FINANCIAL PRACTICES AND EFFICIENCY OF COOPERATIVE RURAL BANKS IN SRI LANKA

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ABSTRACT

Many small financial institutions (SFIs) in developing countries make great effort to provide efficient services to the poorhouse holders. It is generally accepted that maintaining the financial strength which is importance in corporate governance mechanism of institutions, has a close relationship with the efficiency of financial institutions, although they are small. However, there is a doubt of efficiency of SFIs in developing countries due to not maintaining appropriate financial practices. In Sri Lanka, recent collapses of many financial institutions also signal that they do not maintain sound financial practices.

Cooperative rural banks in Sri Lanka (CRBs) one of the formal SFIs in Sri Lanka which serve a large number of customers, deal with a large amount of funds and have substantial contributions to the rural financial sector during the last four decades. This paper seeks to test financial strength of cooperative rural banks in Sri Lanka (CRBs) and whether these strengths have a significant impact on efficiency of these institutions. The financial strength of CRBs was assessed using ratios of capital adequacy, liquidity, asset quality, loan to deposit, profitability, loan portfolio yield, operational efficiency, and operational self-sufficiency. The efficiency of CRBs in Sri Lanka was examined by using Data Envelopment Analysis (DEA), a non-parametric analytic technique. Based on the data extracted from CRBs' financial statements, correlation coefficients showed that several financial practices have significant associations with the efficiency of CRBs in Sri Lanka. This confirms that efficient SFIs maintain sound financial practices which contribute to higher levels of efficiency.

Key words: Efficiency; small financial institutions; financial strength; capital adequacy; liquidity; asset quality; loan to deposit; profitability; loan portfolio yield and efficiency of management

1. Introduction

There is general consensus on the importance of strengthening the regulatory and supervision mechanisms in the financial services sector for the purposes of stability[1], safety and soundness and thus, the protection of depositors (Furstenberg 1997; Llewellyn 1999). The implementation of good corporate governance in regulatory and supervision mechanisms for small financial institutions (SFIs) could help to develop efficient institutions leading to strengthing the entire financial services sector (Macey & O'Hara 2003; Mullineux 2006).

In Sri Lanka, although the Government has implemented quite a range of reforms to strengthen regulation and supervision mechanisms over the last two decades, it has not paid much attention to the regulation and supervision of the rural financial sector which comprises of a wide range of small financial institutions (SFIs). This has not only affected confidence in the whole financial services sector but also the efficiency of these SFIs. In recent literature, corporate governance has been highlighted as an integral part of the regulatory and supervisory framework of financial institutions.

The aim of this study is to review the literature related to risk management issues in corporate governance in the regulation and supervision of financial institutions. The next section describes the role of the risk management process in corporate governance mechanism within the context of the regulatory and supervisory framework for these financial institutions.

2. Literature review

In the corporate governance mechanism of financial institutions, the role of risk management processes is also vital. A risk-based approach helps SFIs to operate efficiently and allows the evolution of a formal financial system (Llewellyn 1998; Van Greuning, Gallardo & Randhawa 1999). Risk management systems are useful for establishing proper governance and self-supervision mechanisms within institutions and, in addition, result in a sound financial control system for the development of sector stability (Van Greuning, Gallardo & Randhawa 1999). Almario, Jimenez and Roman (2006) note that the application of a risk management self-supervisory mechanism as part of the corporate governance mechanism maintains a high level of performance within the institution, thus achieving efficiency with a wide range of services and a broad client base, particularly in the rural financial sector.

Management is responsible for ensuring that the financial institution has an appropriate risk assessment procedure as part of the corporate governance mechanisms (OECD 2004). However, the risk features of SFIs are different from other financial institutions as are their nature and management. Hence, the identification of risk features appropriate to SFIs is essential (Van Greuning, Gallardo & Randhawa 1999). The relevant question is which variables are associated with effective financial control and risk management procedures in SFIs.

[1] A safe and secure financial system encourages financial institutions to function efficiently (CBSL 2006).

