Cost Efficiency of Nepali Commercial Banks in the Context of Regulatory Changes

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Abstract

Nepal has witnessed substantial quantitative growth in the banking sector after the regulatory reforms in early 1990s by Nepal Rastra Bank (NRB). The substantial increases in the number of banks have created intense competition among them. This has resulted in a sharp upward trend in the number of financially troubled banks. The study examined the level of cost efficiency of 18 "A" class commercial banks during the period of 2005/06 to 2011/12 by using stochastic frontier analysis. The overall result indicates that the level of cost efficiency has increased substantially over the period of time with small size banks exhibiting higher cost efficiency as compared to the medium size ones. Similarly, result also shows that change in the regulation after 2008 even though is positively related with the cost, but not statistically significant.

Key Words: Cost Efficiency, Regulation, Stochastic Frontier Analysis

JEL Classification: G28, C73, G18

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I. INTRODUCTION

Banks and Financial Institutions (banks) play the role of intermediary between saving and investment by allowing mobilization of saving from diverse sources to allocating them to more productive activities, ultimately benefitting the whole economy (Gulde, Pattill, & Christensen,2006). Moreover, a banking system which efficiently channels financial resources to productive uses contributes even more to the mechanics of economic growth (Levine, 1997).

Efficiency can be framed both as market efficiency and operating efficiency (Stiglitz, 1981). Market efficiency largely refers to as information efficiency (Ball, 1989), and it is measured by the amount and speed with which information is incorporated into prices. Operating efficiency (Farrell, 1957) denotes whether a firm is cost minimizing (consuming less inputs for the same level of outputs) or output maximizing (producing more outputs for the same amount of inputs). Banks are considered to be cost efficient if they use inputs in optimal proportion (consistent with cost minimization) given their output and prices. However, allocative distortions may arise when observed input price ratios differ from their effective price ratios due to the presence of external constraints, such as, regulations. Regulations of financial sector is a process of deciding what activities central bank or regulatory authority will permit or forbid banks in a market to perform and how. Such regulations have been more stringent in developing economies where controls on banking activities have been applied to meet social and economic objectives of development (for example, Deprived Sector Loan in Nepal), and with fear of them being wanton leading to bank failures. Bank failures are perceived to have widely pervasive, adverse effects on an economy and are considered to be more detrimental than any other business failures, with their spillover effects overreaching outside the borders. Consequently, most of the economies around the world have gravitated towards stricter regulations of banking industry by applying controls on interest rates and margins, regulations relating to branch licensing, capital requirements, loan loss provisions, directed credit programs, and mergers (Caprio, Atiyas, & Hanson, 1997), among others.

In Nepal, growth of the formal financial services sector had commenced only in 1937 with the establishment of Nepal Bank Limited. The establishment of Nepal Rastra Bank (NRB), the central bank of Nepal, in 1956 paved the way for the growth of financial services institutions; the process was soon initiated with the opening of another state-owned commercial bank, Rastriya Banijya Bank in 1966. Since that time there has been a consistent growth of financial service institutions, initially through public initiative but after the period of rapid economic liberalization in 1991, through the private sector initiative. The process of financial liberalization gained momentum in 1987/88 when Nepal entered into a three-year Structural Adjustment Programme (SAP) with the IMF.

In 2004, Bank and Financial Institution Ordinance was enacted and the new legal framework replaced different fragmented legal framework governing the operations of bank. In the context of promulgation of the bank and bank Act, the existing prudential regulations and directions, which were separately issued for bank, have already been revised and integrated into a unified directive and came into implementation from July

16, 2005. By the end of mid July 2014, altogether 250 banks and non- bank financial institutions licensed by NRB were in operation. Out of them, 30 are "A" class commercial banks, 84 "B" class development banks, 53 "C" class finance companies, 37 "D" class micro-credit development banks, 16 saving and credit co-operatives and 30 NGOs. Also, the total banks branches reached to 3,465. Commercial banking operations mainly concentrated in capital city. Most of the bank branches are located in the Central Development Region (770 branches) followed by Eastern Development Region with 287 and the Western Development Region with 264 branches respectively. The Far Western has the lowest number of bank branches i.e. 90 (Bank Supervision Report 2014).

Hence, Nepal has witnessed phenomenal growth in the number of banks after the regulatory restraints on their number were relaxed. The growth is mainly attributed to the liberalization of the banking sector that started in late 1980s. It has been one of the few industries that have shown growth in the last one and half decades despite Maoist insurgency and political instability. The need for regulatory reforms has been warranted in fostering competition and efficiency especially in the economies that are exposed to structural reforms. As highlighted by Berger and Humphrey (1997), regulatory reforms are undertaken to improve the performance of industry and many initiated them by a need to improve the competitive viability of the industry.

