การประเมินผลการดำเนินงานของธนาคารไทยพาณิชย์ในการปรับลดอัตราดอกเบี้ย RAR (RAROC) และมูลค่าเพิ่มทางเศรษฐกิจ (EVA)

EVALUATION OF PERFORMANCE OF THAILAND BANKS IN RISK ADJUSTED RETURN ON CAPITAL(RAROC) AND ECONOMIC VALUE ADDED (EVA) FRAMEWORK

กิตตินันต์ พิศสุวรรณ[1], ษิญาภา ชัยกุลเทวินทร[2]

Kittinant Phitsuwan, siyapa Chaikultawintron

ABSTRACT

As Thailand banks step into Basel–III era, a close look at their performance on risk adjusted basis using RAROC and EVA would throw significant light on their relative strengths and weaknesses. Post restructuring during 1999–2000, the regulatory framework Thailand Commercial Banks throughout 2001–2016 was mainly centered on capitalisation, risk management and governance practices in banks. Financial Sector Blue Print is viewed as the reference framework for growth of banks in the current decade. Though numerous studies have evaluated the performances of Thailand banks in terms of efficiency and productivity gains before and after the merger and also at various phases during the last decade, no study has so far been reported to evaluate their performances using the above framework. This paper intends to fill up this gap. The period covered is 2001 to 2013. Findings of this paper would be of keen interest to the policy planners, investors and researchers alike.

Keywords: commercial banks, risk management, performance measurement

INTRODUCTION

Thailand banking system has developed significantly since the implementation of a conscious strategy of restructuring, mergers, consolidation and rationalisation exercise in the year 2000 to tide over the deleterious effects of the Asian Financial crisis. The post restructuring growth of banks was guided by the Financial Sector Master Plan (FSB) 2001–2010 Thailand Commercial Banks. As stated by Zeti (2013), "There has been a tremendous payoff from the development of our financial system, its restructuring, rationalisation, deregulation and subsequent liberalisation". Since 2001, the financial sector has expanded at an average annual rate of 7.3%, to account for 11.7% of real GDP in 2010 compared to 9.7% in 2001. Domestic banks have accumulated strong capital and loan loss buffers, with improvements in underwriting and risk management practices. Risk Weighted Capital Ratio (RWCR), Return on Asset (ROA) and Return on Equity (ROE) of the domestic commercial banks went up from

[1] ศาสตราจารย์ประจำคณะบริหารธุรกิจ สถาบันเทคโนโลยีแห่งอโยธยา

[2] อาจารย์ประจำหลักสูตร สาขาการจัดการ คณะบริหารธุรกิจ สถาบันเทคโนโลยีแห่งอโยธยา

4.2% to 11.7%, 1.1% to 1.5% and 13.7% to 15.7% respectively between the years 2000 to 2013.As the Thailand marketplace continues to evolve at a rapid pace under the policy of liberalisation as specified in FSB2011–2020, it has become imperative for domestic banks to remain efficient not only to withstand the competitive pressure, especially from the foreign players, but also to thrive in a rapidly changing environment. It may be recalled that basic touch–stone of success of banks is their inner strengths to absorb shocks arising out of various risks in their business profile. This has become increasingly important bench–mark in the aftermath of the global financial crisis which brought perils to banking system worldwide. As BNM steps up its inititttaive to usher–in the requirements of Basel–III, performance of each financial institutions will be under the scanner of the investors as well as those who would like to assess the intrinsic strength of each institution to generate return in accordance with the risk–class to which it belongs. Given this background, there is a need to develop an innovative framework which profiles the performance of banks on a risk adjusted basis. Though there are many reported studies which evaluated the performance of banks using traditional ratio analysis and the Data Envelopment Analysis, there is no published paper literature on the risk adjusted performance measurement of Thailand banks. This paper aims to fill–in this important gap and provide a framework which can be used by regulator, prospective investors and finally future researchers who might be interested in delving deep into the performance of Thailand banks in the framework attuned to global best practices.The assessment was carried out in three stages. In the first stage, the focus was to highlight the key findings of BNM and International Monetary Fund (IMF) assessment about the health of the commercial banks in the country. In the second stage, domestic banking groups were evaluated in the Risk Adjusted Return on Capital (RAROC), Economic Value Added (EVA) framework. In the third stage, relative efficiency of banks was evaluated using Data Envelopment Analysis (DEA) with 'beta' as input parameter and RAROC and EVA as output parameters.