Bank regulators and researchers have made considerable efforts to understand the determinants of risk in banking institutions (Robison & Barry 1977; Kwan & Eisenbeis 1997; Pastor 1999). In practice, there are a number of mechanisms available to understand the risk position of financial institutions. According to Van Greuning, Gallardo and Randhawa (1999), balance sheet structures and changes in income and expense categories are affected by risk in SFIs. Horngren, Sundem and Elliott (1996) note that the balance sheet represents all the assets owned by the institution at a particular date and the claims of the membership against those assets. Hence, it is a snap shot of the financial position of the operations. The income statement depicts the operational results for a particular period. Intended and unintended changes in sources of income, expenses, assets and liabilities reflect the efficiency of the position in SFIs (Van Greuning, Gallardo & Randhawa 1999). Long term debts as a percentage of capital and liquid assets as a percentage of total assets are two ratios that indicate risk factors in the balance sheet (Jansson & Taborga 2000). The return on average assets and operating expenses as a percentage of assets are two income statement based indicators (Jansson & Taborga 2000).

Moreover, Van Greuning, Gallardo and Randhawa's (1999) framework indicates that an adequate capital base and liquidity requirements provide investors with confidence in institutions. Further, portfolio risk and the management of loan delinquency becomes crucial because SFIs collapse when sound practices are not maintained (Van Greuning, Gallardo & Randhawa 1999).

The CAMELS methodology is a commonly used framework for evaluating the risk position of financial institutions. CAMELS is an acronym for six measures (capital adequacy, assets quality, management soundness, earnings, liquidity, and sensitivity to market risk) (Hilbers, Krueger & Moretti 2000). This framework involves the analysis of these six indicators that reflect the soundness of the institution. CAMELS is used as an external supervisory tool for many financial institutions (Hilbers, Krueger & Moretti 2000). However, most financial institutions use this methodology as a governance mechanism to identify their risk positions internally (Demirg'uc-Kunt 1989). The CAMEL[2] methodology was originally adopted by North American Bank regulators to evaluate financial and managerial soundness of U.S. banking institutions (Saltzman & Salinger 1998). Based on the original CAMEL conceptual framework, ACCION developed its own instrument to evaluate MFIs. ACCION CAMEL reviews the same main five areas as the original CAMEL (Saltzman & Salinger 1998). However, some of the methods and standards for assessment differ substantially from that applicable to conventional banks.

In addition to the CAMELS methodology, there are several other methodologies for identifying, monitoring and evaluating SFIs. The World Council of Credit Unions (WOCCU) PEARLS (Richardson 2002), PlaNet Rating's GIRAFE (1999), MICRORATE (1996) and M-CRIL (1998) have been developed by private organisations to assess any type of MFIs. A set of performance indicators has also been introduced by a consultative group to assist the poor (CGAP) (2003) to evaluate the financial soundness of MFIs. Many of the indicators are standardised (CGAP 2003). The CGAP indicators fall into four categories - sustainability/profitability,

[2] Originally this methodology includes five areas (i.e. it did not include sensitivity to market risk).

assets/liquidity management, portfolio quality and efficiency/productivity. Jansson and Taborga (2000) produce several benchmark indicators to evaluate MFIs. They explore nineteen benchmark indicators in six major categories; profitability, capital, assets quality, liquidity, productivity, and growth. These indicators offer a relatively complete overview of an institution's financial structure, operational structure and performance (Jansson & Taborga 2000).

The National Credit Council and the Philippine Central Bank have developed a uniform set of performance standards for all types of SFIs (Almario, Jimenez & Roman 2006). These standards ensure portfolio quality, efficiency, sustainability and outreach of institutions. These standards provide the user with the necessary tools to facilitate an evaluation and assessment of an institution's operations. They can also be used to compare financial performances of financial institutions regardless of whether they are banks, cooperatives or NGOs (Almario, Jimenez & Roman 2006). Further, these benchmarks aid regulators in assessments of institutions' operations that are under supervision.

