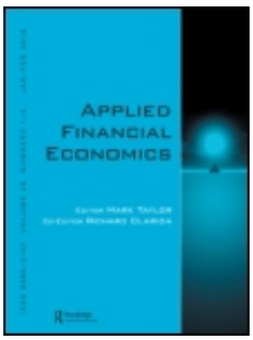

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Foreign banks, profits, market power and efficiency in PICs: some evidence from Fiji

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Studies on bank profitability vis-à-vis market power and efficiency span a number of years, many countries, regions and methods. Yet, the experiences of the Pacific's small states – where foreign banks are widespread and bank profits relatively high – remain unknown, leaving policy-makers ill-informed regarding relevant policy development. This study fills a huge gap in literature by providing some evidence on the issue in a Pacific Island context. Two market power hypotheses – the structure-conduct-performance (SCP) and the relative market power (RMP) hypotheses together with two measures of the efficient structure (ES) hypothesis – X and scale efficiencies are estimated. The nonparametric data envelopment analysis (DEA) technique is used to estimate efficiency scores for banks in Fiji over the period 2000 to 2010 and the dynamic GMM to estimate the relationships between market power and efficiency vis-à-vis profitability. Results show that the RMP and ES hypotheses might hold, but not the SCP. Profits appear to persist over time. Policy implications are considerable including that any suggestions to limit further mergers and acquisitions of banks in the region may have to be properly debated.

Keywords: Pacific Island countries; Fiji; bank profitability; market power; efficiency; profit persistence; DEA; GMM

JEL Classification: D20; D40; G21; L11

I. Introduction

Located North to —north-east of Australia, the Pacific Island countries (PICs) include Fiji, Papua New Guinea, Solomon Islands, Vanuatu, Tonga, Samoa and Kiribati. These 'countries with special needs' or small island developing states are economies with small markets, fragile natural environments and limited opportunities for the private sector. Some are constantly challenged by extreme poverty, structural economic weaknesses, lack of capacity to grow and acute susceptibility to external shocks. The World Bank classifies PICs as 'lower middle income' to 'low income' countries.

It is against this background that findings, such as the IMF's that bank profits in these countries are relatively high, are concerning (PFTAC, 2011). High bank profits may be market power or efficiency-driven. If it is the case that profits are market power-driven,

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then households and firms are likely to experience high cost of borrowing, credit rationing and compromised banking services, among others (Chortareas *et al.*, 2011). More importantly, these experiences are likely to have adverse consequences for, or even retard, economic growth and development (Beck *et al.*, 2007), thus aggravating the socio-economic conditions of the region – especially since the finance-led growth and poverty reduction policies and aspirations in these economies are predominantly bank-dominated; capital markets are either very small and inactive or virtually nonexistent. However, high profitability may also be due to greater efficiency such that the implications of market power effects on profits may be discarded.

While studies on bank profitability vis-à-vis market power and efficiency span a number of years, many countries, regions and methods, the experiences of the PICs remain unknown. Banking history in the region dates back to at least the 1870s, prominently feature foreign banks and the quality of regulatory practices are equivalent to the developed world's, yet policy-makers remain ill-informed with respect to the costs and benefits of further mergers and takeovers (M&As). Unfortunately, due to differences in the regulatory and economic environments, findings of other countries and/or regions may not be applicable to the PICs.

This study thus fills a huge gap in the bank profitability vis-à-vis market power and efficiency literature. It is also the first to examine persistence of bank profits in a Pacific Island context. We examine two market power hypotheses: the structure-conduct-performance (SCP) and the relative market power (RMP) hypotheses together with two measures of the efficient-structure (ES) hypothesis – X and scale efficiencies. Due to data reliability and availability constraints, the study focuses on Fiji. However, given the high level of structural and performance comparability across the region (PFTAC, 2011), findings are likely to apply to other PICs.

Results show that the RMP and ES hypotheses might hold, but not the SCP. Moreover, bank capital and liquidity are negatively correlated with profit levels and credit risk is positively correlated. Profits also appear to persist over time. Policy implications are considerable including the fact that any suggestions to limit further mergers and acquisitions in Fiji, and possibly elsewhere in the region, may have to be properly debated. These insights make policy-makers better informed on the issue of bank profitability vis-à-vis market power and efficiency.

The rest of the article is organized as follows: Section II discuses the IMF findings; Section III briefly reviews trends in the structure and profitability of banks in Fiji; Section IV reviews the relevant literature; Section V discusses data and methodology; Section VI discusses the X and scale efficiency results; Section VII discusses the empirical results and Section VIII concludes with some policy implications.

II. IMF Findings on Profitability of Banks in the Pacific

Prepared at the request of the Central Bank Governors, the IMF report covers six PICs: Solomon Islands, Fiji, Tonga, Samoa, Vanuatu and Papua New Guinea. Table 1 provides a summary of main profitability findings; panel A shows average pre-tax return on assets (ROA) and panel B shows the highest recorded individual ROA. As per Table 1, over the period 2006 to 2009, ratios for PICs were consistently the highest. For example, in 2006, the PIC ratio of 5.2% was 1.7 times more than the next highest in the sample, that of Sub-Saharan Africa.

Compared to Australia, the home country of the largest banks in the region, the PIC ratio was around 3.5 times more. In 2009, the average ROAs across countries and regions appear to have declined compared to 2006 ratios; however, the PIC ratio was still the highest – three times more than Australia's. Similarly, available data shows that banks in the Pacific had the highest individual ROA – as high as 10.5% in 2008 and 9.3% in 2009 – far more than the ratios of other regions – for example, only 3.5% and 1.6%, respectively, in emerging Europe.