Analysis

THE EVOLVING FRAMEWORK OF BANK PERFORMANCE

Drawbacks in Using Traditional Ratio Measures

Although variety of indicators, as mentioned above, are used to measure the performance of banks, ROE remains the most used one (Baer, Mehta, & Samandari, 2011). Based on the analysis of a sample of 12 large European and US banks, the Report on EU Banking Structure (European Central Bank, 2010) has however contended that ROE has provided misleading information in discriminating good banks from the bad ones over different phases of the financial crisis. The report has also indicated that the P/E ratio calculated with expected earnings did not predict risks that were accumulating in the financial system in advance. Moreover, it did not clearly differentiate the business models of investment and universal banks and hence the market valuations were akin to "herd–estimations". The said report also argued that in the time of 'stress', when earnings tend to reach zero, P/E ratio becomes meaningless. It has

also been stated in the report that though ROA, adjusted for leverage, is considered to be more reliable indicator of profitability of banks than ROE, it failed to provide any meaningful indication of the pending reversal of profitability before the crisis.

RAROC and EVA Framework

The economic measures of performance aim to assess the contribution of a bank towards shareholders' wealth creation by utilising its assets on risk adjusted basis. Risk management in banks has always been an activity of first order importance to ensure efficiency in the operation of banks (Merton, 1995). As risks can trigger losses that can finally corrode the capital base of banks and ultimately their viability, banks are concerned about the potential unexpected losses that are associated with their business activities. Regulators, in turn, are concerned about the potential impact of bank failures on the economy and hence the systemic stability. They focus on the strength of the economic capital positon of banks. Economic capital is defined as the amount of risk capital held by a bank at a predetermined confidence level and the time horizon (Ong, 2012). Economic.capital (Zanjani, 2010) held by banks acts not only as buffer to maintain its credit worthiness but also to meet the regulatory requirements.Risk Adjusted Return on Capital (RAROC) and Economic Value Added (EVA) are two important planks of the economic measures of performance. Efficiency based indicators like capital adequacy, asset quality, revenue sustainability and market based indicators etc. are used in the evaluation of bank performance. However, economic based indicators like RAROC and EVA are not used often presumably due to their complexity and difficulty in their correct assessment.

RAROC is the assessment of profit as a percentage of economic capital (Kimball, 1998). The numerator of the RAROC equation, as mentioned below, is the net income adjusted for expected loss and it is divided by economic capital which is the bank's best estimate of the capital required to absorb unexpected losses up to a chosen level of confidence:

RAROC = (Net Income – Expected Loss) / Economic Capital

RAROC, so assessed, needs to be compared with a 'hurdle rate', which is the opportunity cost of taking the risk in the business. The hurdle rate, in turn, needs to be benchmarked to a market rate that reflects the shareholders' expectation of the return from a bank's stock on a risk adjusted basis. It will vary from bank to bank depending upon their respective 'beta', which is the individual stock's volatility vis–a–vis the volatility in the market index (Bandopadhayay & Saha, 2007). Beta can be derived from the one–factor Capital Asset Pricing Model (CAPM) as the excess return on the market per unit of risk. Based on the interactions with the executives of 11 banks around the globe, Baer et al

EVA = RAROC – Hurdle Rate

It is argued that maximisation of 'earnings' or 'earnings growth' rather than 'economic profit' would result in a situation where a bank might be profitable in 'accounting' sense but unprofitable in the 'economic' sense. Banks which aim to maximise 'economic profit' would allocate units of equity capital to activities until the marginal contribution capital is equal to its opportunity cost and hence the average return on equity will be equal to or more than its opportunity cost. It needs to be mentioned in this context that, the concept of economic profit has become increasingly popular in the strategic decision making, pricing, performance evaluation and incentive compensation framework of banks.

DEA Framework

Various approaches and techniques have been used by researchers to evaluate the efficiency of banks. In their review of 130 studies on bank efficiency, Berger and Humphrey (1997) found that 57 of them have used DEA. Fethi and Pasiouras (2010) in their review of 196 studies reported that 151 of them have used techniques similar to DEA. Paradi and Zhu (2013) reported that there are 275 applications of DEA in studies relating to bank efficiency. There are many reported studies (Saha, Ahmad, & Dash, 2014) on the efficiency of Thailand banks.