The above discussion shows that indicators of capital adequacy, liquidity, asset quality, effective financial structure, profitability, and efficiency in the management of financial institutions are commonly used in all methodologies. The literature also provides some empirical justification for the use of the variables identified. Most studies have attempted to identify the effect of these factors on the overall efficiency of the firm.

Capital adequacy is a major factor in determining risk in financial institutions. The objective of capital adequacy analysis is to measure the financial solvency of an institution by determining whether the risks it has incurred are adequately offset with capital to absorb potential losses (Saltzman & Salinger 1998). Evans et al. (2000) consider that capital adequacy determines robustness of financial institutions to shocks to their balance sheets and this ratio provides lagged indicators of many problems in financial institutions. Thus, it is useful to track capital adequacy ratios as these take into account the most important financial risks including credit risks, interest rate risks and foreign exchange risk by assigning risk weightings to institution's assets (Hilbers, Krueger & Moretti 2000).

Bhattacharyya, Lovell and Sahay (1997) find that capital adequacy does not have a significant impact on the performance of public sector banks in India. However, they observed that there was an improvement in the performance of foreign banks while that of the Indian public sector banks declined during their observation period. Indian banks with low risk portfolios, as indicated by a higher capital ratio, are less efficient because they prefer safer and lower earning portfolios over riskier higher earning portfolios (Bhattacharyya, Lovell & Sahay 1997). However, Kwan and Eisenbeis (1997) find that institutions with more capital operate more efficiently than less capitalised bank organisations.

Quality of assets is another risk indicator for financial institutions commonly used in the surveyed methodologies. The reliability of capital ratios depends on the reliability of asset quality indicators (Jansson & Taborga 2000). Evans et al. (2000) state that risks of financial institutions often derive from the impairment of assets, so it is

important to monitor asset quality. The current credit portfolios and non-performing loans directly reflect the quality of assets of financial institutions (Evans et al. 2000). Hence, adequate loan classifications and the accounting treatment of non-performing loans are essential for maintaining asset quality.

Recent research investigates the relationship between loan quality and the efficiency of financial institutions. Miller and Noulas (1997) identify that asset and liability management and the quality of assets affect performance. Larger banks experience poor performance due to the declining quality of their loan portfolio (Miller & Noulas 1997). Robison and Barry (1977) state that rural banks often experience liquidity problems, which arise from seasonal flows of loans and deposits. Therefore, concentrating on risk and liquidity components of portfolio is very important. Robison and Barry suggest that banks with low risk portfolios are less efficient than those with high-risk portfolios. Quality of assets and availability of liquidity may help to reduce risk (Robison & Barry 1977). Demirg'uc-Kunt (1989) and Whalen (1991) emphasise that asset quality and non-performing loans are significant indicators of bank insolvency. Further, Berger and Young (1997) suggest that high loan quality has a positive effect on bank efficiency.

Das and Ghosh (2006) explore the association of capital adequacy, asset quality and profitability with banks efficiency. Banks reporting higher profitability attract customers, create more deposits, lending and are efficient in intermediation activities (Das & Ghosh 2006). They find a close relationship between bank efficiency and the financial soundness of a bank. Further, technically more efficient banks maintain on average, less non-performing loans. Berger and Young (1997)suggest that the relationship between loan quality and cost efficiency run in both directions. Increases in non-performing loans tend to be followed by decreases in measured cost efficiency. Further, there is evidence that decreases in the capital ratio generally increase non-performing loans and substantially affect the efficiency of a bank (Berger & Young 1997). Eisenbeis, Ferrier and Kwan (1999) emphasise that portfolio risk has a positive relationship with efficiency. A large number of problem loans, low capital and a weak liquidity position are directly related to the quality of the portfolio and, eventually affect the efficiency of an institution. It is therefore interesting to examine how capital adequacy, asset quality, liquidity, and profitability influence the efficiency of financial institutions. Misra (2006) explores bank performance with two sets of factors, (i.e. internal and external factors). Internal factors originate from financial statements of a bank, while external factors are systematic forces that reflect an economic environment (Misra 2006). Misra reports that loan portfolio management and investment portfolio contribute positively to financial performances of rural banks.

