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APPLICATION OF DATA ENVELOPMENT ANALYSIS FOR EFFICIENCY APPRAISAL OF THE COMMERCIAL BANKS IN NEPAL

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ABSTRACT:

Close of efficacy of commercial banks is a main driver near the economy and commercial banks themselves to vie by their counters in this economical worldwide market. In this study, technical competences of Nepalese commercial banks below intermediation method and profit-oriented method remained assessed for the passé of 2005 to 2010 by means of input-oriented Data Envelopment Analysis (DEA). We initiate that now positions of the global nasty of the practical competence, the intermediation method on condition that additional efficacy totals than profit-oriented method. Rivalry and original tools can all be aims that banks remain acting well as the in-between purpose. Relating the totals for dissimilar kind of the Nepalese commercial banks founded arranged possession if varied consequences. Beneath intermediation method, combined scheme banks remained new effective while civic area banks remained originate new effective below profit-oriented method. Once likening the separate banks, Nepal Arab Bank Limited and Standard Charted Bank Limited banks remained new effectual below the equally methods. In count, Agriculture Development Bank Limited, Kumari Bank Limited and Siddhartha Bank Limited remained slightly effective (more than 90%) solitary below intermediation method. The learning originate that the bank by effective below intermediation method fixes not continuously nasty that receipts well productivity act.

Keywords: Profitable banking business, DEA ideal, nominal efficacy, Nepal.

INTRODUCTION:

Profitable banks by way of economic intermediary's production a vital role in this inexpensive economic market. In statistic, the economic intermediaries minor the expenses of investigating possible savings, using business regulator, handling hazard, uniting investments, then leading connections (Levine et al., 2000). Profitable banking act measures how sound a bank works and there are numerous issues to designate how a bank is execution compared to its complements. These contain the success of the bank, change of the bank's collection, the bank's asset choices, the bank's market part and market influence (Bikker and Bos, 2005). Founded on that, efficacy act of the profitable banks is vital for the entire economy. Profitable bank failures turn out to be a threat on the banking scheme. In direction to decrease the danger of failures, several replicas and techniques are established to evaluate and examine the banking efficacy. In over-all, there are two elementary methods that appraisal efficacy- parametric and non-parametric (Saad and Moussawi , 2009). The parametric approaches need explicit assumptions about the function that convert inputs into outputs and about the distribution of the error terms. On the new, the non parametric means counting data envelopment analysis (DEA) do not need functional form. DEA needs only the essential data in relations of inputs and outputs under mostly three approaches -production approach, intermediation method and profitability tactic (Eken & Kale，2011). The making method treats banks as the donor of amenities to clients using capital and labor for making for numerous kinds of banking facilities. This method is mainly applicable for assessing branch close efficacy whereas the intermediation method is best suited for examining bank level efficacy. It takes a core branch or the entire bank as an intermediator for "moving" money rented from depositors into the money lent to debtors (Frexias & Rochet, 1997). Drake et al. (2006) introduced the profitability method, which is a comparatively newer method in DEA. The inputs of manufacture and profitability method are kind of similar but the outputs of effectiveness method are, as the name proposes, more

profit concerned with; such as interest income and non-interest revenue. Despite the literatures on bank efficacy not only developed nations but also in change and developing countries have prolonged rapidly, but there are no preceding studies that compare the technical efficacy (TE) score below intermediation method and profit-oriented method in case of Nepal. In this study, intermediation method and profit-oriented method are adopted to know the contrast of efficiency under each different perspective or purpose of a bank. The obtainability of flow data vital by the production approach is usually exceptional rather than in communal. Therefore, as in mainstream of the empirical literature, we adopted the intermediation method and profit-oriented approach to associate the technical efficacy.

Nepal is facing cumulative competition due to the globalization of the financial schemes, so it is important for the commercial banks to understand the issues whether these banks are intermediately effectual or profitability effective. This work assesses the technical efficacy of the sampled Nepalese commercial banks using a relative approach. This paper also discourses the question of whether dissimilar ownership structured commercial banking competence score in Nepal differences due to diverse approach mainly intermediation method and profit-oriented method.

