Determinants of Efficiency of Fiji's Commercial Banks: An Empirical Study: 2002-16

T.K. Jayaraman
Baljeet Singh
Ajeshni Sharma

Abstract

Commercial banks function as intermediaries between savers and investors. Under a fractional reserve system, commercial banks have been empowered to step up money supply by creating demand deposits when they approve loans to the borrowers. In the process, rise in money supply is inevitable and inflationary potential is kept under control only when rise in output is faster than rise in money supply. Inflation affects the efficiency of the banks. But efficiency is also influenced by various other factors, which include efficient loan recovery and expenditure controls. This paper explores factors influencing the efficiency of commercial banks by utilizing an index developed and derived by the authors. The study finds that in Fiji, the real GDP, the margin between average lending rate and deposit rates, and bank credit to private sector were positively associated with bank efficiency, while inflation, bank expenditure, and non-performing loans were negatively associated with bank efficiency.

Introduction

In the 2000's, after the failure of the first ever indigenously owned National Bank of Fiji (NBF)[1] in the 1990s, financial sector reforms were introduced and implemented (Chandra, Jayaraman and Waqabaca, 2008). These enabled the country to recover and restore economic stability. As is well recognized, commercial banks mobilize savings and provide credit

[1] The failure of NBF is a good example of how a bank abuses people's trust. Fiji spent over F$200 million to cover for the failure (Grynberg, Munro and White, 2002).

to investors. In Fiji, the role of the banking system as an intermediary has been growing in importance over the years. Bank credit to economic agents increased from 37.92% in 2000 to 118.84% of GDP in 2015 (WDI, 2017).

Increase in credit growth has a negative side too. The darkest period in the history of banking in Fiji to date is marked by the failure of the first ever national bank, the National Bank of Fiji (NBF). The NBF saga represents the worst that could happen anywhere in the world: inefficiency all around, including sanctioning loans without careful appraisal of projects, credit extended to friends and relatives of bank managers, high officials in the government and politicians - popularized as crony capitalism - and high operating costs. They all led to losses and falling efficiency. If banks were inefficient and loan recovery processes poor, there would be heavy costs on the economy. In this context, a measurement of efficiency of banks and factors influencing bank efficiency become critical for both banks and the central bank. The latter is charged with statutory obligations to regulate the banking system and promote financial stability.

A study (Jayaraman and Sharma, 2017, in this volume) calculated a bank efficiency index (BEI) on the basis of quarterly data from 2002 Q3 to 2016 Q2. It found that efficiency had been falling from the third quarter of 2010 to the third quarter of 2014, and was below the benchmark of 100; this trend was arrested in the last quarter of 2014, but thereafter the index showed violent fluctuations until mid-2016.

This paper explores the influencing factors behind BEI of the commercial banking system as a whole[2]

Reforms in Fiji's Financial Sector

Reforms in Fiji's financial sector[3] were initiated soon after the collapse of National Bank of Fiji, and the 2000 coup. Reforms over the last 15 years by the Reserve Bank of Fiji (RBF) aimed to restore trust and confidence in banks and the economy, and the ability of the institutions to regulate banks and the economy. Reforms were notably in the following

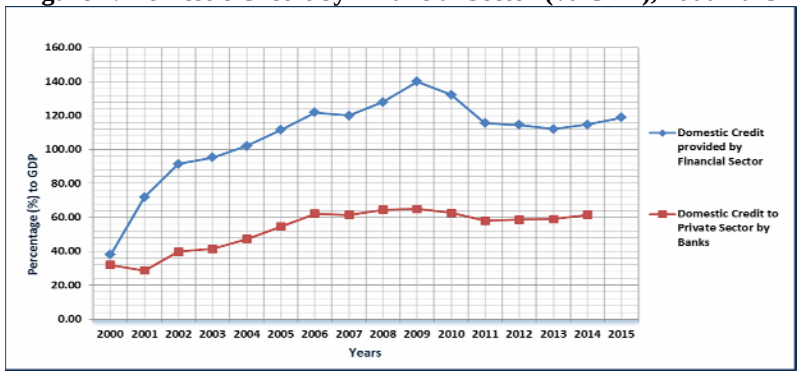
[2] Since the data now in the public domain do not give any information for each commercial bank, our analysis does not go beyond dealing with the commercial banking system as a whole. The RBF declined to make available the data series for individual banks on grounds of confidentiality. Commercial banks approached also declined to release any data on their operations.