Indicators of management quality are also key elements of performance of financial institutions. Most indicators used in assessing the quality of management are subject to a country's economic situation. However, several indicators are used as proxies. Jansson and Taborga (2000) provide 40 indicators to identify the quality of management in MFIs. Evans et al. (2000) stresses that declining trends in profitability indicate problems of financial soundness in financial institutions. Liquidity indicators, especially short term liquidity, provide evidence on the efficiency of financial institutions (Saltzman & Salinger 1998). Liquidity management evaluates an

institution's ability to accommodate decreases in funding sources and increases in assets and the payment of expenses at a reasonable cost (Saltzman & Salinger 1998). Hilbers, Krueger and Moretti (2000) emphasise that initially solvent financial institutions may be driven towards closure by poor management of short term liquidity.

Policy makers view microfinance as one solution to the growing demand for financial services by poor householders, particularly in developing countries (ADB 2000; UN 2005). Most formal commercial banks in these countries are reluctant to provide financial services their rural sectors due to high risks, high costs involved in small transactions, and perceived low profitability. Hence, most people in rural areas acquire their financial needs from small financial institutions (SFIs) such as rural banks, credit unions, micro finance institutions (MFIs), or other informal financial institutions (ADB 2000). Consequently, SFIs serve a large number of customers, deal with a large amount of funds and contribute to the financial services sectors in developing countries. In this context, financial strength is necessary because in the long run, only healthy institutions can offer continuous service to poor householders.

The importance of financial strength has been more highlighted recently in Sri Lanka with the collapse of several formal and informal financial institutions. The failure of Pramuka Bank in 2002 (a licensed specialised bank) and the collapse of Golden Key Credit Card Company in 2008 (a registered finance company and a member of a leading group of companies in Sri Lanka) are two examples. It is obvious that poor governance and a lack of transparency are the primary reasons for these failures (Cabraal 2009). Hence, continuously improve risk management and corporate governance of financial institutions, and ensure that the general public has confidence in the financial system (Cabraal 2009). Therefore, a question arises with respect to the identification of which institutions provide financial services efficiently and which do not. A second question relates to how financial institutions can provide services more efficiently.

3. Operational activities of CRBs

As formal small financial institutions, CRBs have made significant contributions to credit provisioning and savings mobilisation from their inception in 1964 (Ameer 2001). Over the last few decades, these institutions have gained an increasing share of deposits which has been particularly helpful in satisfying growing demand for loans and advances for the people living in most rural parts of Sri Lanka (Ameer 2001). Currently, CRBs operate within a federated, four-tier cooperative structure with a network of fifteen district cooperative rural banking unions. The Sri Lanka Cooperative Rural Bank Federation Ltd (SLCRB) is the highest organisation of the cooperative rural bank movement and represents the National Co-operative Council. Each CRB in a particular district is a member of a district cooperative rural banking union.

Institutions engaging in microfinance activities around the world are not renowned for their commitment to financial transparency and this factor contributes to the fragile nature of the institutions (Desrochersa & Lamberteb 2003; Rosenberg et al. 2003; Duflos et al. 2006; Florendo 2007). Further, no published research into the importance

of SFIs as CRBs in Sri Lanka has been identified in the literature. Many financial institutions introduced a wide range of financial services to the rural financial sector after 2000. The number of SFIs operating in the rural finance market increased. This increase in SFIs may have resulted in greater competition and may have affected the overall efficiency of CRBs activities. Hence, an evaluation of their financial strength is of importance to developing the rural financial sector. Therefore, a quantitative assessment of the financial strength and the efficiency of CRBs in Sri Lanka fill this gap.