AN OVERVIEW OF THE NEPALESE COMMERCIAL BANKING SECTOR:

Previously deliberating the efficiency issues, in this unit this paper presents the key features of the Nepalese commercial banking area. The financial area in Nepal required the important influence made by the insurance system, social safety and capital market, which complete the banking area more crucial to the economy because it signified the only source of money. Profitable banks presently hold a large share of financial activities of the country. Commercial bank group engaged 76.7 percent of total possessions (Nepal Rastra Bank, 2011). Nepalese commercial banks began from the founding of Nepal Bank Limited in 1937. The establishment of Nepal Rastra Bank in 1956 as a central bank provided new feature to Nepalese financial scheme. As the financial sector liberalization procedure during 1980s, Nepalese profitable banking area has seen the alteration in ownership construction and joint venture banks arrived into the market. Though some joint venture banks arrived into the market, a formal and regular capital market doings began from the early-1990s and then national private banks were entered into the market. There are currently 263 financial institutions, including 27 profitable banks (Nepal Rastra Bank, 2011). Among them, 3 are civic area and 24 are privately possessed (17 DPBs and 7 JVBs).

PUBLIC SECTOR BANKS:

Public area banks, which are completely possessed by the government of Nepal have enormous measure of branch networks in in cooperation urban and rural centers everywhere the country and have considerable shares in the total assets of the business. There are three civic sector banks namely Rastriya Banijya Bank (RBBL), Nepal Bank Limited (NBL) and Agriculture Development Bank (ADBL). Completely of these banks work on a nation-wide basis. Public sector banks engross more than 22.70% of whole credits (Nepal Rastra Bank, 2011)

JOINT VENTURE BANKS:

The combined scheme banks have been working on a nation-wide basis and started to found since mid-1980s. The names of the JVBs started to work before 2005 are Nabil Bank Limited (NIBL), Standard Charter Bank Limited (SCBL), Himalayan Bank Limited (HBL), Nepal SBI Bank Limited (NSBI), Nepal Bangladesh Bank Limited (NBBL), and Everest Bank Limited (EBL) (Nepal Rastra Bank, 2011). They have foreign justice participation (along with domestic) and management with good name with international standing. They work under less administrative pressure from local governments, but maximum of the joint venture banks are highly focused in urban areas, mainly in Kathmandu valley. In fact, the gorge is the country's key financial center and contains of Kathmandu (the capital of Nepal), Lalitpur and Bhaktapur districts.

DOMESTIC PRIVATE BANKS:

National private banks came in process by late 1990s and primary 2000s. The DPB recognized before 2005 are Nepal Investment Bank Limited (NIBL), Bank of Kathmandu Limited (BOK), Nepal Credit and Business Bank Limited (NCCBL), Lumbini Bank Limited (LBL),

Nepal Industrial and Profitable Bank Limited (NICB), Machhapuchhre Bank Limited (MBL), Kumari Bank Limited (KBL), Laxmi Bank Limited (LXBL) and Siddhartha Bank Limited (SBL) (Nepal Rastra Bank, 2011). They are achieved and owned by isolated sector. Most of them are comparatively minor in asset size as well as their web.

METHODOLOGY:

The example comprised in this study remained serene of 18 Nepalese profitable banks over the period of 2005 to 2010. The profitable banks that started its processes before 2005 were comprised in this investigation. Many literatures propose the use of homogeneity circumstances for Decision Making Units (DMUs) in a perfect and encourage the use of DEA for firms with alike resources and operations providing similar products and services. Therefore, it is obvious to use data which were recognized before 2005. All the data used on individual banks were got from the Nepal Rastra Bank Bulletin available by the Central Bank of Nepal (Nepal Rastra Bank, 2011), yearly audited financial declarations of the commercial banks available by the respective banks. In the intermediation method, deposit and interest expenditures were used as inputs while loan and advances and attention income as outputs. As in profit efficacy, cost mechanisms are used as inputs and income components are used as outputs (Drake et al., 2006), this study has used attention expenses and loan loss facility as inputs and three outputs -net interest income, commission income and other working income. The practical efficiency with its two components-pure practical (PTE) and scale competences (SE) under the intermediation method were compared with those under the profit-oriented method. Competence scores were estimated with MATLABR2010a database while the normal calculations were done in Excel.