[3] See Jayaraman and Sharma (2017; pp 3-11 above) for a background of Fiji's financial sector.

areas: (i) increasing capital adequacy ratio from 8% to 12%, (ii) improved classification of loans and impaired assets; (iii) disclosure requirements on interest rates, fees and charges; (iv) implementation of interest rate spread disclosures, (v) introduction of complaint management guidelines; (vi) operational risks management; (vii) formulation of policy on money laundering and minimizing terrorist financing risk; and (vii) introduction of an electronic payments and settlement system (called FIJICLEAR). The RBF recently launched a *Financial Sector Development Plan 2015-2025* with a view to further strengthening and deepening the financial sector (RBF Annual Report, 2015).

The impact of reforms was visible in all directions. First and foremost, they restored confidence in the financial system, albeit slowly over the period. Secondly, it was recognized that indigenous banking would take time to develop before any effort would be renewed until the time was ripe. In the meanwhile, due to s steady rise in domestic credit, from 2000 to 2015 bank lending increased from 37.9 percent of GDP to 118.8 percent. Figure 1 shows the trend in domestic credit movement.

Figure 1: Domestic Credit by Financial Sector (% GDP), 2000-2015



(Source: WDI, 2016)

Table 1 presents the sectoral composition of domestic credit, while Table 2 shows domestic credit as a percent of GDP .

While credit to agriculture sector registered a modest increase from F$40.2 million in 2000 to F$74.4 million in 2016, the largest increase in credit was recorded in the real estate sector, where it rose from F$47 million in 2000 to F$761 million. In relative terms, credit to real estate surged from 1.3 percent of GDP in 2000 to 6.9 percent in 2015. The construction sector also witnessed a boom, growing on average by 22 percent per annum, from F$37 million in 2000 to F$581.1 million in 2016.

Table 1: Components of Major Credit by Commercial Banks (F$m): 2000-16

Year	Agriculture	Manufact-ure	Mining & Quarrying	Real Estate	Building & Construct	NBFI's	Public Entreprises	Wholesale	Transport	Electricity	Professional Services	Private Individuals	Central &Local Govt.	Others
2000	40.2	152.5	5.2	47.2	37.0	0.3	49.5	359.9	26.3	6.1	58.6	373.3	8.7	29.3
2001	26.5	145.3	5	58.2	29.7	0.3	47.2	356.5	26.8	3.8	30.4	374.1	7.9	19.9
2002	28.5	146.4	5.1	52.4	32.5	2.4	24.8	371.3	24.3	3.3	30.8	401.5	8.3	31.8
2003	24.7	178.5	4.6	71.5	41.2	0.6	44.0	415.0	30.0	2.3	32.8	456.4	8.8	56.8
2004	23.4	231.4	1.5	122.1	57.0	0.5	75.0	464.8	46.1	4.5	47.5	536.3	7.8	9.3
2005	25.2	217.9	2.2	167.2	93.1	1.5	80.1	513.6	61.2	28.0	64.9	661.1	7.0	38.3
2006	24.1	260.8	1.8	213.4	202.2	6.3	67.4	572.3	72.6	60.6	80.8	794.3	14.3	54.2
2007	33.1	271	1.9	245.6	180.6	7.6	65.3	589.5	73.9	61.1	99.0	787.4	7.9	54.0
2008	32.2	301.3	3.4	286.7	200.8	8.6	70.0	680.9	121.2	43.9	111.6	818.4	11.7	75.0
2009	28.4	300.6	4.3	286.3	216.8	2.2	80.6	700.9	120.4	49.2	101.0	824.6	20.4	55.5
2010	20.6	265.5	4.9	316.9	201.0	3.8	75.1	742.9	123.9	55.6	85.2	855.0	21.4	116.5
2011	26.4	265.6	5.2	350.7	192.7	3.4	61.6	788.3	152.9	125.2	79.8	860.8	24.3	186.3
2012	29.6	285.6	7.9	371.6	206.6	0.3	49.9	853.1	141.6	129.7	91.1	876.1	53.8	265.9
2013	38.6	344.5	8.1	429.4	259.3	2.9	94.8	936.7	152.9	179.8	96.8	1047.2	16.2	257.6
2014	45.6	419.5	15.3	477.0	352.5	3.9	105.6	1195.6	221.6	239.1	112.1	1386.6	20.5	255.2
2015	79.9	423.4	16.3	632.1	481.4	6.2	70.5	1220.7	245.3	229.1	127.5	1634.1	16.2	313.6
2016	74.4	450.1	16.4	761.0	581.1	5.5	52.4	1258.3	284.7	213.1	122.4	1819.2	15.1	349.1