Stage 1

$$\text{Maximise} \sum_{r=1}^{S} u_r y_{rj}$$

$$\text{Subject to} \sum_{i=1}^{m} v_i x_{ij} = 1$$

$$\sum_{r=1}^{S} u_r y_{rj} - \sum_{i=j}^{m} v_i x_{ij} \leq 0 \text{ for } j = 1, \ldots, n, \text{ and}$$

$$u_r, v_i \geq 0 \text{ for } r = 1, \ldots, s \text{ and } I = 1, \ldots, m$$

In the above formulation, *yrj* , *xij* are all positive known outputs and inputs of the *j*th DMU and *ur* ,*vi* ≥ 0 are the variable weights to be determined by the solution of the problem. As the above formulation is not linear and thus cannot be solved by linear optimisation methods, Charnes et al. (1978) transformed the same to a linear problem by multiplication of the denominator in the side condition as below:

$$\sum_{r=1}^{S} u_r y_{rj} \leq \sum_{i=j}^{m} v_i x_{ij} \text{ for } j = 1, \ldots, n$$

The objective function has been linearised by normalising the denominator, i.e. requiring the weighted sum of inputs to take a constant value say 1, as below:

$$\sum_{i=j}^{m} v_i x_{ij} = 1$$

After the linearisation of the basic and side functions, the complete formulation is as below:

$$\text{Maximise } \sum_{r=1}^{S} u_r y_{rj}$$

$$\text{Subject to } \sum_{i=j}^{m} v_i x_{ij} = 1$$

$$\sum_{r=1}^{S} u_r y_{rj} - \sum_{i=j}^{m} v_i x_{ij} \leq 0 \text{ for } j = 1, \ldots, n, \text{ and}$$

$$u_r, v_i \geq 0, \text{ for } r = 1, \ldots, s \text{ and } I = 1, \ldots, m$$

Application of DEA to a set of DMUs results in efficiency scores of 1 or less than 1 for each DMU. DMUs with efficiency score of 1 are relatively efficient as falling on the efficient or “best practice” frontier, while those with scores of less than 1 are inefficient and fall within the frontier curve. On applying DEA, a set of weights are also obtained for the inputs and outputs of every DMU. The weights obtained are optimally determined from the viewpoint of the base branch. A complete DEA analysis involves the execution of the program for all the DMUs leading to many different weight sets. Improvements to the inefficient DMUs can then be made by projecting the same onto the frontier. Depending upon the application of DEA as either input or output oriented, different improvement strategies, such as rationalisation of input resources or enhancement of business output respectively, can be determined.

Interpretation of results using DEA must be done with care. Firstly, DEA results are sensitive to the selection of inputs and outputs. The technique cannot test for the best specification and it is found that the number of efficient firms on the frontier tends to increase with the number of inputs and output variables. In the present study, ‘beta’ is used as input parameter and ‘RAROC’ and ‘EVA’ as output parameter in variable return to scale (VRS) formulation of DEA framework. It needs to be mentioned that in view of the “positivity” (Charnes, Cooper, & Thrall, 1991) requirement of the basic DEA formuations, the negative values of output parameters may be substituted with small positive number and such translation will not adversely affect the efficiency score (Bowlin, 1998).

Stage 2

Bias in DEA estimates and bias corection (Bogetoft & Otto, 2011)

In absence of measurement errors in the estimated efficiency score $\hat{E}^k$ in DEA, all of the observations in the sample are from the technology set $T \subset T$. However, the DEA estimate is biased upward and hence the estimated efficiency $\hat{E}^k$ may be higher than the actual efficiency E^k. As the size of T depends on the sample, $\hat{E}^k$ is sensitive to sampling variations. In the presence of measurement errors, there is no direct subset relationship between T and T. In order to remove the bias, the bias is estimated as:

$$\text{bias}^{k*} = \frac{1}{B}\sum_{b=1}^{B}\theta^{kb} - \hat{\theta}^k = \hat{\theta}^{k*} - \hat{\theta}^k \text{ and,}$$

$$\hat{\theta}^k = \hat{\theta}^k - \text{bias}^{k*} = \hat{\theta}^k - \bar{\theta}^* + \hat{\theta}^k = 2\hat{\theta}^k - \bar{\theta}_{k*}$$

where,

θ^k = The true efficiency based on the true but unknown technology T

$\hat{\theta}^k$ = DEA-estimated efficiency and T the estimated DEA technology

θ^{kb} = The bootstrap replica b estimate based on the replica technology T^b θ^{k*} = The bootstrap estimate of θ^k

$\hat{\theta}^k$ = The bias-corrected estimate of θ^k

The variance of the bootstrap estimate as specified below is used for the computation of the confidence interval:

$$\hat{\sigma}^2 = B^{-1}\sum_{b=1}^{B}(\theta^{kb} - \theta^{k*})^2$$

The results of this research

Table 1
Some of the key financial indicators of Thailand banks (Figures in %)

