion in 1999, respectively.

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Table 1: Description of Dependent and Independent Variables of the Market Structure Model, and their Predicted Relationships

Variable	*Description*	*Predicted Relationship*
	Dependent	
ROA	Return on Assets	
	Independent	
CR3	3-Firm Concentration Ratio	$\beta_1 > 0$, S-C-P* is supported $\beta_1 = 0$, ES** is supported
MS	Market Share, bank's deposits as a percentage to total deposits	$\beta_2 = 0$, S-C-P* is supported $\beta_2 > 0$, ES** is supported
CA	Capital-to-Asset Ratio	β_3 is indeterminate
lnTA	Total Asset (in natural log)	β_4 is indeterminate
LA	Loans to Asset Ratio	β_5 is indeterminate
DT	Demand Deposit-to-Total Deposit Ratio	$\beta_6 > 0$
OEA	Operating Expenses-to-Total Asset Ratio	$\beta_7 < 0$
MDG	Market Deposit Growth Rate	β_8 is indeterminate

*Structure-Conduct-Performance Paradigm;
**Efficient Structure Hypothesis

Table 2: Correlation Matrix

	CR3	MS	CA	lnTA	LA	DT	OEA	MDG
CR3	1.000							
MS	0.063	1.000						
CA	-0.115	-0.378***	1.000					
lnTA	-0.377***	0.699***	-0.372***	1.000				
LA	-0.385***	-0.200**	0.023	-0.028	1.000			
DT	-0.005	-0.124	0.351***	-0.107	-0.321***	1.000		
OEA	-0.023	-0.065	0.009	-0.108	-0.058	-0.070	1.000	
MDG	-0.182**	-0.042	0.049	-0.207**	0.404***	-0.083	-0.156	1.000

*** indicates significance at $p<0.01$; ** at $p<0.05$

Table 3: Generalized Least Squares Estimation Results

	Equation 2	Equation 3	Equation 4
Intercept	0.0569864***	0.0858572***	0.0839788***
	(4.15)	(6.18)	(8.41)
CR3	0.0132637	-0.0009731	
	(0.78)	(-0.07)	
MS		0.1157568***	0.1121109***
		(4.35)	(4.44)
CA	0.0195453	0.0444741***	0.0453177***
	(1.18)	(2.77)	(2.82)
lnTA	-0.0045714***	-0.007874***	-0.0077154***
	(-5.45)	(-7.54)	(-8.02)
LA	-0.010017	-0.0053321	-0.0054107
	(-1.60)	(-0.96)	(-0.98)
DT	0.0183011*	0.0201287**	0.0196213**
	(1.86)	(2.12)	(2.08)
OEA	-0.003151	-0.0032732	-0.0031608
	(0.627)	(-0.52)	(-0.51)
MDG	0.02446748***	0.0241294***	0.0242117***
	(4.72)	(5.40)	(6.20)
AR(1)	0.6131	0.6676	0.6677
Log likelihood	538.5263	548.536	548.6902
Wald χ^2	78.30	125.89	122.58
Prob > χ^2	0.0000	0.0000	0.0000

Dependent variable is ROA. Reported figures are parameter estimates and figures in parentheses below are their respective z-statistics.

*** indicates significance level at $p<0.01$; ** at $p<0.05$; * at $p<0.10$.

Table 4: GLS Model Extensions: CR3*MS, MDG*CR3 and MDG*MS Interaction Effects

	(a)	(b)	(c)
Intercept	0.0785702***	0.0785176***	0.0864903***
	(8.00)	(7.67)	(6.36)
CR3			-0.0158071
			(-1.07)
MS		0.1041031***	
		(4.06)	
CA	0.0437558***	0.0446695***	0.0223583***
	(3.76)	(2.77)	(1.39)
lnTA	-0.0070763***	-0.0072513***	-0.0063986***
	(-7.66)	(-7.37)	(-6.39)
LA	-0.0059267	-0.0040876	-0.0031787
	(-1.07)	(-0.74)	(-0.54)
DT	0.0184679**	0.0191757**	0.0166855*
	(1.96)	(2.00)	(1.68)
OEA	-0.0029543	-0.0024452	-0.0048428
	(-0.49)	(-0.39)	(-0.85)
MDG	0.0253749***		
	(6.38)		
CR3*MS	0.2487486***		
	(3.76)		
MDG*CR3		0.07284***	
		(5.97)	
MDG*MS			0.22263***
			(2.98)
AR(1)	0.6721	0.6776	0.6733
Log likelihood	547.5632	548.141	548.7944
Wald χ^2	113.18	116.81	57.04
Prob > χ^2	0.0000	0.0000	0.0000

Dependent variable is ROA. Reported figures are parameter estimates and figures in parentheses below are their respective *z*-statistics.