3.1 Financial strength and efficiency

Based on theoretical and empirical research, financial soundness has a close relationship with the efficiency of financial institutions (Berger & Young 1997; Das & Ghosh 2006). Many risk methodologies for financial institutions show that capital adequacy, liquidity, asset quality, maintaining effective financial structures, profitability, and efficiency of management are key indicators of financial soundness (MICRORATE 1996; Saltzman & Salinger 1998; Richardson 2002; CGAP 2003). These indicators have an affect on the efficiency of financial institutions (Robison & Barry 1977; Berger & Young 1997; Bhattacharyya, Lovell & Sahay 1997; Kwan & Eisenbeis 1997; Miller & Noulas 1997; Eisenbeis, Ferrier & Kwan 1999; Jansson & Taborga 2000; Das & Ghosh 2006; Seelanatha 2007). Although, interpretations of indicators and categories vary between studies, these indicators are important for maintaining financial strength with risk management processes.

The above argument also applies to SFIs. Although they are small, transparency is necessary to build the confidence of customers (Llewellyn 1998; Van Greuning, Gallardo & Randhawa 1998). With respect to SFIs, inadequate management that results in deficiencies in control of activities, creates programmes that do not provide efficient services in developing countries and these may be unsustainable (Hulme & Mosley 1996; Holden & Prokopenko 2001). In Sri Lanka, the recent financial institution collapses could signal that ineffective financial practices were applied within these institutions.

In the light of these gaps in the literature, this study seeks to test whether CRBs financial practices have a significant impact on efficiency of CRBs in Sri Lanka. The following hypotheses are formulated.

H_1 CRBs in Sri Lanka operate efficiently in providing microcredit activities.

H_2 CRBs with higher financial strength will have higher levels of efficiency.

The financial strengths of SFIs are assessed using capital adequacy, liquidity, asset quality, loan to deposit, profitability, loan portfolio yield, efficiency of management. Efficiency of management is decomposed further operational efficiency (Jansson & Taborga 2000; CGAP 2003; Almario, Jimenez & Roman 2006), and operational self-sufficiency (McGuire 1996; CGAP 2003). Each variable is measured using ratios based on financial statement data. The ratios are measured as means for each CRB over the study period. Correlation coefficients are used to examine the impact of CRB

size and financial practices on efficiency and to assess the differences in location, Kruskal-Wallis tests are used.

4. Methodology

For the assessment of efficiency, data envelopment analysis (DEA) was used to evaluate the efficiency of CRBs in Sri Lanka. DEA is a methodology based on the concept of relative efficiency and is widely used in the productivity and efficiency analysis of financial institutions (Brockett et al. 1997; Murthi, Choi & Desai 1997; Schaffnit, Rosen & Paradi 1997; Taylor et al. 1997; Soteriou & Zenios 1999; Saha & Ravisankar 2000; Portela & Thanassoulis 2007). It permits the selection of efficient firms within the industry. DEA is used in prior studies on the efficiency of financial institutions to examine the impact of some specific changes such as financial reforms, the impact of financial practices and the impact of different ownership groups. Gutiérrez-Nietoa, Serrano-Cincaa and Molinerob (2007) for example use DEA to analyse the efficiency of Latin American MFIs.

DEA assesses the efficiency frontier on the basis of all input and output information from the sample (Rogers 1998). Thus, the relative efficiency of firms operating in the same industry can be estimated (Fried et al. 2002). Hence, identification of performance indicators in CRBs is useful for identifying a benchmark for the whole industry. Moreover, the DEA methodology has the capacity to analyse multi-inputs and multi-outputs to assess the efficiency of institutions (Coelli, Rao & Battese 1998). While many efficiency studies of SFIs use traditional financial ratios (Gibbons & Meehan 1999; Jansson & Taborga 2000; Tucker & Miles 2004) these ratios provide only partial measures of efficiency. Partial measures can be misleading when attempting to draw conclusions about the overall efficiency of institutions (Berger & Humphrey 1997; Coelli, Rao & Battese 1998). The DEA approach does not suffer this constraint.

4.1 DEA formulation

Several DEA models have been presented in the literature. The basic DEA model presents an efficiency based on the productivity ratio which is the ratio of outputs to inputs. This study applies Charnes, Cooper and Rhodes's (1978)(CCR) model and Banker, Charnes and Cooper (BCC) (1984) model. The production frontier has constant returns to scale in the CCR model. The basic CCR formulation (dual problem/envelopment form) presents in Equation One (See Appendix One).