(Source: Reserve Bank of Fiji)

Table 2: Domestic Credit

Year	Agri	Manufg	Mining & Quarry	Real Estate	Bldg & Construct	NBFI's	Public Entreprise	Wholesale	Transport	Electricity	Prof Services	Private Individuals	Central & Local Govt.	Others	Domestic Credit Provided by Banks (% of GDP)
2000	1.12	4.25	0.15	1.3	1.0	0.0	1.4	10.0	0.7	0.2	1.6	10.4	0.2	0.8	31.97
2001	0.70	3.84	0.13	1.5	0.8	0.0	1.2	9.4	0.7	0.1	0.8	9.9	0.2	0.5	28.72
2002	0.71	3.63	0.13	1.3	0.8	0.1	0.6	9.2	0.6	0.1	0.8	10.0	0.2	0.8	39.83
2003	0.56	4.07	0.10	1.6	0.9	0.0	1.0	9.5	0.7	0.1	0.7	10.4	0.2	1.3	41.49
2004	0.50	4.90	0.03	2.6	1.2	0.0	1.6	9.8	1.0	0.1	1.0	11.3	0.2	0.2	47.28
2005	0.50	4.29	0.04	3.3	1.8	0.0	1.6	10.1	1.2	0.6	1.3	13.0	0.1	0.8	54.44
2006	0.45	4.86	0.03	4.0	3.8	0.1	1.3	10.7	1.4	1.1	1.5	14.8	0.3	1.0	62.09
2007	0.60	4.94	0.03	4.5	3.3	0.1	1.2	10.8	1.3	1.1	1.8	14.4	0.1	1.0	61.55
2008	0.57	5.37	0.06	5.1	3.6	0.2	1.2	12.1	2.2	0.8	2.0	14.6	0.2	1.3	64.51
2009	0.51	5.35	0.08	5.1	3.9	0.0	1.4	12.5	2.1	0.9	1.8	14.7	0.4	1.0	64.99
2010	0.34	4.41	0.08	5.3	3.3	0.1	1.2	12.3	2.1	0.9	1.4	14.2	0.4	1.9	62.66
2011	0.39	3.92	0.08	5.2	2.8	0.1	0.9	11.6	2.3	1.8	1.2	12.7	0.4	2.8	57.97
2012	0.42	4.02	0.11	5.2	2.9	0.0	0.7	12.0	2.0	1.8	1.3	12.3	0.8	3.7	58.69
2013	0.50	4.46	0.10	5.6	3.4	0.0	1.2	12.1	2.0	2.3	1.3	13.6	0.2	3.3	59.06
2014	0.54	4.97	0.18	5.7	4.2	0.0	1.3	14.2	2.6	2.8	1.3	16.4	0.2	3.0	62.38
2015	0.87	4.60	0.18	6.9	5.2	0.1	0.8	13.3	2.7	2.5	1.4	17.7	0.2	3.4	65.25

(Source: Reserve Bank of Fiji and Authors' Calculations)

Personal loans and automobile lending increased from 10.4 percent of GDP to 17.7 percent during the period. Electricity sectoral lending increased from 0.2 percent of GDP to 2.5 percent, possibly on account of it being seen as a priority sector for renewal energy and expanding the national grid access. However, professional services and public enterprises relatively portfolios fell, respectively, from 1.6 percent of GDP to 1.4 percent and from 1.4 percent to 0.8 percent as a percentage of GDP from 2000 to 2016.