Incidentally, bank profits appear to remain high in the region despite governments' good intentions to liberalize the banking systems over time, focussed mainly on improved competition and efficiency. However, as the IMF report further notes, banking sectors in the region

Table 1. Return on assets: PICs and others, 2006–2009

Panel A: Average ROAs (%)				
	2006	2007	2008	2009
PICs	5.2	4.9	4.0	2.8
Australia	1.5	1.4	0.7	0.9
New Zealand	1.7	1.6	1.3	…
Latin America	2.2	2.1	1.9	1.9
Sub-Saharan Africa	3	2.5	3.3	…
Mid East & Central Asia	2.2	2.1	1.4	…
Emerging Europe	1.6	1.7	1.3	0.3
Panel B: Individual High ROAs (%)				
PICs	7.7	8.6	10.5	9.3
Latin America	3.5	3.1	3.5	5.5
Sub-Saharan Africa	5.8	3.9	4.2	…
Mid East & Central Asia	4	3.4	3.2	…
Emerging Europe	3.4	3.9	3.5	1.6

Note: … indicates data not available.
Source: IMF Report on *Interest rates and bank profitability in the Pacific;* PFTAC, (2011).

continue to be limited to three to four banks, raising the question: does market power indeed influence high bank profits in the PICs? We investigate this issue later, but first, some background on Fiji's financial sector.

III. Fiji's Banking Sector: Structure and Profitability, 2000–2010

Structure

As is common in the region, Fiji's banking sector is more or less *the* financial sector. Banks are subject to international, BIS-based, regulatory standards and are relatively advanced technologically – services available to customers include telephone and internet banking. With the first bank established in 1873, Fiji has a long banking history as well. Fiji has always been attractive to well-established foreign banks and while foreign interest prevails, the sector has consistently been limited to four to five banks in its 140 year history.

Acquisitions have been common, mainly by two of the oldest (Table 2). As Table 2 shows, Fiji's pioneer bank was acquired by the Bank of New Zealand (BNZ) after only 3 years of operations. BNZ in turn was acquired by the Australia and New Zealand Banking Group (ANZ) in 1990. While entry and exit is not state-controlled, acquisitions have tended to keep the sector historically concentrated (Fig. 1). The Herfindahl–Hirschman Index (HHI) averaged around 3030 in the period 2000 to 2010, suggesting high level of market concentration – generally, a HHI of more than 2500 indicates high concentration. This is confirmed by the concentration index (CI) – the share of the three largest banks relative to the total industry; over the period 2000 to 2010, Fiji's CI averaged 88%. By comparison, in the same period, the average credit risk (CR) was 60% in Australia, 90% in New Zealand and in the case of some neighbouring and developing Asia-Pacific countries, 61% in the Philippines, 45% in Thailand.

Profitability and risks

For profitability, we focus on ROA since comparative corresponding global data is available only for this measure, which is illustrated in Fig. 2, where, 'FJ' denotes Fiji operations. As per Fig. 2, over the period 2000 to 2010, there was a marked difference between the ROAs of Fiji and global operations. Take the case of Westpac Banking Corporation (WBC), for instance, the gap is significant and huge.

While highly profitable, banks are not exposed to very high levels of risks (PFTAC, 2011). Take, for instance,

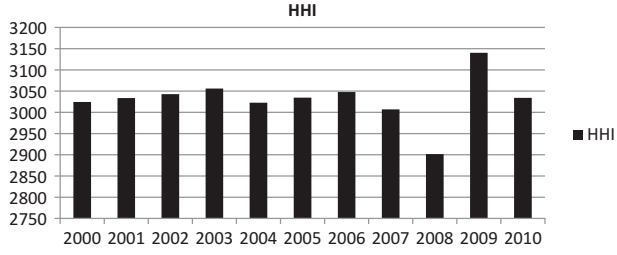

Fig. 1. Concentration index (HHI) of Fiji's banking industry, 2000–2010

Table 2. A brief history of bank acquisitions in Fiji, 1873–2012

Currently operating	First Entry	Country of ownership/ incorporation	Acquisitions	Comment
Australia and New Zealand Bank (ANZ)	1952	Australia	Bank of New Zealand (BNZ) (1876–1990) Citibank (1970–78) Barclays Bank International (1972–85) Bank of Hawaii (1993–2001)	BNZ entered the market by taking over Fiji's pioneer bank, FBCT (1873–76)
Westpac Banking Corporation (WBC)	1901	Australia	HSBC (1986–88)	Previously, Bank of NSW
Bank of Baroda	1961	India	None	
Bank South Pacific	2009	Papua New Guinea	Habib Bank Ltd (HBL) (1991–2006) Colonial National Bank (CNB)	HBL was a Pakistani bank. CNB had entered the market by acquiring 51% shares in Fiji's only local bank, National Bank of Fiji in 1999, and the rest of the 49% in 2006.

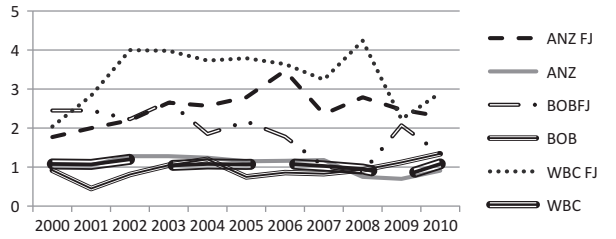

Fig. 2. Return on Assets (ROA, %) of Fiji operations of selected banks compared to corresponding overseas banking group, 2000–2010