The reforms led to significant increase in the number of banks but challenge to survive in a competitive and precarious environment made them desperately engage in excessive risk taking behavior, and in some cases in contravention of law. As a consequence, the financial environment of the last few years has seen a good number of financially troubled banks. In some situation, NRB had been forced to take over the management of banks to prevent contingency effects on the whole economy. From late 2008 and early 2009, NRB started enforcing more stringent regulations to prevent similar incidents recurring. Living through ups and downs, the banking sector in current time appears to be more matured and disciplined. On the one hand, restrictive regulations applied by NRB may have contributed to its credibility, while on the other such restrictive regulations also add cost to banks, different banks having different ability to cope with such costs. An important query is therefore, how far such restrictive regulations have added to cost of banking in Nepal. Another query is with passing of time, whether the banking sector has become more cost efficient, especially in the context of increased number of banks in the country. Most of the banks that faced problems notwithstanding sound balance sheet and other traditional accounting analysis show otherwise. Cutting wastes and following best practice in managing the operations are required to survive in a competitive environment. The focus of research on bank performance has shifted away from the traditional approach of analyzing financial ratios to estimating efficiency through frontier techniques as it covers a structural relation based on many factors. Therefore, the objective of the study of analyzing cost efficiency (or inefficiency) of the Nepali commercial banks is a step taken further in this research agenda. In addition, the study also investigated whether the level of cost efficiency is different in terms of the size of the banks. The study also examined whether the cost of the banks increased after NRB imposed restricted regulation in 2009.

II. LITERATURE REVIEW

The impact of banking regulation changes has been the subject of considerable academic research. Studies have shown different results regarding the impact of regulatory reforms on the efficiency and performance of the banking sector. The competitive environment in the post reform period often poses a challenge to the efficiency of commercial Bank. Berg, Finn, Førsund, Hjalmarsson and Suominen (1993) studied bank efficiency in Norway, Sweden, and Finland. By employing three outputs (that is, total loans, total deposits, and number of branches) and two inputs (that is, labour, measured in man-hours per year, and capital, measured by book values of machinery and equipment), their results showed that the largest Swedish bank were the most efficient, and hence they concluded that they were in the best position to expand in a future Common Nordic banking market. Fecher, Kessler, Perelman and Pestieu (1993), on the other hand, applied a stochastic production frontier approach to evaluate technical efficiency for the financial services sectors of eleven OECD (Organization for Economic Co-operation and Development) countries. They found that Japan had the most efficient financial services, while Denmark had the least efficient.

Allen and Rai (1996) applied a stochastic cost frontier approach to compare cost inefficiency across fifteen developed countries grouped into either universal or separated banking countries. The estimated inefficiency levels of these groups of bank were measured, and then regressed against various bank and market characteristics. Using two outputs (that is, traditional banking assets such as loans and investment assets) and three inputs (that is, labour, capital, and borrowed funds), their results showed that financial institutions in Japan, Australia, Austria, Germany, Sweden, and Canada are the most efficient, whereas financial institutions in France, Italy, the United Kingdom, and the United States were the least efficient.

Goldberg and Rai (1996) measured X-inefficiency and scale inefficiency for a sample of eleven European countries. Employing two outputs (loans as the primary output, and all other earning assets as the secondary output), and three inputs (price of fixed capital, defined as capital and occupancy expenses divided by fixed assets; price of labour defined as staff expenses divided by number of employees, and price of borrowed funds, defined as total interest expenses divided by interest bearing liabilities), they found that bank in Germany, Denmark, Belgium, and Spain were operating with the smallest deviation from the efficient cost frontier (X-efficient), while bank in Italy and France were operating the furthest from the optimal scale (scale-inefficient). The results also showed that banks in Germany, Switzerland, and Belgium were very competitive while bank in Spain and France were the least competitive.

Expanding the scope of cross country study, Fries and Taci (2004) examined cost efficiency of 289 banks of 15 post-communist countries of Europe. They found that banking systems in which foreign-owned bankhada larger share of total assets record lower costs and that the association between a country's progress in banking reform and cost efficiency was non-linear. Early stages of reform were associated with cost reductions, while costs tend to rise at more advanced stages. Their study revealed that Estonia, Kazakhstan, Latvia, Lithuania, Slovakia and Slovenia have the highest average

level of bank efficiency with average measures in the range 0.75 to 0.86. This group is followed by Croatia, Hungary and Poland with average efficiency of 0.62 to 0.67. The countries with the least efficient bank on average are Bulgaria, the Czech Republic, FYR Macedonia, Romania, Russia and Ukraine, with average efficiency measures in the range 0.42 to 0.59.