Bank Efficiency and Non-performing Loans

Strong growth in bank credit, though welcome, leads to problems of the kind a banking system would often have to face in the event of failure to pay off the loans taken by the customers. In their anxiety to capture greater market share in expanding phases of the economy, banks relax their routine and normal appraisal procedures. Jayaraman and Sharma (2017) show there have been episodes of fall in efficiency index in Fiji.

Aggressive loan pushing measures often tend to be followed in due course by poor recovery of loans from those who would have been in the first place not creditworthy. Secondly, frequent disruptions in economic activities caused by political uncertainties and consequent decline in economic growth, reflected in decreasing gross domestic product, have been found to be associated with fall in loan recovery, as the repayment capacities of individual customers and business houses get adversely affected. Fiji put in place an easy monetary policy environment. In addition, in the last ten years globally, to fight recession with rapid growth in bank credit, commercial banks have been forced to increase their provisions for loan losses and to step up for unforeseen contingencies.

The incidence of non-performing loans in Fiji, therefore, has been rising. Table 3 shows the trends.

Jayaraman and Sharma (2017, in this volume) show that banking efficiency index has been subject to fluctuations and volatility. Our interest is in exploring the causes behind the fall in BEI as well as determinants of BEI. The next section is devoted to these.

Model, Data, Methodology and Results

Bank efficiency is primarily determined by two major variables. The first is the income derived from interest rates levied on loans provided to the customers *minus* interest paid on deposits mobilized. The second variable is the total expenditure, comprising operating expenditure

Table 3: Fiji's Bank Credit and Non-Performing Loans: 2002-2015

	Real GDP Growth Rate	% of GDP	Lending rate less deposit rate (%)	Change in CPI (%)	Non-performing loans: Gross Loans (%)	Non-Performing loans F$m
Year	***GR***	***psc***	***Margin***	***Inflation***	***npl***	***NPL***
2002	3.20	39.83	5.76	0.72	6.59	76.28
2003	1.00	41.49	5.69	4.22	4.66	63.45
2004	5.30	47.28	5.45	2.83	4.23	68.70
2005	0.70	54.44	4.95	2.30	3.69	73.56
2006	1.85	62.09	1.79	2.50	2.45	59.48
2007	-0.85	61.55	1.96	4.78	5.68	140.66
2008	1.03	64.51	5.24	7.82	3.13	82.73
2009	-1.39	64.99	2.94	3.17	3.74	104.26
2010	2.95	62.66	2.07	3.69	4.37	126.08
2011	2.71	57.97	3.72	7.28	3.86	120.33
2012	1.88	58.69	4.55	3.42	4.19	148.78
2013	6.08	59.06	4.03	2.88	2.69	103.67
2014	5.45	62.38	3.90	0.57	2.16	104.27
2015	5.56	65.25	3.27	1.40	1.45	79.36

(Source: WDI and Authors' Calculations)

and provision made for expected bad loans and contingencies. Since interest income is derived from loans sanctioned, the amount of credit disbursed directly influences the anticipated interest income. Higher credit disbursement ensures greater income from another source as well, which is the margin, defined as the difference between the average lending interest rate and average deposit interest rate. Rise in the margin would be an attractive incentive for banks to step up their lending. At the same time, more lending tends to lead to reckless lending. The latter is always due to poor appraisal of loan applications and sanctions regardless of the quality of projects. Such lending leads to increases in the incidence of risky loans over time. Inevitably non-performing loans (NPL) would accumulate. Income foregone from interest on non-performing loans would rise. Eventually these result in falling profits for banks. Increases in NPL would impose heavy costs in terms of making higher provision for bad loans, adding to annual expenditure side as well.

Besides these two factors influencing operations of banks directly, there are two macroeconomic factors which affect banks' profitability. One is economic growth, which is reflected in the rise in real GDP (RGDP), and the other is inflation which is reflected in increase in con-

sumer price index (CPI). It may seem odd to have both real GDP and inflation together. Rising RGDP indicates growing confidence, kindling growth expectations. Rising expectations mean optimism, inducing borrowers to undertake risky projects. Banks take advantage of business men's optimism expecting that they would continue to derive higher interest income.