In this Equation, θ denotes the efficiency of DMU_j. while y_{rj} is the amount of r^{th} outputs produced by DMU_j using x_{ij} amount of i^{th} input. Both y_{rj} and x_{ij} are exogenous variables and λ_j represents the benchmarks for a specific DMU under evaluation (Zhu 2003). Slack variables are represented by s_i and s_r. According to Cooper, Seiford and Tone (2004) the constraints of this model are:

i. the combination of the input of firm j is less than or equal to the linear combination of inputs for the firm on the frontier;

ii. the output of firm j is less than or equal to a linear combination of inputs for the firm on the frontier; and

iii. the main decision variable θ_j lies between one and zero.

Further, the model assumes that all firms are operating at an optimal scale. However, imperfect competition and constraints to finance may cause some firms to operate at some level different to the optimal scale (Coelli, Rao & Battese 1998). Hence, the Banker, Charnes and Cooper (1984) BCC model is developed with a production frontier that has variable returns to scale. The BCC model forms a convex combination of DMUs (Coelli, Rao & Battese 1998). Then the constant returns to scale linear programming problem can be modified to one of variable returns to scale by adding the convexity constraint $\sum_{\lambda j} = 1$ (Zhu 2003). The Equation Two illustrates (see appendix One) the basic BCC formulation (dual problem/envelopment form).

This approach forms a convex hull of intersecting planes (Coelli, Rao & Battese 1998). These planes envelop the data points more tightly than the constant returns to scale (CRS) conical hull. As a result, the variable returns to scale (VRS) approach provides technical efficiency (TE) scores that are greater than or equal to scores obtained from the CRS approach (Coelli, Rao & Battese 1998). Moreover, VRS specifications will permit the calculation of TE decomposed into two components: scale of efficiency (SE) and pure technical efficiency (PTE). The relationship of these concepts is shown in the Equation Three (Appendix One). Hence, this study first uses the CCR model to assess TE then applies the BCC model to identify PTE and SE in each DMU.

4.2 The selection of inputs and outputs

There is considerable debate in the empirical literature about the selection of input and output combinations. Three basic approaches for financial institutions are used in DEA research. These are the intermediation, production and asset approaches. The intermediation approach views financial institutions mainly as mediators of funds between savers and investors (Yue 1992; Avkiran 1999). The production approach emphasises the role of financial institutions as providers of service for account holders (Drake & Weyman-Jones 1992). With the asset approach, outputs are strictly defined by assets and the productivity of loans (Favero & Papi 1995).

Intermediation and asset approaches are used in this study to assess the efficiency of CRBs in Sri Lanka. The other approaches have not been used as the appropriate internal data for decision making units (DMUs) is unavailable to the researchers. An individual CRB is considered as a DMU. The efficiency scores are estimated for individual CRB and mean efficiency scores are calculated for the sample as a whole. The annual trends in estimated efficiency are also examined with mean estimated scores over the study period. The Table 1 (see Appendix Two) presents the input-output specifications. These inputs and outputs have been identified from prior studies conducted in different contexts.

4.3 Sample

The study is based on 108 CRBs established in Sri Lanka. The required data was obtained from CRBs for the three years 2003 to 2005. The comparison of efficiency is made between years 2003 to 2005. Year 2003 is chosen to measure the baseline for efficiency after the introduction of a wide range of financial services to the rural

financial sector in many SFIs. This study window is selected to allow newer entrants time to establish their operations prior to estimating their efficiency.

5. Empirical results

5.1 Financial practices

As discussed previously, maintaining sound financial practices is expected to influence the efficiency of financial institutions. Therefore, the financial practices of CRBs are assessed to identify if higher level of financial strength have a favourable effect on the efficiency of CRBs in Sri Lanka.