Andries and Cocris (2010) analyzed the efficiency of the main bank in Romania, the Czech Republic and Hungary for the period 2000-2006. Their results of the analyses showed that the bank in the three East-European countries has reached low levels of technical efficiency and cost efficiency, especially the ones in Romania, and that the main factors influencing the level of bank efficiency in these countries are: quality of assets; bank size, annual inflation rate; banking reform and interest rate liberalisation level and form of ownership. Fang, Hassan and Marton (2011) examined the cost and profit efficiency of banking sectors in six transition countries of South-Eastern Europe over the period 1998–2008. They found that Albania bank have relatively high cost efficiency, because of the relatively high level of banking sector concentration.

The impact of regulatory changes and reforms on the efficiency of different banking sectors has been found to be different across the individual countries. Studies in Australia (Sturm &Barry 2004), Spain (Vivas, 1997), and Turkey (Isik & Hassan, 2003), showed that financial liberalisation has positively affected the efficiency and productivity of commercial bank. On the other hand, in Italy (Boscia, 1999) and in Korea productivity has declined after deregulation (Mahadevan, 2004).

Some other authors have examined the size of the banks and its relation to cost efficiency Kamberoglou, Liapis, Simigiannis and Tzamourani (2004) investigated cost efficiency in a panel of Greek bank over 1993-1999, a period characterized by major changes in the banking sector brought about by gradual financial deregulation. Their result showed that Greek bank were found to exhibit substantial cost inefficiencies, indicating that there was significant room for improving their competitiveness and profitability. Further they also found that the small private bank seemed to be the most efficient ones (average efficiency including the three bank on the frontier 81% or 82% for the balanced and unbalanced samples respectively), while the large public bank were shown to be the least efficient (average 43% and 35%, respectively). Furthermore, the small public bank were on average (average efficiency 75%) less efficient than the small private ones but more efficient than the private large bank (average efficiency 63% or 52%).

More recently, Oluitan (2014) has examined the level of efficiency of bank in Africa over ten years. The author has used SFA methodology and the countries divided according to the level of income of the respective countries and using of three output variables and three input variables. The result of the study has shown that the level of inefficiency of the financial sector ranges from about 10-26 percent. Much of the inefficiency within the continent is a result of poor intermediation and possibly low skilled staff.

Based on these studies, several conclusions can be made. First, there exists no unanimous consensus on the impact of regulation changes reforms on the efficiency of the banking sector. Second, the relationship between bank size and ownership with the efficiency is

mixed depending on the country studied. Third, whether country's banking sector is more efficient than the others varies from study to study. For example, Pastor, Perez & Quesada (1997) indicated that Austria and Germany were less efficient than France, whilst the study by Allen and Rai (1996) indicated otherwise. However, the U.K. banks were found to be relatively inefficient in all the studies. Fourth, there is no consistency of using input and output variables among different studies. Input and output variables are used based on the country specific requirement and availability of data. Berger and Humphrey (1997) documented 130 studies on the subject covering 21 countries, all of them undertaken during the 1990s. A review of some of these studies indicates that important aspects in which these studies differ are in the choice of technique for efficiency measurement, in deciding what constitutes bank' outputs and in the case of the parametric approach, in the choice of functional form for the production/cost function and in specifying the probability distributions of the inefficiency terms.

III. RESEARCH METHODOLOGY

The study used Stochastic Frontier Analysis (SFA) to measure the level of cost efficiency of selected commercial banks. SFA is an analytical method commonly used in the construction of the 'best-practice' frontier. It assumes that the deviation from the estimated frontier is due to either random fluctuations or inefficiency. To separate these two components, an asymmetrical probability distribution is presumed for the inefficiency term, whereas the noise error term is assumed to be normally distributed.Berger and Humphrey (1997) and Bauer, Berger, Ferrier, and Humphrey (1998) emphasized on efficient frontier approaches, such as SFA or Data Envelopment Analysis (DEA) to be more informative compared to the use of traditional financial ratios.

The study is based on secondary data. The sources of data are NRB, Nepal Stock Exchange Ltd. (NEPSE), and Ministry of Finance (MOF). Information on different variables is collected from NRB which is provided online in its official website. In addition to this, the respective website of bank is also used to get individual bank's information through annual reports. Data on major macro-economic variables are collected from NRB and Ministry of Finance websites.