The investigation applied DEA method based on CCR (named after Charnes et al., 1978) and BCC (named after Banker et al., 1984) replicas to obtain competence actions under CRS (constant return on scale) and VRS (variable return on scale) assumptions. The TE and PTE were determined by CCR (CRS) model and BCC (VRS) model, correspondingly. The SE was originate by TE/PTE.

The CCR model can be defined as follows:

Contemplate a set of DMUs to be assessed, DMUj (j =1, 2, . . . , n) that ingests the amounts Xj ={xij } of m unlike inputs (i =1, . . . , m) and yields the amounts Yj ={yrj } of r outputs (r=1, . . . , s). The practical efficacy of a specific DMU0 under the supposition of constant revenues to scale (CRS) can be obtained from the following linear series:

$$\max \sum_{r=1}^{s} u_r y_{r0} / \sum_{i=1}^{m} v_i x_{i0}$$

$$s.t. \sum_{r=1}^{s} u_r y_{rj} / \sum_{i=1}^{m} v_i x_{ij} \le 1 \quad j = 1, \cdots, n$$

$$u_r, v_i \ge \varepsilon; r = 1, \cdots, s; i = 1, \cdots, m \qquad \text{..... (1)}$$

Its dual program is as follows:

$$\min \theta - \varepsilon(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+)$$

$$s.t. \sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta x_{i0} \quad i = 1, \cdots, m$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{r0} \quad r = 1, \cdots, s$$

$$\lambda_j, s_i^-, s_r^+ \ge 0 \quad j = 1, \cdots, n \qquad \text{..... (2)}$$

BCC model can be defined as follows:

The BCC model lets a calculation of PTE that is dignified without the SE. The mathematical method of BCC model is as follows:

$$PTE_0 = \max (\sum_{r=1}^{s} u_r y_{r0} + \mu_0) / \sum_{i=1}^{m} v_i x_{i0}$$

$$s.t. \sum_{r=1}^{s} u_r y_{rj} + \mu_0 - \sum_{i=1}^{m} v_i x_{ij} \le 0 \quad j = 1, \cdots, n$$

$$u_r, v_i \ge \varepsilon; r = 1, \cdots, s; i = 1, \cdots, m \qquad \text{..... .... (3)}$$

Its dual program is as follows:

$$\min \theta_0^{BCC} - \varepsilon(\sum_{r=1}^{s} s_r^+ + \sum_{i=1}^{m} s_i^-)$$

$$s.t. \sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta_0^{BCC} x_{i0} \quad i = 1, \cdots, m$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^- = y_{r0} \quad r = 1, \cdots, s$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

$$\lambda_j, s_i^-, s_r^+ \ge 0; i = 1, \cdots, m; r = 1, \cdots, s; j = 1, \cdots, n \qquad \text{... .....(4)}$$

RESULTS AND DISCUSSION:

EFFICIENCY COMPARISON OF THE INDIVIDUAL BANKS UNDER INTERMEDIATION AND PROFIT APPROACH:

The average practical efficiency scores and the profit efficacy scores of the separate banks included in the example are accessible in Table 1. It was shown that no any Nepalese profitable banks obtained 100% practical efficiency below intermediation method but ADBL, NABIL, SCBL, KBL, and SBL have been branded as marginal incompetent banks because they have reached TE score above the 90% but less than 100% (Jha et al, 2013). Under profit competence method, only SCBL obtained fully well-organized while NABIL was also near to 100% throughout the study passé. This result designated that SCBL and NIBL have done well for practical efficiency under intermediation method, as they were able to do their essential role and achieve their success. Though some banks were operative at a high level of working efficiency and marginally incompetent under intermediation method, these banks were supreme inefficient below profit-oriented method. This result obviously shows that it is not essential that a theoretically well-organized bank is also optimally gainful.