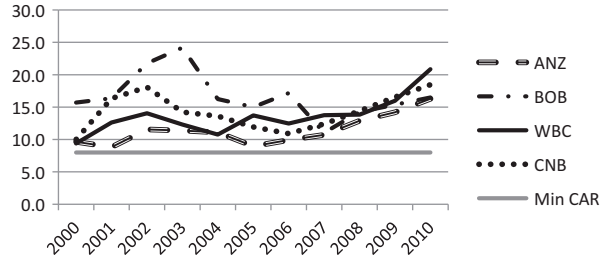

Fig. 3. Capital adequacy ratios of banks in Fiji

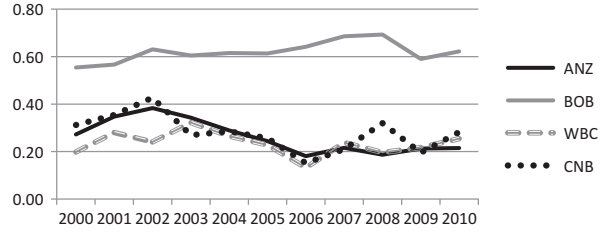

Fig. 4. Liquidity risk of banks, 2000–2010

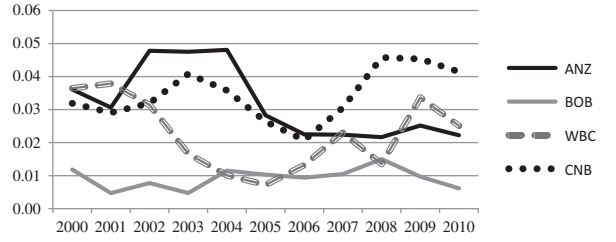

Fig. 5. Credit risk of banks, 2000–2010

capital risk, measured using the Bank for International Settlements (BIS) capital framework. As Fig. 3 shows, the ratio has consistently been above the 8% minimum, indicating that capital risk is low. Moreover, the ratios have been rising in the period 2007 to 2010 – a period of otherwise increasing worldwide economic and financial uncertainty.

Similarly, liquidity positions do not appear to be a concern. As Fig. 4 shows, banks appear to have ample liquid assets relative to total. Moreover, the credit risk appears low as well (Fig. 5).Credit risk is measured by the ratio of general reserves for credit losses to gross loans; the generally low and downward trending patterns suggest that banks are not expecting high levels of unexpected loan losses in the future.

Overall, Fiji's banking sector appears to be highly concentrated, which could be a reason for high profitability; however, banks may have become more efficient over time, which may also contribute to high profits. The next section reviews the literature on the possible profitability vis-à-vis market power and efficiency associations, followed by an investigation of the situation in Fiji.

IV. Literature Review

The SCP hypothesis of Bain (1951) essentially proposes that markets characterized by a few firms will practice pricing behaviours with the objective of maximizing profits via collusion, price leadership or other tacit price arrangements. In these markets, profits are expected to be greater than the competitive norm. A related theory is the RMP, which asserts that supernormal profits will be earned only by firms with large market shares and well-differentiated products (Shepherd, 1982). Studies show that a causal relationship exists between market concentration and performance of firms, supporting the collusion hypothesis of the SCP paradigm (Goddard *et al.*, 2001). Evidence of collusion may be observed by higher interest rates on loans, lower rates on deposits and higher fees and charges.

However, profitability may also be driven by greater efficiency such that: (i) greater technical efficiencies or better technologies may lead to higher profits via lower operating costs – the ESX (X efficiency) hypothesis; and/or (ii) lower operating costs and thus higher profitability may be driven by more efficient production levels – the ESS (scale–efficiency) hypothesis. Greater efficiency may also increase both profit levels and market share, resulting in spurious relationships, implying that market power and efficiency tests should be conducted simultaneously to ascertain the relative impact of each on profitability (Claeys and Vander, 2009). In the event that there is a positive relationship between size and/or concentration vis-à-vis profitability, further M&As may be limited to manage price-setting behaviours of banks. However, M&As may not be limited if the ES hypotheses are proven, since higher profitability would then also be a result of efficiency gains.

The evidence on the relative impact of market power and efficiency on profitability appears inconclusive. Moreover, while extensive, most studies have tended to focus on developed countries, particularly the United

States and more recently, the European Union; the PICs have been largely ignored. With respect to market power, a review of literature by Gilbert (1984) shows that over half of the banking studies supported the SCP hypothesis. More recent studies supporting the SCP hypothesis include Lloyd-Williams and Molyneux (1994) in the case of Spanish banks; Molyneux and Forbes (1995) in the case of European banks and Berger and Hannan, (1997) in the case of US banks. However, efficiency may also contribute to higher profits. For example, in the case of European banks, Goldberg and Rai (1996) find support for the ESX hypothesis in countries with low concentration ratios with the impact of RMP evident otherwise.

Similarly, in the case of Spanish banks, Maudos (1998) finds support for both ESX and RMP. In the case of US banks as well, both ESX and RMP may contribute to higher profits (Berger, 1995). In the case of Chinese banks, Fu and Heffernan (2009) find support for RMP, particularly in the pre-banking reform period (i.e. pre-1992), but ESX becomes more prominent in explaining bank profits thereafter; however, the authors do not find any support for the SCP hypothesis. In the case of Latin American countries, Chortareas *et al.* (2011) find support for the ES hypothesis, disregarding claims of any collusion in the region's banking sectors. In the case of Mexico, Garza-Garcia (2012) finds that bank profits are not determined by either technical or scale efficiencies; they are determined by market power. In the case of the PICs, the relationships are not known.

Persistence of profit

Abnormal profits are likely to be competed away in a market with free entry and exit conditions, such as in the PICs, so that profits might converge towards their long-run equilibrium (Mueller, 1986, 1977). The static models commonly used in the literature to test the competition vis-à-vis bank performance relationships are useful in identifying the casual links between market power and profit variables. However, contrary to a basic assumption of these models, there is no certainty that markets are in equilibrium in the long run. To manage this bias, dynamic models are now applied to test the market power–profitability relationships (e.g. Athanassoglou *et al.*, 2005; Goddard *et al.*, 2011). A dynamic model appears to be particularly useful in testing the influence of entry and exit conditions on profits. Long-run equilibrium is more likely and at a rapid pace in settings with sufficiently free entry and exit conditions; slower adjustments to such equilibrium and thus abnormal profits are more likely where rigid structural features persist (Goddard *et al.*, 2011).