For the purpose of the study, 18 "A" class commercial banks are included in the sample. All these banks are listed in NEPSE. As the commercial banks have 78 percent share of total assets of Nepali banking industry (Bank Supervision Report, 2014), we assume that they fairly represent the sector. To analyze the impact of different regulatory changes over the period of time, only those "A" class commercial banks are included which are established on or before 2005. These banks are selected non-randomly on the basis of availability of full set of data for the purpose of research. Exhibit 1 shows the list of banks selected for the study. The data used for the research are from fiscal year 2005/2006 to fiscal year 2011/2012. Therefore, the cost efficiency of each bank has been measured from fiscal year 2005/06 to fiscal year 2011/12. The analysis started from the publication of first annual report of each sample bank. Similarly, "regulatory changes" are defined as different rules, directives, policies guidelines issued or enacted by NRB over the period of time. The bank size is categorized as large, medium and small, which is

based on the total assets size of the respective banks. Segregating bank size based on total assets is consistent with previous studies (Karim, 2002; Kamberoglou, Liapis, Simigiannis & Tzamourani, 2004). First six banks with the highest total assets were categorized as large bank, next six large banks in terms of their assets size were categorized as medium level banks and last six were categorized as small banks.

Cost efficiency measures the cost performance of a banking firm relative to the best-practice (least-cost) bank(s) that produces the same output under the same exogenous conditions using stochastic frontier analysis. The cost inefficiency of Nepali banks is estimated based on Battese and Coelli (1992) model which uses the SFA approach. In this case, cost function is specified as:

$$\ln C_{it} = \ln f(y_{it}, w_{it}; \theta) + u_{it} + \Phi v_{it} \quad \ldots\ldots\ldots (1)$$

where the subscript *i* indicates a single bank (*i* = 1, 2,…N) and *t* is for a specific year (*t*=1, 2,…T); *C* represents total costs (C), used to estimate cost efficiency; $\ln f(y_{it} w_{it}; \theta)$ is a logarithmic functional form; *y* is a vector of outputs; *w* is a vector of input prices; Φ is equal to one for the cost function; θ is a vector of parameters to be estimated. The random noise term, *v*, follows a symmetrically normal distribution with zero mean and variance of σ^2_V, $v_{it} \sim ii\ d\ N\ (0, \sigma^2_V)$. The inefficiency term, *u*, can follow any non-negative distribution and can be specified as a function of factors affecting efficiency levels. In this research, *u* was assumed to follow a non-negative truncated normal distribution. Following Battese and Coelli (1992) model, term u is defined thus:

$u_{it} = u_0 e^{-n(t-T)}$; it embodies time varying inefficiency property. Positive value of "n" indicates decaying rate of inefficiency. "t"and "T" are current and terminal time period (here 2011/2012).

The cost efficiency is calculated as:

$$CE_{it} = \frac{C_{it}^{min}}{C_{it}} = \exp\{-u_{it}\} \quad \ldots\ldots\ldots (2)$$

For the estimation of the cost frontier function, the functional form used is Cobb Douglas power form. This form has been widely employed and allows for the necessary flexibility when estimating frontier models. A number of researches in banking sector have estimated the frontier by employing either by Translog functional form or by Cobb Douglas type power function. The study selected Cobb Douglas cost function especially in the context of relatively smaller number of observations (hence lesser parametrization) to estimate inefficiency score. Hasan, Kamil, Mustafa and Baten (2012) used this functional form to estimate domestic bank efficiency in Malaysia. Shanmugam and Das (2005) also used Cobb-Douglas method to measure technical efficiency of bank in four different ownership groups in India during the reform period, 1992–1999. The Cobb-Douglas cost function used in this study is of the following form:

$$\ln C_{it} = \beta_1 + \beta_2 \ln y_{1,it} + \beta_3 \ln y_{2,it} + \beta_4 \ln w_{1,it} + \beta_5 \ln w_{2,it} + \beta_6 \ln w_{3,it} + \beta_7 D_{it} + u_{it} + v_{it} \quad \ldots\ldots\ldots (3)$$

Where

w1=capital's price= other operating expenses/fixed assets; w2= labor's price=wages & salaries/total assets; w3= fund price=interest expenses/total deposits; y_1= Loan and Advances; y_2 = Investment. D=dummy 1 for years from 2008/9 to 2011/12, 0 otherwise. The prefix "ln" stands for natural log. By imposing linear homogeneity in prices, w_i's, that is, $(\beta_4 + \beta_5 + \beta_6 = 1)$, the above model is transformed into:

$$\ln(C_{it}/w_{3,it}) = \beta_1 + \beta_2 \ln y_{1,it} + \beta_3 \ln y_{2,it} + \beta_4 \ln(w_{1,it}/w_{3,it}) + \beta_5 \ln(w_{2,it}/w_{3,it}) + \beta_7 D_{it} + u_{it} + v_{it} \quad \text{..... (4)}$$