Economic growth facilitates greater cash flows for businesses as well as households, hence making loan servicing easier. On the other hand, expectations of inflation during the expansionary phase, which are normal, work in opposite directions. Aside from reducing purchasing power of households, inflation hurts business sector as raw materials and wages rise in nominal terms and reduces business profits. Consequently, banks may experience less inflows of net interest income.

Thus, rising RGDP, based on past growth, raises expectations that future would be a repetition of the past. This has a positive effect on BEI. On the other hand, inflationary expectations put a break to BEI. It is well observed phenomenon during expansionary phases of the economy that shortages develop, causing inflationary bottlenecks.

Therefore, the model is formulated as follows:

BEI = f (RGDP, CPI, MARGIN, PSC, TE, NPL) ; where:

BEI = bank efficiency index
RGDP = Real GDP in Million $
CPI = consumer price index.
MARGIN = difference between average lending rate and average deposit rate in percent
PSC= bank credit to privates sector in million F$
TE = Total expenditure in million F$
NPL = non-performing loans in million F$

The hypotheses to be tested are:

(i) BEI and RGDP are positively associated as economic growth directly influences bank efficiency by raising business prospects and profitability of firms and incomes of households as bank net income would rise;
(ii) BEI and CPI have a negative relationship as inflation would hurt bank efficiency by raising costs all around, reducing business cash flows and household incomes, thereby hurting their capacity to meet interest obligations;
(iii) BEI and Margin are positively related, as the higher margin would provide greater incentive to lend more, increasing net income of banks, given the total expenditure;
(iv) BEI and PSC have a direct relationship, as increase in lending to private sector would enhance net income earnings of banks and profitability of their operations, holding other things constant;
(v) BEI and TE have an indirect relationship since rise in total expenditure adversely affects profitability of bank operations and reduces bank efficiency;
(v) BEI and NPL are negatively associated, since rise in non-performing loans reduces the net interest income and lowers bank efficiency.

Commercial Banks Credit (percent of GDP): 2000-2015

Data

The data relating to RGDP, CPI, MARGIN, NPL and PSC employed in empirical investigation are sourced from Asian Development Bank (2016) and World Development Indicators (2016). As the data series are not available on a quarterly basis, these were converted by cubic spline procedure into quarterly figures. Data series on BEI and TE data series are calculated from the Income and Profits data available on a quarterly basis from various issues of RBF's Quarterly Review. Table 7 presents the variables employed in the econometric analysis. The period covered is 2002 Q4 to 2015 Q4. We, thus, have 53 quarterly observations.

Methodology

We resort to the ARDL bounds testing approach of Pesaran *et al* (2001), which does not require testing of unit root tests of the variables included in the empirical analysis. However, we conducted the unit root tests to ensure that data series are free from bias due to non-stationarity and hence the results obtained would be free from any bias. The ARDL approach involves two steps.

- Step 1 test is to test the existence of a long run relationship between the variables of interest as predicted by the theory.
- If such a relationship is shown to exist, then Step 2 estimates the short and long run parameters of the relationship.

Table 7: Variables employed for the study: 2002- 2015

Year	BEI index	GDP F$ Mill	CPI Index	Margin %	PSC F$m	TE F$ m	NPL F$m
2002	100.9988	5940.349	73.644	5.763	1158.200	22.36	76.282
2003	96.62052	5999.753	76.717	5.691	1362.700	23.94	63.455
2004	116.2132	6317.739	78.886	5.447	1625.600	25.2	68.701
2005	121.617	6361.964	80.752	4.953	1996.200	27.8	73.561
2006	116.1839	6479.818	82.764	1.793	2423.300	29.1	59.481
2007	92.93003	6424.697	86.740	1.961	2475.400	39.2	140.655
2008	138.1744	6491.051	93.447	5.244	2643.100	36.1	82.732
2009	88.65248	6401.083	96.451	2.941	2787.000	37.6	104.262
2010	58.88651	6590.214	100.000	2.075	2883.300	46.7	126.079
2011	78.70917	6768.488	107.287	3.720	3118.000	48.4	120.334
2012	45.44723	6895.971	110.943	4.548	3554.900	59.2	148.780
2013	74.57072	7315.280	114.171	4.035	3856.800	53.8	103.665
2014	99.682	7713.705	114.788	3.903	4835.000	58.4	104.267
2015	146.0952	8142.854	116.361	3.274	5479.800	62.5	79.358