Capital adequacy, liquidity, asset quality, loan to deposit, profitability, loan portfolio yield, operational efficiency, and operational self-sufficiency are considered as variables determining sound financial practices in financial institutions. These ratios provide an overview of an institution's financial strength. Many of these ratios have accepted benchmarks. These benchmarks are identified in the following sections, where relevant, and are compared to the ratios for sampled CRBs. The sampled firms' ratios are calculated as the average of annual figures from financial statements for the three years 2003, 2004 and 2005. Table 2 (Appendix Two) presents the descriptive statistics for financial practices of the sample.

Descriptive statistics (Table 2) show substantial variations in most of the variables with relatively high standard deviations. Some CRBs in the sample neglect to maintain adequate capital adequacy on assets (minimum -11.27%), capital adequacy on deposits (minimum -16.55%), liquidity of assets (minimum -3.52%), and return on assets (minimum -2.90%). The Kolmogorov-Smirnov statistics (Table 2) show the liquidity of assets, return on assets, and operational self-sufficiency variables make significant *($p>0.05$)* departures from the normal distribution.

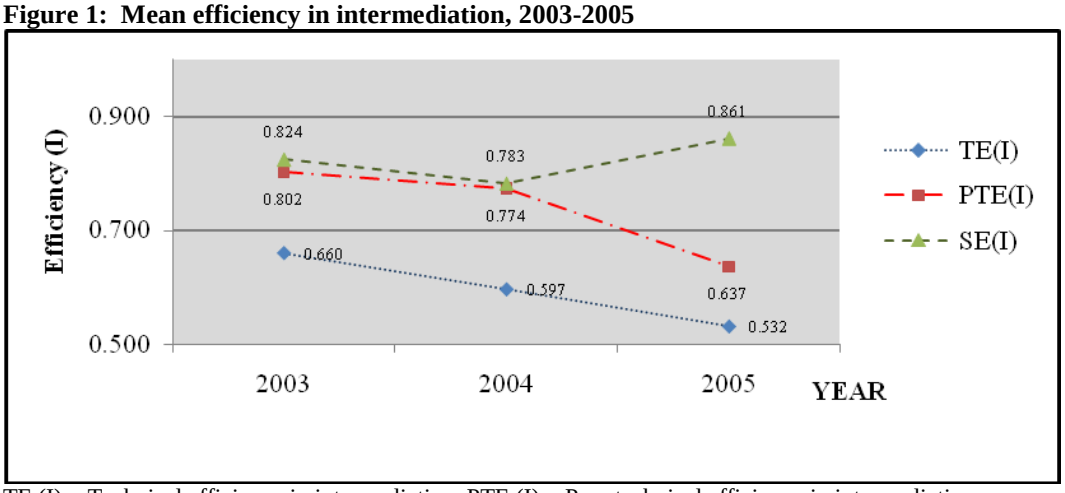
5.2 Efficiency in intermediation

Table 3 presents the summary of efficiency analysis on intermediation. The TE (I) represents technical efficiency (intermediation) in the Charnes, Cooper, and Rhodes (CCR) model [Constant returns to scale (CRS) specification]; PTE (I) represents pure-technical efficiency (intermediation) in the Banker, Charnes, and Cooper (BCC) model [Variable returns to scale (VRS) specification]; and SE (I) represents scale efficiency (intermediation) with VRS. As stated previously, CRS ignores scale differences and assumes that all CRBs are operating at the optimal scale. In contrast, VRS assesses efficiency after controlling for scale differences. Efficiency scores are calculated for both CRS and VRS to shed light on the potential impacts of scale differences on efficiency.

The TE (I) scores in Table 3 show eight CRBs (10%) in 2003, five (5%) in 2004 and six (6%) in 2005 are efficient as indicated by efficiency scores equal to 1.00. The PTE (I) scores show 24 (30%) CRBs are efficient in 2003, 18 (19%) in 2004 and 18 (18%) in 2005. The number of efficient CRBs on SE (I) are consistent with the TE (I) except for 2005.