To address the impact of restrictive regulatory pursuit of NRB on cost of banks, a dummy variable, D, is created to take value of 1 for period 2008/9 to 2011/12. This period has seen a shift in policy towards restrictive practices. Examples of some restrictive practices are regulation on CD ratio, CEO's salary and tenure, ceiling on real estate sectors and others. Chattergee (2006) used a regulation dummy to investigate the effect of the restrictive regulation on the cost of banks. Once inefficiency score of each bank is calculated, the score is then used to examine the level of inefficiency of bank in terms of their size and ownership.

One of the most debated issues in banking literature is the measurement of output. There is no consensus on the definition of bank output and input. Different studies have used different approaches for identifying banks' inputs and output. These approaches for measuring output can be mainly grouped into two broad categories: (a) the *production approach* and (b) the *intermediation approach*. The *production approach*, initiated by the contributions of Benston (1964) and Bell and Murphy (1968), defines banking activities as the production of services for depositors and borrowers. Under this approach, output is measured by the number and type of transactions or accounts (both deposits and loans) and the inputs used are only physical units such as labor and capital. Unfortunately, such detailed transaction flow data is typically proprietary and not generally available (Berger & Humphrey,1997). Under the *intermediation approach*, banks are thought of as primarily intermediating funds between savers and investors, and the inputs are essentially financial capital (that is, deposits collected by bank and their interest cost) and the outputs are measured by the volume of loans and investments outstanding. The intermediation approach is consideredmore pragmatic and appropriate for evaluating entire financial institutions (Berger &Humphrey,1997).It assumes that banks collect deposits to transform them, using labor and capital, into loans and other assets. This research also used the intermediation approach to define inputs and outputs for Nepali banks following Berger and Mester (1997); Altunbas, Gardener, Molyneux, and Moore (2001); Maudos, Pastor, Perez and Quesada (2002); Koetter (2006); Mahesh and Bhide (2008); Karim (2001) and Sunil (2008).

Accordingly, to be in consistent with the intermediation approach used by most SFA studies, bank outputs in this research are defined as follows: loans (y_1), and investments (y_2). Loans aggregate commercial and industrial, real estate, consumer, agriculture, and other outstanding credit. Investments include securities, equity investments, and all other investments reported on the balance sheet. The prices of factors of production are defined

as the input-specific cost per unit of output. Therefore, the price of labor (w_2) is defined as total employee expenses divided by the sum of assets, which is used by previous studies (see Bos & Kolari 2005, Altunbas et al. 2000 & Srairi, 2009). Likewise, the price of capital (w_1) equals operating expenses divided by fixed assets (Srairi, 2009) and the price of fund (w_3) equals to interest expenses divided by total deposits (Srairi, 2009, Mahesh & Bidhe, 2008). Finally, total cost (C) is the sum of salaries, operating expenses and interest expenses.

IV. EMPIRICAL ANALYSIS

The maximum likelihood estimates of the parameters of Cobb Douglas stochastic frontier model observed that the coefficients of loan and advance and investment are found to be significant with values of 0.976 and 0.088, respectively. This indicates that the respective elasticities of loan and advance and investment (output) were 0.97% and 0.088%. On the other hand, the coefficient of DUM (the effect of restrictive regulation) was found to be insignificant with a value of 0.04, implying that the change in regulation after 2008 even though is positively related with the cost, but not significant, statistically .Significant coefficients on the capital and labor's prices showed that a one percent increase in these variables caused 0.11% and 0.22% increase in the cost of bank on average. Since due to constraint of linear homogeneity imposed, the elasticity coefficient on fund price is 0.66 meaning that 1% increase in the price of deposit causes 0.66% increase in the cost – implying that the fund has more on cost than capital and labor combined. The value of Gamma (γ) was estimated to be 0.91, which indicated that 91% of variation from the cost frontier was due to cost inefficiency. This confirmed substantive variability in cost inefficiency across bank and across time in Nepal. As the estimate for the eta (ŋ) parameter was observed to be positive, it can be concluded that the cost inefficiency effects tended to decrease over time.