Table 1: Contrast of efficiency beneath intermediation and profit- oriented method

	Bank	Under intermediation approach			Under profit-oriented approach		
		TE	PTE	SE	TE	PTE	SE
Public Sector Banks	NBL	0.734	0.770	0.949	0.875	0.985	0.883
	RBBL	0.688	0.692	0.992	0.792	1.000	0.792
	ADBL	0.971	1.000	0.971	0.824	1.000	0.824
	Average	0.798	0.864	0.971	0.830	0.995	0.833
Joint Venture Banks	NABIL	0.915	0.921	0.993	0.996	1.000	0.996
	SCBL	0.921	0.949	0.969	1.000	1.000	1.000
	HBL	0.806	0.851	0.947	0.606	0.682	0.905
	NSBI	0.794	0.866	0.914	0.469	0.655	0.721
	NBBL	0.744	0.837	0.902	0.722	0.800	0.877
	EBL	0.888	0.921	0.983	0.771	0.817	0.933
	Average	0.845	0.721	0.951	0.761	0.826	0.905
Domestic Private Banks	NIBL	0.877	0.877	0.901	0.687	0.807	0.872
	BOK	0.895	0.895	0.969	0.667	0.838	0.803
	NCCBL	0.743	0.743	0.858	0.650	0.820	0.746
	LBL	0.771	0.771	0.818	0.647	0.891	0.698
	NIC	0.857	0.857	0.976	0.629	0.766	0.798
	MPBL	0.756	0.756	0.911	0.734	0.841	0.875
	KBL	0.919	0.919	0.984	0.585	0.811	0.731
	LXBL	0.897	0.896	0.982	0.752	1.000	0.752
	SBL	0.944	0.944	0.991	0.682	0.943	0.730
	Average	0.851	0.911	0.932	0.670	0.858	0.778

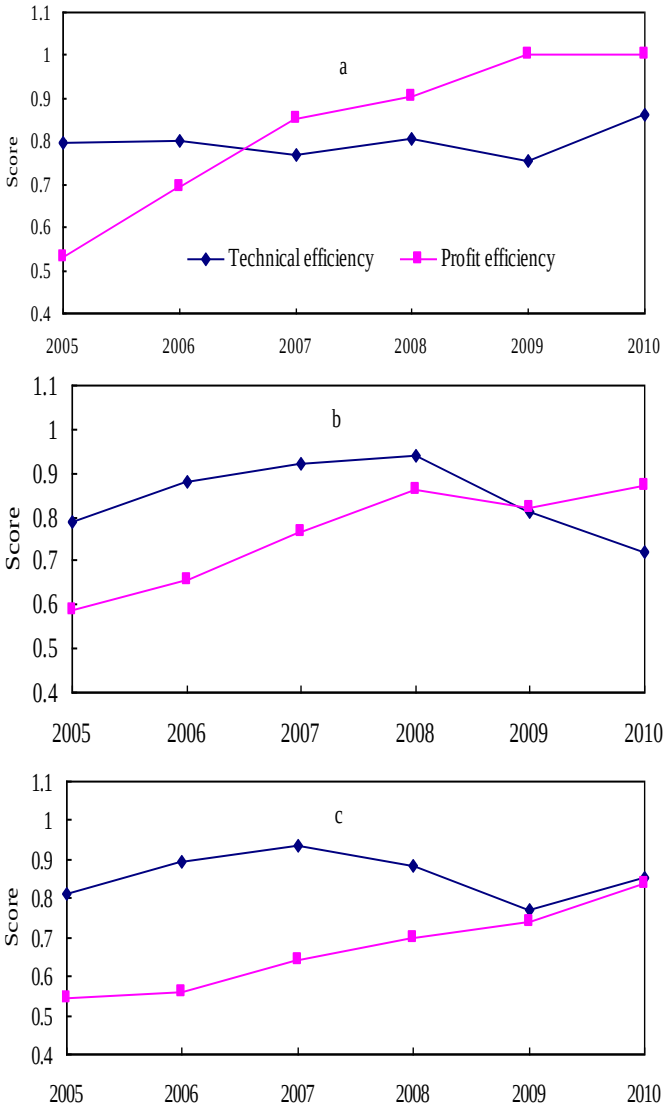
PTE showed that the ADBL was the most well-organized bank with PTE efficacy of 100%. NABIL, SCBL, EBL, KBL and SBL have been originate bordering inefficient banks due to the advanced efficiency notches in between 90-99.9% under intermediation method while under profit-oriented method RBBL, ADBL, NABIL, SCBL and LXBL were fully efficient while NBL and SBL were close to 100%. It shows that below profit-oriented method more banks were effectual than that of beneath intermediation method. The consequences reverse the consequences of Drake et al. (2006) who specified that practical efficiency is generally higher under the intermediation method than under the profit-oriented method. The consequences support the results of Pasiouras.F. (2007) for Greek profitable banks. Lower than intermediation method, SE ranged between 81.8 to