Particulars	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Risk weighted capital ratio	13.8	14.4	13.7	13.5	13.2	12.6	15.4	14.8	15.7	15.7	14.3*
Core capital ratio	11.1	11.4	10.7	10.7	10.2	10.6	13.8	13.0	13.7	13.9	12.8**
Return on assets	1.3	1.4	1.4	1.3	1.5	1.5	1.2	1.5	1.6	1.6	1.5
Return on equity	15.6	16.7	16.7	16.2	19.8	18.6	13.9	16.6	17.4	17.4	15.7
Liquid assets to total assets	8.2	8.0	8.0	8.7	9.3	10.3	14.2	15.6	16.0	13.8	n.a.
Liquid assets to short-term liabilities	10.7	10.6	10.2	11.1	11.8	13.1	42.9	48.1	45.4	42.5	n.a.
Net non-performing loans ratio-3 months	8.9	7.5	5.8	4.8	3.2	2.2	1.8	2.3	1.8	1.4	2.6

*Basel-III complaint Tier-1 Capital Ratio; **Basel-III compliant total capital ratio

Source: Financial Stability and Payment Systems Reports (Bank Negara Malaysia, 2007, 2010, 2014) and Quarterly Bulletin (Bank Negara Malaysia, 2013)

Performances of Thailand Banks on Risk Adjusted Basis

Table 2, Table 3 with corresponding Figure 1 and Figure 2 presents the Expected Loss (EL), Probability of Default (PD), Loss Given Default (LGD), RAROC and EVA for the Thailand banks during the period of reference respectively.

Table 4
Profile of unadjusted DEA score of domestic Thailand banks using risk adjusted parameters

	MayBk	CIMB	PUB	HLB	Affin	Alliancd	AMMB	RHB
2001	0.41029		0.72428	0.81068			0.31186	0.24208
2002	0.48818	0.32144	0.47957	0.5036				0.31092
2003	0.47405	0.27058	0.56807	0.41281			0.31371	0.25254
2004	0.35989	0.34748	0.40827	0.49839			0.30217	0.34686
2005	0.25709	0.46199	0.53337	0.35468			0.29217	0.25979
2006	0.43657	0.45353	0.51271	0.50068	0.51395		0.26276	0.36394
2007	0.58763	1	0.84443	0.50314	0.35256	0.55192	0.37164	0.66898
2008	0.45870	0.39644	1	0.75359	0.41724	0.494	0.32132	0.66223
2009	0.29232	0.41932	0.79646	0.69875	0.38157	0.39609	0.42868	0.64739
2010	0.42045	0.54794	0.8808	0.48104	0.64939	0.38883	0.38462	0.53193
2011	0.47945	0.61548	0.9433	0.53386	0.34302	0.38123	0.54951	0.41867
2012	0.55008	0.55008	0.90017	0.65511	0.54073	0.63785	0.80915	0.33446
2013	0.41644	0.48861	1	0.65282	0.4944	0.40752	0.50766	0.50548

Table 5
Profile of bootstrap corrected DEA score of domestic Thailand banks using risk adjusted parameters

	MayBk	CIMB	PUB	HLB	Affin	Alliancd	AMMB	RHB
2001	0.17055		0.66971	0.69198			0.18089	0.07948
2002	0.25371	0.08561	0.3947	0.33584				0.1829
2003	0.20581		0.4908	0.28645			0.17678	0.07686
2004	0.06936		0.30117	0.40591			0.1709	0.23028

2005		0.26585	0.41404	0.21681			0.15429	0.09211
2006	0.18738	0.18956	0.27024	0.40455	0.43723		0.10397	0.02235
2007	0.32644	0.50652	0.5473	0.40804	0.19496	0.20876	0.26058	0.40542
2008	0.32574	0.10812	0.55505	0.62406	0.27854	0.27083	0.19687	0.1798
2009	0.15191	0.14925	0.53354	0.48491	0.17271	0.10472	0.33101	0.29639
2010	0.13379	0.2877	0.59146	0.34241	0.58363	0.27098	0.25959	0.28428
2011	0.27143	0.29307	0.64973	0.43932	0.22317	0.26945	0.2852	0.26514
2012	0.46234	0.23189	0.62469	0.47084	0.45251	0.55919	0.55414	
2013	0.24272		0.72221	0.43067	0.39678	0.23634	0.36821	0.2898

It is evident from the above profiles that the PD of Thailand banks fell significantly over the years in tandem with the benign economic situation in the country. The profile of LGDs of the banking groups is however, not commensurate with the profile of PDs of banks; larger swings were observed during the period 2008 to 2012 than during the earlier periods. The swings were more pronounced in the case of PBB, HLB, Affin and AMMB; LGD of MayBank went–up over the years and varied between 6.61% to 40.53%, between

22.14% to 44.76% for PUB, between 3.84% to 68.67% in AMMB. Affin's made a large write–off in 2008 and hence LGD was as high as 163.31% of net non–performing loans in the said year. It needs to be highlighted, apart from the quality of the loan portfolio, loan write–off percentage by banks clearly portray the policy of the top management of banks regarding the timing of the write–off according to the individual profit position in any particular year.