Average Inefficiency Score of Bank

A bank is regarded as cost efficient if it can get maximum output from given inputs or reduces inputs used in producing given output. Therefore, firms on the frontier are labeled as ''best practice,'' and they show optimum efficiency in the utilization of their resources. A value of close to "0" indicates that a firm lies on the best practice frontier or full cost efficiency. The larger is the value the higher is the cost inefficiency of the firm showing cost operations above the frontier or inefficient use of resources. Individual banks year-wise inefficiency score is provided in exhibit 2.In general, the result shows that the cost efficiency of Nepali commercial banks have increased (inefficiency decreased) during the sample period i.e. from 2005/6 to 2011/12 which is consistent with the other studies. The result of decline of cost inefficiency (increase efficiency) over the entire sample period is consistent with the result of Kumbhakar and Sarkar (2004) and Sensarma (2005). Sensarma argued that over the time with increased competitive pressure and entry of new bank in the industry, cost of financial intermediation would come down and thereby cost efficiency of the banking sector on an average would rise (Sensarma, 2005). Chatterge (2006) also showed that the average inefficiency of Indian domestic banks declined during the period 1995–96 to 2001–02. Both studies argued that the main reason for declining inefficiency is to due to increased completion. The market segment of

commercial banks in Nepal is highly concentrated within urban areas, mainly at Central Development Regions, banks are mainly concentrating their operations in urban and semi urban areas rather than establishing their presence in rural areas where the access of financial services has been poor (Exhibit 5). The uneven geographical distribution of banks in urban areas is one factor that has increased competition (Nepal Rastra Bank, 2012). As a result, products can be easily imitated by the competitors and the customer switching cost is very low. Therefore, increasing competition and threat of similar products, is putting strong pressure on banks to improve their earnings and to control costs. Within this context, the significant increase in the cost efficiency suggests that competitive pressure may have contributed to reduce the cost inefficiency over time.

Exhibit 3 shows average inefficiency scores of each banks of the sample. Siddhartha Bank Ltd (SBL) appears to be most cost efficient bank among the best practice with 0.0296 score followed by Kumari Bank Ltd (KBL) and NICASIA with 0.030 and 0.035 in second and third respectively. The most interesting finding is the efficiency score of Agricultural Development Bank (ADB) in which government has majority shareholding and is ranked four in terms of efficiency. Best practice banks are the ones which succeed in converting a minimum set of inputs to maximum output and are considered to operate on the efficient frontier, while the others operate above the frontier and their efficiencies are correspondingly lower. Nepal Bank Ltd (NBL) is ranked last in the efficiency score and RBB is ranked second last. The result shows that these two banks, even though show consistent improvement, still lag behind other bank in terms of cost efficiency. The average efficiency score is 0.16. Bank wise average inefficiency score is presented in exhibit 3.

Inefficiency with the Size of the Banks

Consistent with the result of average inefficiency score, the cost efficiency of all three sizes of banks is improved over the period of time. Exhibit 4 shows average inefficiency scores of sample banks based on the size. If we compare from 2005 and 2011/12, the cost inefficiency of Large size banks has reduced significantly i.e. from 0.39 to 0.14 which is almost 60% improvement in their efficiency. Similarly, the average cost inefficiency of Mid Size Bank appeared to have decreased during 2005 to 2011. The average inefficiency score is 0.17 in 2005 which is around 0.079 in 2011/12. However, during the 2008 and 2009, the cost inefficiency slightly increased to (approx) 0.10 in 2009 from 0.075 in 2007. This is the period when Nepali banking system has also witnessed the over exposure in real estate sector and had to write off substantial amount of loan and the liquidity from the market is dried out. Banks were competing to collect scare deposits which caused the increased in the cost of fund was one of the reasons for the increasing cost in inefficiency during these two years. Finally, consistent with the results above, Small size banks have also shown improved cost efficiency during the sample period. Cost inefficiency is increased by almost 20% in 2006 as compared to 2005. But after 2006 and since 2007, small bank observed overall decrease in the cost inefficiency.

The results of the cost inefficiency of all size banks are in general in decreasing trend. A Large bank seems to be less cost efficient than Mid and Small size banks. This result has been reported earlier in the literature, for example in the case of Greek Bank

(Christopoulos et al. 2002). The markets where large and small bank are concentrated might be different, affecting their performance. In the context of Nepal, the reason could be that bigger banks may be difficult to manage high staff expenses, and the large branch network may be costly to maintain. The trend of opening branches by the bank in Nepal has increased significantly over the period of last decade (Exhibit 6). The number has increased substantially from 2010 to 2012. Consistent with Sensaram (2005), a large branch network is associated with costly deposit mobilization but may not contribute too much in generating revenues.