Empirical evidence on profit persistence in banking appears to be limited and results appear to be influenced by structure. A study on the US banking sector finds profit persistence to be temporary, not permanent (Levonian, 1993). Further, profit persistence may depend on the performance distribution of a bank and may strongly be related to impediments to competition, regulatory policies and macroeconomic variables (Berger *et al.*, 2000). In the case of European countries, Goddard *et al.* (2004) find profit persistence to be greater for mutual banks compared to commercial banks. The authors also find that strong regulatory practices may contribute to greater profit persistence. In the case of Italian banks, profit persistence is observed in concentrated markets with high profit ownership (Agosttino *et al.*, 2005). In the case of Turkish banks, Bektas (2007) finds no evidence of profit persistence. In the case of Greece, profits might persist but only moderately and might converge to long-run equilibrium. To the best of our knowledge, there is no existing study on profit persistence in the case of the PICs.

V. Data and Methodology

Data

The data for this study is mainly from the Reserve Bank of Fiji's online database and so is highly reliable. At the time of investigation, available relevant data was only for the period 2000 to 2010, i.e. 11 years. With five banks in Fiji, the data set might appear limited. However, it is sufficient to investigate efficiency of banks using the data envelopment analysis (DEA) technique since DEA works well with small sample sizes. In a recent study, Moffat and Valadkhani (2011) use the technique to investigate the efficiency of 10 institutions over a 6 year period. The data set was also sufficient to run a regression analysis using the dynamic generalized method of moments (GMM) technique, which we use in this study as well. In a recent study, Gounder and Sharma (2012) investigate the determinants of net interest margin for banks in Fiji using the same sample size as the one used in this study. Small sample sizes have also been used in other studies, including Bergendahl and Lindblom (2008) in investigating the efficiency of independent savings banks (ISBs) in Sweden, Havrylchyk (2006) in examining the efficiency of the Polish banking system; Pasiouras (2007) in estimating the technical and scale efficiency of Greek banks and Ataullah *et al.* (2004) in comparing bank efficiencies between India and Pakistan.

Data envelopment analysis (DEA)

We propose to do two things: (i) compute the two efficiency estimators – ESX (X efficiency) and ESS (scale efficiency); and (ii) subsequently, test the influence of both ESX and ESS, together with market power and other

control variables on bank profitability in Fiji. To compute the efficiency estimators, we employ the nonparametric DEA technique. As noted above, an important advantage and a main reason for using DEA is that it works well with small samples such as ours. Also, unlike parametric approaches such as the stochastic frontier analysis (SFA), DEA does not posit a particular functional form for the best practice banks' frontier. However, DEA does not also take any random error into account; if random errors exist, measured efficiency by nonparametric approaches may be confounded by these random deviations from the true frontier (Mester, 1996).

Introduced by Charnes *et al.* (1978), under the assumption of constant returns to scale (CRS) in production, the DEA essentially measures the ratio of outputs relative to specified number of inputs. Assuming that there is data on N inputs and M outputs for a group of firms I, and letting x_i and y_i represent column vectors of inputs and outputs in the ith firm, then the input and output matrices for the group can be represented as $N \times I$ and $M \times I$, respectively. A firm's decision to maximize output (output-oriented model) can be represented mathematically as Max u, $v(u'yi/v'xi)$. When $v'xi = 1$, the formula is transformed to:

$$\begin{aligned} &\text{Max } u,v(u'y_i),\\ &\text{it is subject to the constraints:}\\ &v'x_i = 1,\\ &uy_j - vx_jd \le 0, j = 1, 2.....I,\\ &u, v \ge 0, \end{aligned} \tag{1}$$

where u is an $M \times 1$ vector of output weights and v is an $N \times 1$ vector of input weights. Due to the duality in linear programming, Equation 1 may be converted into the following input-oriented linear programming function for calculating DEA efficiency under the assumption of CRS,

$$\begin{aligned} &\text{Min}_{\lambda,\theta}\ \theta\\ &\text{subject to:} -y_i + Y\lambda \ge 0,\\ &\qquad\qquad \theta x_i - X\lambda \ge 0,\\ &\qquad\qquad \lambda \ge 0, \end{aligned} \tag{2}$$

where λ is an $I \times 1$ vector of constants. Here, θ is a scalar – its value is the efficiency score for the ith firm. $\theta \le 1$, with a value of 1 indicating a point on the frontier and, hence, a technically efficient firm (Coelli *et al.*, 2005). To allow for scale inefficiency, Banker *et al.* (1984) introduced a variable returns to scale (VRS) model, which in turn allows the computation of scale efficiency derived from CRS technical efficiency (TE), that is, scale efficiency = $TE(CRS)/TE(VRS)$.

The DEA model, under the assumption of VRS, is constructed by adding the constraint: $\prod' \lambda = 1$ to the CRS model as follows:

$$\begin{aligned} &\text{Min}_{\lambda,\theta}\ \theta\\ &\text{subject to:} -y_i + Y\lambda \ge 0,\\ &\qquad\qquad \theta x_i - X\lambda \ge 0,\\ &\qquad\qquad \prod' \lambda = 1,\\ &\qquad\qquad \lambda \ge 0 \end{aligned} \tag{3}$$

where $\prod$ is an $I \times 1$ vector of ones. Thus, the VRS approach forms a convex hull of intersecting planes that envelop the data more tightly than the CRS approach.