Step 1 of the ARDL approach involves estimating an ARDL, as shown in the equation given by the following equation:

$$\begin{aligned}\Delta \ln BEI_t &= c_0 + \delta_1 \ln BEI_{t-1} + \delta_2 \ln RGDP_{t-1} + \delta_3 \ln CPI_{t-1} \\ &+ \delta_4 \ln Marg in_{t-1} + \delta_5 \ln PSC_{t-1} + \delta_6 \ln TE_{t-1} \\ &+ \delta_7 \ln NPL_{t-1} + \sum_{i-1}^{p} \alpha_i \Delta \ln BEI_{t-i} + \sum_{i-0}^{q} \beta_j \Delta \ln RGDP_{t-j} \\ &+ \sum_{i-1}^{q} \chi_k \Delta \ln CPI_{t-k} + \sum_{i-1}^{q} \lambda_n \Delta \ln M\ \arg in_{t-n} + \sum_{i-1}^{q} \pi_s \Delta \ln PSC_{t-s} \\ &+ \sum_{i-1}^{q} \varpi_w \Delta \ln TE_{t-w} + \sum_{i-1}^{q} \vartheta_z \Delta \ln NPL_{t-z} + u_t\end{aligned}$$

The terms with the summation signs in the equation stand for the error correction model (ECM) dynamics, and the coefficient δ_i are the long-run multipliers, corresponding to the long-run relationship, while coefficient c_0 is the drift, and ε_t are the white noise errors (Poon, 2010).

The general unrestricted error model is tested downwards sequentially by dropping the statistically non-significant first difference variables of the equation to arrive at a 'goodness-of-fit' model, using a general-to-specific strategy (Poon 2010).

The null hypothesis of no long run relationship between the variables of interest (no cointegration) i.e.

$$H : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$$

is tested via an F test. The asymptotic distribution of the F statistic is non-standard. Pesaran et al (2001) provide lower and upper bound critical values. If the calculated F statistic is larger (smaller) than the upper (lower) bound critical value, then the null hypothesis of no cointegration is rejected.

After confirming long run cointegration, a ARDL model within an unrestricted error correction model (UECM) framework (as shown in equation 4b) is estimated to confirm long run relationship. This study selects the optimal number of lags in UECM-ARDL models using Akaike Information Criterion (AIC).

$$\begin{aligned}\Delta \ln BEI_t &= c_0 + \sum_{i-1}^{p} \alpha_{1i} \Delta \ln BEI_{t-i} + \sum_{i-0}^{q} \alpha_{2i} \Delta \ln RGDP_{t-j} + \sum_{i-1}^{q} \alpha_{3i} \Delta \ln CPI_{t-k} \\ &+ \sum_{i-1}^{q} \alpha_{4i} \Delta \ln M\ \arg in_{t-n} + \sum_{i-1}^{q} \alpha_{5i} \Delta \ln PSC_{t-s} + \sum_{i-1}^{q} \alpha_{6i} \Delta \ln TE_{t-w} \\ &+ \sum_{i-1}^{q} \alpha_{7i} \Delta \ln NPL_{t-z} + \lambda \varepsilon_{t-1} + u_t\end{aligned}$$

Where, λ is the speed of adjustment parameter, and EC_{t-1} is one-period lagged error correction term.

The long and short-run parameter estimates, the coefficient of the lagged error term (εc_{t-1}) is shown in table 10. The coefficient of (εc_{t-1}) is negative with a value less than 1 which confirm long-run relationship.