V. SUMMER AND CONCLUSION

The study used stochastic frontier analysis to test and investigate different hypotheses as outlined in the research methodology section. Eighteen "A" class banks were selected on nonrandom basis based on availability of data. All banks that were included in the study are listed in NEPSE. Even though all banks are category "A" banks as classified by NRB, they are different in terms of asset size and the date of operation.

The results of the cost inefficiency of all banks are in general in decreasing trend.The study also found that large banks are less cost efficient relatively than medium and small banks. Impact of restrictive regulations observed hitherto after 2008 on cost of banks was not statistically significant even at 10% level of significance.

In conclusion, the enhanced competition might have forced bank to reduce cost, diversify products through innovation, provide better services to client, and broaden the client base to minimize risk and to retain clients. This ultimately led to gains in efficiency and productivity of the overall sector. Some caveats are in order: inefficiency among banks could be caused by various factors- managerial inefficiency, inefficiency brought by larger scale of operation, branches' expansion in high cost area, lesser productivity of added resources – which will require further data and research. The inefficiency scores calculated here should not be directly compared across banks of different scales of production (operation). Hence the results are to be taken as indicative rather than confirmative.

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Exhibit 1
Selected FIs for the study

Name of bank	Abbreviation
Nepal Bank Ltd.	NBL
Rastriya Banjiya Bank	RBB
Agriculture Development Bank	ADB
NABIL Bank Ltd.	NABIL
Nepal Investment Bank Ltd.	NIBL
Standard Chartered Bank Nepal Ltd.	SCBNL
Everest Bank Ltd.	EBL
Luxmi Bank Ltd.	LaxBL
Nepal SBI Bank Ltd.	NSBL
Kumari Bank Ltd.	KBL
Siddhartha Bank Ltd.	SBL
Lumbini Bank Ltd.	LBL
Himalayan Bank Ltd.	HBL
Machhapuchhre Bank Ltd.	MBL
Nepal Industrial and Commercial Bank Ltd.	NICASIA
Nepal Bangladesh Bank Ltd.	NBB
Bank of Kathmandu	BoK
Nepal Credit and Commerce Bank Ltd.	NCC

Exhibit 2
Bank wise Inefficiency Score

Bank	2005	2006	2007	2008	2009	2010	2011
NBL	0.8548711	0.7461904	0.6513264	0.5685225	0.4962456	0.4331573	0.3780895
RBB	0.5954261	0.519729	0.4536552	0.3959815	0.3456399	0.3016983	0.2633431
ADB	0.0674788	0.0589001	0.0514121	0.044876	0.0391709	0.034191	0.0298443
NABIL	0.0959638	0.0837638	0.0731148	0.0638196	0.0557062	0.0486242	0.0424425
NIBL	0.1481693	0.1293324	0.1128902	0.0985383	0.086011	0.0750764	0.0655318
SCBNL	0.483442	0.4219815	0.3683345	0.3215077	0.280634	0.2449567	0.2138151
EBL	0.0829525	0.0724066	0.0632015	0.0551666	0.0481532	0.0420314	0.0366879
HBL	0.2505228	0.2186735	0.1908733	0.1666074	0.1454264	0.1269382	0.1108004
Laxbl	0.0819719	0.0715507	0.0624544	0.0545145	0.047584	0.0415346	0.0362543
NSBL	0.1940563	0.1693857	0.1478515	0.129055	0.1126481	0.098327	0.0858266
KBL	0.0444301	0.0387817	0.0338513	0.0295478	0.0257913	0.0225124	0.0196504
SBL	0.0429406	0.0374815	0.0327164	0.0285572	0.0249267	0.0217577	0.0189916
LBL	0.1280477	0.1117688	0.0975595	0.0851567	0.0743306	0.0648809	0.0566325
MBL	0.3014274	0.2631066	0.2296575	0.2004609	0.1749761	0.1527312	0.1333143
NICASIA	0.0510271	0.04454	0.0388776	0.033935	0.0296208	0.0258551	0.0225681
NBB	0.3959151	0.345582	0.3016478	0.2632989	0.2298254	0.2006075	0.175104
BoK	0.1396903	0.1219313	0.10643	0.0928995	0.0810891	0.0707801	0.0617818
NCC	0.3072658	0.2682028	0.2341059	0.2043437	0.1783653	0.1556895	0.1358965