Input/output specifications. In efficiency studies, it is acknowledged that the choice of variables may influence results. The input and output combination in the literature has been specified variously depending on the approach. For example, as per the 'intermediation' approach, inputs usually include deposits, fixed assets and employee numbers/expenses and the outputs include loans and other interest-bearing investments. Similarly, as per the 'production' approach, inputs include fixed assets and employee numbers/expenses and outputs include deposits, loans and other interest-bearing investments. Thus, between these two approaches, the main difference is the treatment of deposits. To mitigate any significant variations in the results arising from the use of the two different approaches, recent research has suggested using deposits as an intermediary product (Holod and Lewis, 2011). Similarly, as per the value-added approach, the inputs include fixed assets, employee numbers/expenses and interest expense and the outputs include deposits, loans and other interest-bearing investments.

We use deposits as inputs and thus the 'intermediation' approach, influenced by the Berger and Humphrey (1997) argument that this approach may be 'superior for evaluating the importance of frontier efficiency to the profitability of the financial institution, since minimization of total costs, not just production costs, is needed to maximize profits' (p. 197). In a recent study, Sharma *et al.* (2012) use the DEA technique to compute overall efficiencies of banks and other deposit institutions in Fiji. We go a step further to compute the two specific efficiency estimates – ESX and ESS. Essentially, we rerun the DEA using the same data set, but for banks only; moreover, Table 3 presents the descriptive statistics of the inputs and outputs, averaged for the period 2000 to 2010.

The DEA analysis produces two categories of scores: (i) CRS ; and (ii) VRS , where the VRS scores represent ESX estimates and CRS/VRS gives the estimates for scale efficiency (ESS).When ESS = 1, a bank is efficient under

Table 3. Input/output descriptive statistics, average 2000–2010 (in FJDm)

	FA	DEP	EMP	LON	OEA
ANZ	27272	1045253	51995	893671	129419
BOB	3175	265739	6080	99662	152647
WBV	14478	713154	23474	625473	31841
CNB	8837	416645	24582	346177	38918
BSP	386	36407	1517	25962	10049
Mean	10829	495439	21529	398189	72575
SD	10669	393502	19878	363159	63922
Min	386	36407	1517	25962	10049
Max	27272	1045253	51995	893671	152647

Note: ANZ = Australia and New Zealand Banking Corporation Ltd; BOB = Bank of Baroda; BSP = Bank of South Pacific Limited; CNB = Colonial National Bank Limited; and WBC = Westpac Banking Corporation Limited. FA = fixed assets; DEP = deposits; EMP = employee expenses, a proxy for number of employees; LON = loans; and OEA = other earning assets.

both CRS and VRS, when ESS < 1, the bank is not scale-efficient.

Generalized method of moments

With the EES and ESX scores available, the next step is to estimate their influence, together with that of market power and other control variables, on bank profits in Fiji. To do that, we employ a dynamic model – the GMM and panel data. GMM accounts for the dynamic process in bank profitability and is designed to handle autoregressive properties in the dependent variable when lagged values are introduced as explanatory variables. In addition, GMM allows the use of instrumental variables which produces more precise and accurate estimators. Thus, exogenous variables, the lagged dependent variable and the lagged endogenous variables are utilized as instruments. Instruments should be relevant and valid, i.e. correlated with the endogenous regressors and orthogonal to the errors. The over-identifying restrictions are tested via the commonly employed *J*-statistic of Hansen (1982). If the null hypothesis is rejected, the implication is that the instruments do not satisfy the required orthogonality conditions. Further, in the context of GMM, the moment conditions are valid only if there is no serial correlation in the idiosyncratic errors. Accepting the null hypothesis at higher order, AR (2), implies that the moment conditions are valid.

Accordingly, the regression estimates are based on the following equation:

$$\begin{aligned}\pi_{it} = {} & \alpha_{it} + \beta_1 \pi_{i,t-1} + \beta_2 HHI_t + \beta_3 MS_{it} + \beta_4 LR_{it} \\ & + \beta_5 CR_{it} + \beta_6 CAP_{it} + \beta_7 ESX_{it} + \beta_8 ESS_{it} \\ & + \beta_9 INF_t + \beta_{10} GDP_t + \beta_{11} COUP_t + \mu_i + \varepsilon_{it}\end{aligned} \quad (4)$$

where,

π is return on assets – net income/total assets or return on equity – net income/total equity; two standard measures of profitability;

α is the constant term;

π_{t-1} lagged ROA or ROE, two measures of profit persistence;

HHI Herfindahl–Hirschman Index – defined as the sum of the squared market share value of each bank in the banking sector, a measure of market concentration and the SCP hypothesis;

MS is market size – total assets of one bank to total assets of all banks, a measure of the RMP hypothesis

LR is liquidity risk – total liquid assets to total assets; higher ratios indicate lower risk;

CR is credit risk – general reserves for credit losses to gross loans; higher ratios indicate higher perceived risk;

CAP is capital risk – total capital to total risk adjusted asset; measure of capital risk; higher ratios indicate lower risk;

ESX is X or TE;

ESS is scale efficiency;

INF is the annual inflation rate;

GDP is the annual gross domestic product growth;

COUP is a dummy variable, equals value 1 in 2000 and 2007, 0 otherwise

μ is unobserved bank-specific time invariant effect; and

ε is a disturbance effect independent across banks.

In the equation, π is a measure of bank profitability; we use both ROA and ROE. π_{t-1} is the lagged ROA or ROE and measures the persistence of profits, i.e. the extent to which a bank remains in the same profit distribution. In the absence of market power, abnormal profits are likely to be competed away very quickly. The coefficient of the variable, in this case β_2, indicates the speed at which profits might adjust to long-run equilibrium (Athanassoglou *et al.*, 2005). Profits are perceived to persist if the value of the coefficient lies between 0 and 1; a value closer to 0 indicates a high speed of adjustment and that the industry is highly competitive, a value closer to 1 indicates a very low speed, suggesting that the industry might be uncompetitive.