Estimates

We start the estimation procedure by conducting unit root tests by employing the augmented Dicky-Fuller test with lag length chosen using the modified Akaike Information Criterion as per Ng and Perron (2001). The results of these tests are reported in Table 8 - the presence of a unit root in some variables in levels. Repeating the tests on first differences of

the non-stationary variables reveals that all are stationary in first differences, and are hence integrated of order 1. Thus, all our variables of interest employed in the analysis are appropriate for application of the ARDL bounds testing methodology.

Table 8: Augmented Dickey-Fuller unit root test for the variables in level and difference

Variables	level	First difference
Ln(BEI)	-4.11***	
Ln(RGDP)	1.95	-2.85**
Ln(CPI)	-2.85**	
Ln(Margin)	-2.28	-5.02**
Ln(PSC)	-0.87	-3.35*
Ln(TE)	0.56	-7.38***
Ln(NPL)	-1.15	-3.51**

Note: ***, ** and * indicate significance at 1%, 5% and 10% levels respectively

We now proceed to calculate F-statistics to test the long-run relationship in which the maximum lag length *p* is 3 in the ECM. The results of the bounds for F-test in equation are shown in Table 9.

Table 9: Results of bounds of the F-test

F-statistics		12.0***
	Lower Bound	Upper bound
1%	2.88	3.99
5%	2.27	3.28
10%	1.99	2.94

Note: *** significance at 1% level.

The results confirm the existence of a cointegration relationship between BIE and covariates[4]. We therefore estimate ARDL model within an

[4] It is also plausible that cointegration would exist when individual independent variable in the above model are treated as dependent variables, however, in case of such endogenous regressors, ARDL provides unbiased estimates in the long run (Ahmad and Du, 2017). Therefore, we have not tested for cointegration when other individual variables in the model are treated as dependent variables, as we intend to analyse effects of control variable on bank efficiency index.

unrestricted error correction model (UECM) framework to confirm the long-run relationship. This study selects the optimal number of lags in UECM-ARDL models using Akaike Information Criterion (AIC). The long run-run parameter estimates, the coefficient of the lagged error term (εc_{t-1}) is shown in table. The coefficient of (εc_{t-1}) is negative with a value less than 1 and also significant.

The results obtained provide evidence in favour of a cointegration relationship among variables established by the bounds testing procedure. The coefficients of Real GDP, PSC, and MARGIN, are significant with positive signs, implying they exert positive influence on bank efficiency index. While total expenditure (TE), consumer price index (CPI) and non-performing loan (NPL) are significant with negative signs, implying they have negative influence on bank efficiency index in the long run. Thus, the hypotheses which we wanted to test have been proved to be correct.

The model was subjected to a number of diagnostic and specification test. All test results confirm that model fits the data adequately. RESET (Regression Specification test) indicates no serious omission of variables, Breusch-Godfrey F-statistics test reveals that errors are homoscedastic, LM test indicates there is no serial correlation and the Jarque-Bera statistics suggest that the disturbances of the regressors are normally distributed.

Table 10: Results of the estimated long run coefficients

Regressor	Coefficient	Standard error	T-Ratio	Prob.
C	-15.5	6.4	-2.4	0.02
Ln(GDP)	2.55	0.83	3.06	0.00
Ln(Margin)	0.16	0.022	7.08	0.00
Ln(PSC)	1.29	0.17	7.56	0.00
Ln(TE)	-1.85	0.15	-12.3	0.00
Ln(CPI)	-1.13	6.4	-2.4	0.02
Ln(NPL)	-0.17	0.05	-3.19	0.00
εc_{t-1}	-0.39	0.49	-7.9	0.00
Jarque- Bera value (JB-L) (test of normality)			4.01 (value)	
Breusch-Godfrey F-statistics (BJG) (Heteroscedasticity)			0.24	
LM (serial Correlation)			0.12	
Adjusted R-square			0.94	

Summary and Conclusion

This paper undertook an empirical study on the determinants of commercial bank's efficiency in Fiji, utilizing the bank efficiency index (BEI) series (Jayaraman and Sharma (2017)) for a 14-year period (2002-2015). Results show that real GDP (RGDP), Margin and bank credit (PSC) are positively associated with BEI; and consumer price index (CPI), non-performing loans (NPL) and total expenditure (TE) incurred by banks are negatively related with BEI. The results of the empirical study validate the hypotheses. Policy implications are clear. While the macroeconomic conditions, namely economic growth and inflation are beyond the control of a small, open island economy such as Fiji, whose growth is heavily impacted by world economic conditions and whose consumption is highly dependent on imports including staples of rice and wheat, CPI is influenced by world commodity prices. Therefore, the only possible ways open to commercial banks for promoting banking efficiency are through keeping non-performing loans under control by a stricter economic appraisal of loan applications, and through reducing operating expenditure. The 'leaner and meaner' expenditure control measures suggested to governments are also equally applicable to banks.