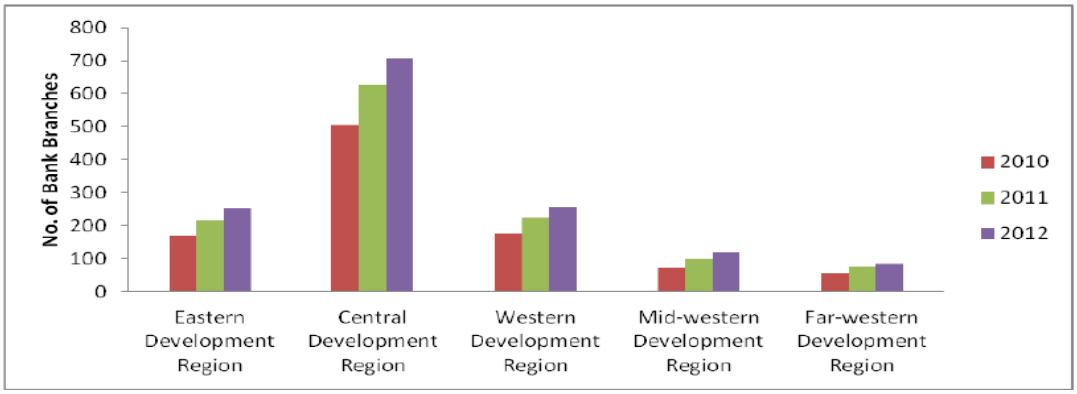
Exhibit 3
Individual bank average inefficiency score from 2005 to 2011

Rank	Bank	Average efficiency score
1	SBL	0.030
2	KBL	0.031
3	NICASIA	0.035
4	ADB	0.047
5	LaxBL	0.057
6	EBL	0.057
7	NABIL	0.066
8	LBL	0.088
9	NIBL	0.095
10	BoK	0.096
11	NSBL	0.134
12	HBL	0.173
13	MBL	0.208
14	NCC	0.212
15	NBB	0.273
16	SCBNL	0.334
17	RBB	0.411
18	NBL	0.590
Average Score		0.160

Exhibit 4
Year wise average inefficiency score of banks with different size

Year	Large Banks	Medium Banks	Small Banks
2005/06	0.391	0.170	0.151
2006/07	0.349	0.089	0.183
2007/08	0.308	0.075	0.157
2008/09	0.248	0.084	0.139
2009/10	0.194	0.099	0.118
2010/11	0.169	0.083	0.140
2011/12	0.144	0.079	0.090

Exhibit 5
Region wise concentrations of branches of Bank



Source: (Nepal Rastra Bank,2012)

Exhibit 6
Number of branches of Bank in Nepal

Name of Banks	2010	2011	2012
Nepal Bank Limited (NBL)	110	111	112
Rastriya Banijya Bank Limited (RBBL)	128	128	142
NABIL Bank Limited (NABIL)	37	46	49
Nepal Investment Bank Limited (NIBL)	40	41	41
Standard Chartered Bank Nepal Ltd. (SCBN)	16	16	16
Himalayan Bank Limited (HBL)	30	35	39
Nepal SBI Bank Limited (NSBI)	44	46	59
Nepal Bangladesh Bank Limited (NBBL)	19	19	19
Everest Bank Limited (EBL)	37	43	45
Bank of Kathmandu Limited (BOK)	37	39	45
Nepal Credit and Commerce Bank Ltd. (NCCBL)	17	17	22
Lumbini Bank Limited (LBL)	13	15	37
Nepal Industrial & Commercial Bank Ltd. (NIC)	26	34	16
Machhapuchchhre Bank Limited (MBL)	41	41	54
Kumari Bank Limited (KBL)	27	29	28
Laxmi Bank Limited (LXBL)	22	27	29
Siddhartha Bank Limited (SBL)	30	40	41
Agriculture Development Bank (ADBL)	97*	234*	234*
Global Bank Limited (GBL)	28	28	57
Citizens Bank International Limited (CBIL)	18	30	33
Prime Commercial Bank Limited (PCBL)	17	24	32
Sunrise Bank Limited (SRBL)	41	47	29
Bank of Asia Nepal Limited (BOA)	27	29	49
DCBL Bank Limited (DCBL)	12	21	21
NMB Bank Limited (NMB)	15	18	21
Kist Bank Limited (KiBL)	51	51	52
Janata Bank Nepal Limited (JBNL)	3	13	23
Mega Bank Nepal Limited (MBNL)		14	23
Commerz & Trust Bank Nepal Limited (CTBNL)		7	14
Civil Bank Limited (CBL)		1	13
Century Commercial Bank Limited (CCBL)		1	8
Sanima Bank Limited (SBL)			22
Total	**980**	**1245**	**1425**

** Also includes branches with development banking functions.*