HHI is the Herfindahl–Hirschman Index, a measure of the degree of market concentration (in terms of assets); a positive relationship will indicate acceptance of the SCP hypothesis. *MS* is the market share of each bank in terms of assets and a positive sign would suggest that the relative market share contributes to profitability such that the RMP hypothesis would be accepted. *CR* is a measure of credit risk and a negative sign is expected since nonperforming loans are costly to banks. *LR* is a measure of liquidity risk and a negative sign is expected since greater levels of liquid assets imply lower levels of interest earning assets. *CAP* is a measure of capital risk and a positive sign is expected since greater capital levels might reduce

funding costs of borrowing, among others. ESX and ESS are measures of X and scale efficiencies, respectively; a positive relationship with ROA would support the ES hypothesis, indicating that profits are influenced by improved efficiencies. Turning to the macroeconomic variables, *INF* is the annual inflation rate and the expected sign is negative. *GDP* is a measure of growth and the expected sign is positive. *COUP* is a dummy variable, measuring the consequences of the two coup d'états the country has experienced in the sampling period and the expected sign is negative. The two coups (2000 and 2007) negatively impacted GDP in these years; it would be interesting to see how they may have affected bank profits.

VI. X and Scale Efficiency Results

Overall, the industry appears to have done better with respect to X compared to scale efficiency, i.e. TE scores are higher than production scores; over the period 2000 to 2010, the industry average for X was 85.4% and for scale was 71.9% (Table 4). For X, the lowest was 76.1% (2001) and the highest was 95.2% (2006); for scale, lowest was 66.3% (2007) and highest was 78.3% (2000). The difference between technical and scale efficiency scores appears to be more obvious among the larger banks. For example, the largest bank, ANZ, had an average TE score up to 88.6% but an average scale efficiency score of only 50.2% over the sampling period. Comparatively, the smallest bank, Bank SP, had a score of 84.8% for TE and 88.7% for scale efficiency.

Our results are consistent with those of several efficiency studies on Australian banks, which are parent banks of three of the five banks in Fiji (e.g. Sturm and Williams, 2004; Kirkwood and Nahm, 2006; Shamsuddin and Xiang, 2012). On one hand, a large bank may take advantage of technology that is more advanced and superior managements as well as the benefits of economies of scale and/or scope. On the other hand, the large bank may also take advantage of the premiums of being too-big-to-fail. In addition, the market power of the large bank may incur inefficiencies because of the shelter hypothesis (Leibenstein, 1966). In the case of banks in Australia, Sturm and Williams (2004) find that scale inefficiency dominated technical inefficiency over the period 1988 to 2001, especially for the big four.[1] The authors interpret this as a strategy used by the big four to discourage entry of foreign banks following deregulation. The X and scale

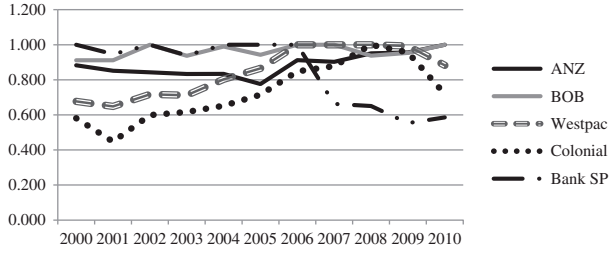

Fig. 6. X efficiency of banks in Fiji, 2000–2010

Table 4. X and scale efficiency scores of banks in Fiji, 2000–2010

Panel A: X efficiency												
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Mean
ANZ	88.27	85.18	84.26	83.30	83.37	77.61	91.25	90.25	95.11	95.59	100.00	88.56
BOB	91.14	91.18	100.00	93.69	98.98	94.30	100.00	100.00	93.74	95.38	100.00	96.22
WBC	67.73	64.84	71.72	71.19	80.31	86.57	100.00	100.00	100.00	99.28	88.24	84.53
CNB	58.07	44.74	59.86	61.65	65.25	71.54	84.82	87.84	100.00	95.65	71.89	72.85
BSP	100.00	94.65	100.00	93.94	100.00	100.00	100.00	66.24	65.09	55.33	58.54	84.89
Mean	81.04	76.12	83.17	80.75	85.58	86.00	95.22	88.87	90.79	88.25	83.73	85.41
Panel B: Scale efficiency												
ANZ	48.06	48.25	47.89	47.21	46.02	56.33	53.81	50.32	45.92	53.93	54.42	50.20
BOB	84.78	84.84	84.07	83.22	83.30	83.10	82.76	82.24	80.41	81.10	91.56	83.76
WBC	70.02	75.83	71.77	84.44	88.30	81.73	89.97	84.03	77.29	73.17	63.90	78.22
CNB	88.47	77.55	76.63	58.78	55.90	56.78	56.61	52.10	42.94	45.56	36.19	58.87
BSP	100.00	70.86	100.00	74.86	81.05	100.00	100.00	62.73	99.20	89.22	97.40	88.67
Mean	78.27	71.47	76.07	69.70	70.92	75.59	76.63	66.29	69.15	68.60	68.69	71.94

[1] The big four includes: National Australia Bank Limited (NAB), Commonwealth Bank of Australia (CBA), Australia and New Zealand Banking Group Limited (ANZ) and Westpac Banking Corporation Limited (WBC).

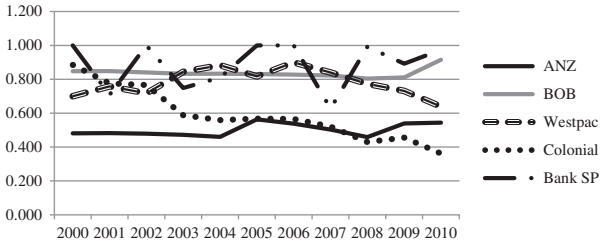

Fig. 7. Scale efficiency of banks in Fiji, 2000–2010

efficiencies of the five banks are illustrated in Figs. 6 and 7, respectively.