*** indicates significance level at $p<0.01$; ** at $p<0.05$; * at $p<0.10$.

Table 5: GLS Model Extensions: Inclusion of EKB, ENT and CRI Dummy Variables

	(a)	(b)	(c)
Intercept	0.0878936***	0.0860908***	0.0768072***
	(5.87)	(5.29)	(5.12)
CR3	-0.0045289	0.00244	-0.0145415
	(-0.28)	(0.15)	(0.89)
MS	0.0978111***	0.1251685***	0.0853212***
	(3.62)	(4.52)	(2.96)
CA	0.0425688***	0.040828**	0.0415954**
	(2.58)	(2.44)	(2.51)
lnTA	-0.0078957***	-0.0080048***	-0.0062005***
	(-6.77)	(-6.13)	(-4.79)
LA	-0.0064526	-0.0075956	-0.0044153
	(-1.13)	(-1.19)	(-0.77)
DT	0.0142646	0.0231943**	0.015454
	(1.51)	(2.33)	(1.52)
OEA	-0.0038268	-0.002509	-0.0029584
	(-0.64)	(-0.35)	(-0.43)
MDG	0.0219909***	0.0266487***	0.0185783***
	(4.68)	(5.28)	(3.58)
EKB	0.0033037**		
	(2.10)		
ENT		0.0007369	
		(0.44)	
CRI			-0.0025969*
			(-1.62)
AR(1)	0.6522	0.5737	0.6721
Log likelihood	549.7976	541.8745	549.5064
Wald χ^2	95.49	130.55	99.00
Prob > χ^2	0.0000	0.0000	0.0000

Dependent variable is ROA. Reported figures are parameter estimates and figures in parentheses below are their respective *z*-statistics.

*** indicates significance level at $p<0.01$; ** at $p<0.05$; * at $p<0.10$.

Appendix A
Bank Sample Profile

Bank Name	Profile: Gov't, Private, Foreign; EKB or NKB*
1. PNB	Government EKB from 1990 to 1996; Private EKB from 1998 to 2001
2. Allied Bank	Private EKB from 1990 to 2001
3. BPI	Private EKB from 1990 to 2001; Merged with Far East Bank & Trust Comp. in 1999
4.Equitable PCI Bank	Private EKB from 1990 to 2001; Merged with PCI Bank in 1999
5. Metrobank	Private EKB from 1990 to 2001; Acquired Solid Bank in 1999
6. UCPB	Private EKB from 1990 to 2001
7. China Bank	Private NKB in 1990; EKB from 1991 to 2001
8. PB Com	Private NKB from 1990 t0 1994; EKB from 1995 to 1999; NKB from 2000 to 2001
9. RCBC	Private NKB in 1988; EKB from 1989 to 2001
10. Security Bank	Private NKB from 1988 to 1994; EKB from 1995 to 2001
11. Union Bank	Private NKB from 1988 to 1991; EKB from 1992 to 2001
12. Standard Chartered Bank	Foreign NKB from 1988 to 2000; Foreign EKB in 2001

*EKB stands for Expanded Commercial Bank (or Universal Bank); NKB stands for Non-expanded Commercial Bank (or plain Commercial Bank).
Source: BSP Factbook, various issues

Appendix B
Descriptive Statistics: 12-year Average of Bank-specific Variables

Bank Name	ROA	MS	CA	lnTA	LA	DT	OEA
Philippine National Bank	0.0021	0.1317	0.1042	11.9343	0.4486	0.1209	0.0960
Allied Banking Corporation	0.0187	0.0412	0.1251	10.8697	0.4546	0.1502	0.1242
Bank of Philippine Islands	0.0177	0.1298	0.0978	11.8788	0.4739	0.0748	0.0959
Equitable PCI Bank	0.0159	0.0486	0.1130	11.0364	0.4462	0.0586	0.0828
Metrobank and Trust Comp.	0.0159	0.1350	0.1084	12.0163	0.5032	0.0489	0.0920
United Coconut Planters B.	0.0098	0.0507	0.1192	11.0779	0.5508	0.0428	0.0934
China Banking Corporation	0.0211	0.0281	0.1425	10.4917	0.5416	0.0725	0.0952
Union Banking Corporation	0.0223	0.0090	0.1752	10.1928	0.4638	0.1499	0.0837
Rizal Commercial Bank Corp	0.0136	0.0514	0.0949	11.0976	0.5903	0.0505	0.0930
Security Bank Corporation	0.0132	0.0218	0.1203	10.2516	0.5316	0.0749	0.0869
PB Comm	0.0160	0.0147	0.1361	9.8459	0.5680	0.0661	0.1059
Standard Chartered Bank	0.0048	0.0065	0.2749	9.2485	0.5035	0.1141	0.1126
Average	0.0143	0.0557	0.1343	10.8285	0.5063	0.0853	0.0968

Source: Banks'Audited Financial Statements, Banks' Annual Reports