99.2% though under profit -oriented method most of the banks were ranged below 90%; only SCBL was fully efficiency. It indicated that commercial banks are performing better as the intermediary purpose while it did not occur the same in handling the success.

EFFICIENCY ASSESSMENT OF DIFFERENT TYPE OF THE BANKS BASED ON THE OWNERSHIP:

Fig. 1 associates the consequences of practical efficiency under intermediation method and income oriented method for PSB, JVB and DPB. The regular TE under intermediation method of PSB ranged between 0.755 (2009) and 0.863 (2010). Hence, it designated that there was a changing trend in their mean of yearly practical efficiency slow of the profitable banks of Nepal over the study passé. It causes the civic sector banks are not performance very well in technical efficacy especially in the six ages while the profit efficacy improved meaningfully 0.532 (2005) and 1.00 (2009, 2010) when involved off-balance sheet items as an output and loan loss delivery as an input. Thus, calculating for credit risk seemed to have impact on the efficacy scores. It can be specified that public sector banks are handling the profitability but still struggling in steadying the efficacy in relation with technical efficacy. This assessment contradicts the marks of Drake et al. (2006) who stated that practical efficiency is usually higher under the intermediation method than under the profit method.

The contrast of practical efficiency under intermediation method and profit oriented method of the joint scheme banks exposed that they were comparatively technical well-organized. The normal value of practical efficiency was in cumulative trend excepting 2010 ranged among 0.721(2010) and 0.941 (2008) while profit concerned with approach was also in cumulative trend ranged between 0.586 (2005) and 0.869 (2010). This outcome confirms JVB made outstandingly in terms of intermediary efficacy and also manage their effectiveness.



The outcomes support the results of Drake et al. (2006) who specified that practical efficiency is generally higher under the intermediation method than under the profit method. The mean efficacy level under intermediation method and profit oriented method of domestic isolated sector bank was reached between 0.770 (2009), 0.933 (2007) and 0.545 (2005), 0.838 (2010). Under intermediation method, practical efficiency was in fluctuating trend whereas practical efficiency was in cumulative trend under profit-oriented method. Though practical efficiency beneath intermediation method was in changing trend but competence was in international normal like other emerging countries. This consequence clearly explains that national private sector profitable banks in Nepal have done well for technical efficacy under intermediation method as they are able to do their essential roles and also achieve their effectiveness. The intermediation method and profit-oriented method

technical efficiency of national private banks was sound over the examined passé. DPB had the benefit of being shaped in the early 2000 and so were well placed to accept high-level skill when traditional.

CONCLUSIONS:

By by means of two methods of intermediation and profit concerned with under DEA model, year by year, outcomes indicated that the separate profitable banks of Nepal have performed well for the intermediate role in terms of total mean. Profit concerned with approach exposed that banks are still stressed in stabilizing the competence in relation with profit seeking actions. Comparing notches obtained from the intermediation method with those obtained from the profit-oriented method of different ownership structured banks if mixed results. However, we find that in footings of the overall mean, the civic sector banks profit-oriented method efficiency provided higher competence scores than intermediation method efficiency whereas joint venture banks and national private banks provided intermediation method score higher than profit-oriented method efficiency. Although, civic area bank's overall mean was more than their accompaniments under profit-oriented method but individually joint scheme banks namely NABIL and SCBL were fully effective. It specified that the civic sector banks are not militarized savers money for profit assembly impresarios.

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