X efficiency

As Fig. 6 shows, in terms of TE, Bank of Baroda (BOB) appears to be the overall best performing bank; its average score over the period 2001 to 2010 was 96.2%, clearly the highest. More importantly, BOB's good performance appears to be consistent for the entire sampling period. Occasionally, BOB's score reached 100% (four times, including in 2010). Of the two larger banks, ANZ appears to be second ranked in TE; its average over the period was 88.6%. On a further positive note, ANZ's score, like BOB's, reached 100% in 2010. Beginning with 88.3% in 2000, ANZ's TE appears to have been on a declining trend, albeit marginally until 2004; it dipped noticeably to 77.6% in 2005, but rebounded and has been over 90% thereafter, peaking at 100% in 2010.

The other large bank, Westpac, does not appear to have performed very well compared to others. Ranked fourth, Westpac's average was 84.5% over the period 2000 to 2010. Interestingly, however, Westpac reached 100% three times (2006–2008), rising steadily from 67.7% in 2000, and peaking in 2006. Post-2008, the trend has been declining and was 88.2% in 2010.Technically, at least, Westpac would be expected to perform much better.

Scale efficiency

As noted above, the scale efficiency scores are generally lower than the TE scores, especially for the larger banks. Over the sampling period, the two large banks, ANZ and WBC, appear to be operating under decreasing returns to scale (DRS); the three smaller banks appear to be operating under increasing returns to scale (IRS) or CRS. The best performer regarding scale efficiency, was again BOB, which showed stable and high scale efficiency (Fig. 7). BOB's average score over the period 2000 to 2010 was 83.8%, lower than its own X efficiency average score and also ranked second this time. The leader of the pack with respect to scale efficiency was Bank of South Pacific Limited (BSP), the smallest and newest bank in the country; its average score was 88.7%. However, it may be noted that BSP appears to have had a rather volatile experience, including some noticeable dips, such as in 2007 to 61.7% from 100% in the previous year. Overall, though, the smaller banks (BOB and BSP) appear to be more production-efficient compared to the larger banks (ANZ and Westpac).

ANZ's average was 50.2%, clearly the lowest across the five banks; its highest was 54.4% (2010) and lowest 46.0% (2005); that is, ANZ's production efficiency level appears to be only around half of the optimum level. In 2010, ANZ appears to have been about 77% less efficient than BSP and 67% less than BOB. Westpac's performance was better than ANZ's; its average score was 78.2%, but still much lower than BSP's or BOB's. Moreover, Westpac had not reached its full capacity in the period 2000 to 2010, its production efficiency appears to have peaked in 2006 (90%) and the trend has been steadily declining thereafter, to rest at 63.9% in 2010.

Table 5. GMM estimates of market power and efficiency vis-à-vis profitability

Column	Model 1	Model 2	Model 3	Model 4
L.DEP	0.5304**	0.4590***	0.6564**	0.5359***
	(0.2019)	(0.1400)	(0.2342)	(0.0646)
HHI	0.1254	0.1195	−3.0158	0.2585
	(0.1728)	(0.1455)	(0.3369)	(4.5942)
MS	0.0132	0.0166*	1.8332	1.8155***
	(0.0102)	(0.0082)	(1.2790)	(0.3994)
ESX	0.0175	0.0192**	−0.4667**	−0.2811
	(0.0107)	(0.0073)	(0.2033)	(0.2065)
SSE	0.0161*	0.0177**	−0.2087	−0.2056
	(0.0081)	(0.0067)	(0.2267)	(0.2043)
CR	0.0137	0.0110	1.2382**	0.8929*
	(0.0192)	(0.0169)	(0.5288)	(0.4404)
CAP	−0.0002**	−0.0003**	−0.0024	−0.0050**
	(0.0001)	(0.0001)	(0.0025)	(0.0016)
LR	−0.0136*	−0.0136**	−0.2481	−0.0442
	(0.0071)	(0.0056)	(0.2830)	(0.2963)
GDP	0.0007	0.0002	−0.0042	−0.0062**
	(0.0005)	(0.0004)	(0.0084)	(0.0024)
INF	−0.0001	−0.0001	−0.0006	0.0003
	(0.0001)	(0.0001)	(0.0014)	(0.8320)
COUP		−0.0051		−0.0703
		(0.0031)		(0.0538)
AR(1)	−0.4863**	−0.3722**	−0.5574*	−0.3561**
	(0.2088)	(0.1633)	(0.2853)	(0.1388)
AR(2)	−0.2695	−0.0770	−0.2495	−0.0360
	(0.2265)	(0.1995)	(0.2189)	(0.0998)
Adjusted R^2	0.5800	0.5700	0.7334	0.7420
SE of regression	1.1100	1.1260	0.0726	0.0714
J-statistic	10.100	9.7400	4.7653	4.0600
	[0.3400]	[0.3716]	[0.8542]	[0.9074]

Notes: SEs are in parentheses below the coefficient estimates; *p*-values are in brackets. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

VII. GMM Results

The results of the GMM regression analysis are provided in Table 5. In Models 1 and 2, ROA is the dependent variable, in Models 3 and 4, ROE is the dependent variable. The Hansen test shows no evidence of over-identifying restrictions as the *p*-value of *J*-statistics is not significant in any of the models. The diagnostics also indicate that a negative first-order autocorrelation AR(1) is present. However, second-order autocorrelation is rejected, as indicated by the nonsignificant *p*-values for AR(2) errors, implying that the estimates are consistent.

As Table 5 shows, the lagged dependent variable is positive and significant in all models, indicating that profits are likely to persist over time. However, as the coefficients lie between 0.45 and 0.65, the indication is that the market may not be as highly uncompetitive as generally perceived. Moreover, the *HHI* shows no significance in any of the models, thus the SCP hypothesis may be rejected, i.e. the structure of the sector may not significantly influence profitability of banks in Fiji. On the other hand, *MS* is positive and significant in two cases when *COUP* is controlled for, indicating that the RMP hypothesis may be accepted. Thus, it appears that banks with greater market share may be able to obtain higher profits. Higher profits also appear to be influenced by efficiencies. However, the influence appears to be affected by the measure of profitability used.