References

Ahmed, N & L. Du (2017) 'Effects of energy production and CO2 emissions on economic growth in Iran: ARDL approach'. *Energy*. 123: 521-537.

Bhattacharya, A, C.A.K. Lovell & P. Sahay (1997) 'The impact of liberalization on the productive efficiency of Indian commercial banks'. *European Journal of Operational Research* 98(2): 332-345.

Campa, J. & I. Hernando (2006) 'M&As performance in the European financial industry'. *Journal of Banking & Finance* 30(12): 3367-3392.

Chandra, A., T. K. Jayaraman & F. Waqabaca (2004) 'Reforms in banking supervision in Fiji: A Review of Progress'. *Pacific Economic Bulletin* 19(3): 102-114.

Charnes, A., W. Cooper & E. Rhodes (1978) 'Measuring efficiency of decision making units'. *European Journal of Operational Research* 2(6): 429-444.

Grynberg, R., D. Munro & M. White (2002) *Crisis : the collapse of the National Bank of Fiji*. Suva, USP Book Center: University of the South Pacific.

Jayaraman, T.K & A. Sharma (2017) 'Measuring Bank Efficiency in Fiji'. *College of Business Hospitality and Tourism Studies, Working Paper Series.* WP1/2017 (Unpublished), pp. 1-10.

Jayaraman, T.K & C. Choong (2007) 'Financial Sector Development and Growth in Fiji: an Analysis of Credit Boom and its Implications'. *The Asia Pacific Economic Journal* 5(1): 1-20.

Ng, S. & P. Perron (2001) 'Lag length selection and the construction of unit root tests good size and power'. *Econometrica* 69(6): 1519-1554.

Persaran, M.H., Y. Shin & R. J. Smith (2001) 'Bounds testing approaches to the analysis of level Relationships'. *Journal of Applied Econometrics* 16(3): 289-326.

Poon, W.C. (2010) 'A monetary policy rule: the augmented monetary conditions index for Philippines using UECM and bounds tests'. Discussion Paper No. 04/10, *Monash University*, Melbourne.

Reserve Bank of Fiji (2016a) *Annual Report 2015*. Online at: http://www.rbf.gov.fj/Publications-(1)/Reserve-Bank-Annual-Reports

Reserve Bank of Fiji. (2016b) *Quarterly Review* (various issues). Online at: http://www.rbf.gov.fj/Publications-(1)/Quarterly-Review

Sathye, M. (2003) 'Efficiency of banks in a developing economy: The case of India'. *European Journal of Operational Research* 148(3): 662-671.

Seiford, L.M. & R. M. Thrall (1990) 'Recent developments in DEA: The mathematical programming approach to frontier analysis'. *Journal of Econometrics* 46(1-2): 7-38.

Sherman, H.D. & F. Gold (1985) 'Bank branch operating efficiency: Evaluation with data envelopment analysis'. *Journal of Banking & Finance* 9(2): 7-38.

World Bank (2017) *World Development Indicators*. Online at https://data.worldbank.org/country/fiji

Authors:

T.K. Jayaraman is Professor, Faculty of Business and Finance, International Cooperative Partner in Research, University of Tunku Abdul Rahman, Kampar Campus, Perak State, Malaysia and my e-mail address : tkjayaraman@yahoo.com (Corresponding Author)

Baljeet Singh is Lecturer at University of the South Pacific, Suva, Fiji.

Ajeshni Sharma is Lecturer in Banking at the Fiji National University. Email: ajeshni.sharma@fnu.ac.fj