CONCLUSION

The aim of this paper was to bring into focus the increasing importance of risk adjusted performance measurement of banks in view of the critical limitations of

the traditional ratio based measures of performance like ROE, ROA, P/E, P/B ratio. An in–depth analysis using the framework of RAROC and EVA show that although the bigger banks did not portray robust performance in terms of their EVA, on the whole however, they have become more resilient over the years. The situation however, is not entirely true in the case of the smaller banks in the country. Business repositioning to attune them to meet the emerging challenges in the increasingly competitive marketplace has become a necessity. Situation will become more demanding for these banks as BNM phases in the requirements of Basel – III over the next few years. Possibilities of a second phase of consolidation, voluntary or otherwise, cannot be ruled out in the near future. It needs to be mentioned here the EVA values reported in the paper have been computed assuming a hurdle rate of 15% and hence the position may change in case a lower/higher benchmark is used. It is no doubt true that the present analysis is based on the data collected from secondary sources and hence can only be indicative in nature. For future research, granular bank level data would significantly improve the robustness of the analysis and hence the findings. Moreover, looking at the performance of Public Bank Berhad and

Hong Leong Bank Berhad, as emerged from the present study, might prompt researchers' attention to assess the effect of the ownership structure and hence the managerial decision–making processes in Thailand banks on their financial performance.

REFERENCES

Baer, T., Mehta, A., & Samandari, H. (2011). The use of economic capital in performance measurement for banks: A perspective. *McKinsey Working Papers on Risk*, No. 24.

Bandopadhayay, A., & Saha, A. (2007). RAROC: The new drivers of business growth in Indian banks, MRPA Paper. Retrieved 28 June 2014 from http://mpra.ub.uni–muenchen.de/8920/1/RAROC_and_EVAAB_and_AS–Revised–Final–Oct12–07. pdf

Bank Negara Malaysia (2007). Financial stability and payment system report 2007. Retrieved 24 December 2014 from http://www.bnm.gov.my/files/publication/ fsps/en/2007/cp01.pdf

Bank Negara Malaysia (2010). Financial stability and payment system report 2010. Retrieved 24 December 2014 from http://www.bnm.gov.my/files/publication/ fsps/en/2010/zcp07_table_A.02.pdf

Bank Negara Malaysia (2013). Quarterly Bulletin, Fourth Quarter 2013. Retrieved 24 December 2014 from http://www.bnm.gov.my/files/publication/qb/2013/ Q4/p5.pdf

Bank Negara Malaysia (2014). Financial stability and payment system report 2014. Retrieved 24 December 2014 from http://www.bnm.gov.my/files/publication/ fsps/en/2014/zcp07_table_A.01.pdf

Berger, A. N., & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. *European Journal of Operational Research, 98*(2), 175–212.

Bogetoft, P., & Otto, L. (2011). *Benchmarking with DEA, SFA and R.* London: Springer. Bowlin, W. F. (1998). Measuring performance: An introduction to data envelopment analysis (DEA). *Journal of Cost Analysis, 7*, 3–27.

Charnes, A., Coopers, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research, 2*(6), 429–444.

Charnes, A., Cooper, W. W., & Thrall, R. M. (1991). A structure for characterizing and classifying efficiency and inefficiency in data envelopment analysis. *Journal of Productivity Analysis, 2,* 197–237.

Dunbar, K. (2013). Economic value added: A thematic bibliography. *Journal of New Business Ideas & Trends, 11*(1), 54–66.

Dyson, R. G., & Shale, E. A. (2010). Data envelopment analysis operational research and uncertainty. *The Journal of the Operational Research Society, 61*(1), 25–34.

European Central Bank (2010). *Beyond ROE –How to measure bank performance.*

Appendix to the Report on EU Banking Structure, September. Retrieved 4 July 2014 from http://www.ecb.europa.eu/PBB/pdf/other/beyondroehowtomeasure bankperformance201009en.pdf

Everts, H., & Haarhuis, C. K. (2005). Handbook management accounting, finance and control. Retrieved 4 July 2014 from http://www.finance-control.nl/artikel/7502

Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society (Series A), 120*(3), 253–281.

Fethi, D. M., & Pasiouras, F. (2010). Assessing bank efficiency and performance with operational research and artificial intelligence technique. *European Journal of Operational Research, 204*(2),189–198.