SSE has a positive and significant effect in ROA models, but the effect is not significant in ROE models. Interestingly, ESX has a positive and significant effect in the ROA model where COUP is controlled for but has a negative and significant effect in the ROE model where no control is for COUP. The discrepancy in the results of the two models may lie in the gearing issue, since ROE is significantly affected by financial leverage. Given the fact that banks are highly levered, this discrepancy may imply that ROA is a more appropriate measure of profitability. Since both ESX and SSE are significant in two cases, the ES hypothesis might be accepted.

With respect to the remaining bank-specific variables, *CR* is positive and significant in two cases, indicating that banks with more risky assets may be more profitable. It can also imply that perceptions about higher losses from credit are likely to encourage management to be more mindful of profit levels, resulting in profits actually increasing during these times. *CAP* is negative and significant in all four models, indicating that more capital may not necessarily lead to higher profit levels. LR is also negative and significant in two cases, indicating that higher levels of liquid assets are likely to result in lower profit levels. These results are similar to previous studies on Fiji (Gounder and Sharma, 2012). The macroeconomic factors do not show any significance whatsoever, indicating that the profitability of banks in Fiji may not be affected by the macroeconomic environment.

VIII. Conclusion and Some Policy Implications

The IMF finding that bank profits in the PICs are relatively high is concerning, especially in light of the adverse socio-economic circumstances of these economies. Essentially, these are small island developing states; some are even categorized as less developed economies. The foregoing raises the question of whether the high profits might be market power-driven. If they are, possible consequences might be high loan rates, credit rationing, compromised banking services, among others, which, based on the finance-growth literature, may in turn lead to retarded, not enhanced economic growth and increased, not reduced poverty and inequality. However, profits may also be efficiency-driven such that implications of market power effects on profits may be discarded. Accordingly, an appropriate understanding of the simultaneous effects of market power and efficiency on profits, in a Pacific Island context, appears imperative for policy development.

Two market power hypotheses – the SCP and the RMP hypotheses – together with two measures of the ES – X and scale efficiencies – are estimated. The study uses the nonparametric DEA technique to estimate the efficiency scores for banks in Fiji over the period 2000 to 2010 and the dynamic GMM to estimate the relationships between market power and efficiency vis-à-vis profitability.

Results show that bank profitability might be influenced by relative market share (RMP theory) and efficiencies (ES hypothesis), but not market structure (SCP theory). Profits also seem to persist over time. although the coefficients indicate that the industry may not be as uncompetitive as might appear. Thus, the RMP and ES hypotheses appear to hold in the case of banks in Fiji. Other influential bank-specific variables include capital and liquid assets – both negatively associated, and credit risk – positively associated. That is, higher levels of capital and liquid assets tend to reduce profits and higher perceived credit risk tends to increase profits. The macroeconomic variables, on the other hand, appear to have little effect on profits.

From a policy perspective then, it appears that any suggestions of limiting further mergers and acquisitions to discourage further market concentration may need to properly debated. While the RMP hypothesis appears to hold, the SCP hypothesis does not. That is, market

concentration does not appear to influence bank profitability. With respect to the RMP hypothesis, while market share appears to influence profits, it may not necessarily be the case that banks with greater market share are indeed pricing their products above competitive levels. Both ROA and ROE measures of profitability focus on net income, which is comprised of interest as well as non-interest income components. Interest income of banks in Fiji has usually been closely monitored by the Reserve Bank of Fiji, including regulations on interest spreads since 2010.Moreover, pricing information is well advertised. Thus, pricing above competitive levels may not seem to be an effective strategy for banks in Fiji. Accordingly, any suggestion that market power, either in the form of structure or market share, might be a major source of high bank profitability in Fiji may not be valid. Similarly, any suggestion that market power might be a cause of any high cost of borrowing, credit rationing and/or compromised banking services might also not be valid.

If finance matters for growth, poverty, etc. and if banks can remain highly profitable without having to enhance their interest income levels via substantially expanded loan portfolios, then significant further finance-led macroeconomic benefits may not appear too promising. Moreover, the finding that profits may have partly been due to improved efficiencies – the ES hypothesis appears to hold – makes it challenging to require banks to become substantially more efficient.

In view of the foregoing, encouraging banks to supply more credit in the hope of fostering growth and reducing poverty via finance might have to be accomplished via strategies other than limiting market concentration and/or substantially improved efficiencies, especially in light of emerging new regulations relating to interest spreads, mandatory lending, etc. In addition to maintaining a 4% interest spread, banks are required to lend a specified proportion of their mobilized deposits to micro and small enterprises (from 2010), and agriculture and renewable energy sectors (from 2013), which the banks are happy to comply with. Moreover, Fiji's banking system remains sound and stable; global financial and economic crises have not had much effect on stability and soundness. There is no guarantee that a less concentrated market or enhanced efficiency will foster Fiji's economic growth via increased demand and supply of credit. However, there is a chance that a less concentrated market might have adverse consequences for stability and soundness.

Given that the structure of banking and financial systems across the Pacific Island states is greatly comparable, the results and policy implications of this study are likely to apply to other regional economies as well. Future research may investigate the importance of various interest and noninterest components of income for bank profitability in Fiji and across the region; it appears that noninterest income might be an import source. Research may also look at other options for enhancing finance-led growth in the region and employ techniques other than DEA to estimate banking efficiency, which might better explain the efficiency–profitability relationship. In the meantime, the insights of this study make policy-makers in Fiji, and possibly elsewhere in the Pacific, much better informed with respect to the important issue of bank profitability vis-à-vis market power and efficiency.

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