Figure 1 graphs mean efficiency scores in intermediation during the period 2003 to 2005. Regarding mean scores, there is a downward trend in average TE (I) from 2003 to 2005 (66.0% in 2003, 59.7% in 2004 and 53.2% in 2005). A similar trend exists for PTE (I) (80.2% in 2003, 77.4% in 2004 and 63.7% in 2005). However, although SE (I) declines from 82.0% to 78.0% from 2003 to 2004, it recovers to 86.0% in 2005. The average efficiency scores of the least efficient CRBs in the sample are also continuously declining over the study period. This is evident in the minimum efficiency scores reported in the Table 1. The minimum score for TE (I) in 2003 (33%) fell to 16% in 2005. Although the estimated average efficiency scores for all CRBs show a declining trend throughout the study period, there was a slight upward trend in SE (I). This is attributed to scale differences in the CRBs. These results suggest that CRBs do not use their inputs efficiently and they could produce the same outputs while reducing inputs.

Figure 1: Mean efficiency in intermediation, 2003-2005



TE (I) = Technical efficiency in intermediation. PTE (I) = Pure technical efficiency in intermediation.
SE (I) = Scale efficiency in intermediation. Efficiency (I) = Efficiency in intermediation.

5.3 Efficiency in asset transformation

In addition to evaluating efficiency in intermediation, this study evaluates efficiency in the asset transformation process. Asset transformation requires the maximisation of the usage of assets, turning idle assets into working capital for income generation uses. CRBs maximising the usage of assets perform better than those that don't. The evaluation of efficiency in asset transformation of CRBs based on estimated efficiency scores from model two are presented in this section.

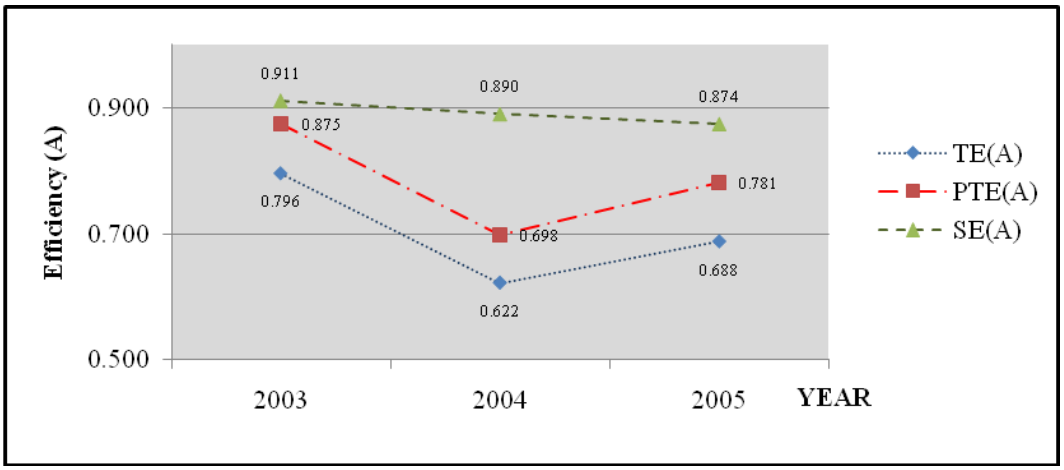
TE (A) represents technical efficiency in asset transformation from the CCR model (CRS specification). PTE (A) represents pure-technical efficiency in asset transformation from the BCC model (VRS specification). SE (A) represents scale efficiency in asset transformation from the VRS model. Table 4 (Appendix Two) presents a summary of the estimated efficiency scores in asset transformation. The estimated efficiency scores for each DMU and the estimated mean efficiency scores in the three year window for each DMU are shown.

For TE (A) scores, 22 CRBs (27%) in 2003, 17 (20%) in 2004 and 18 (18%) in 2005 were efficient. A similar trend exists for PTE (A) scores; 40 (48%) CRBs were

efficient in 2003, 25 (25%) in 2004, and 31 (31%) were efficient in 2005. SE (A) scores, too, show a very similar trend for CRBs during this period.

Figure 2 presents mean efficiency scores in asset transformation during the period from 2003 to 2005.

Figure 2: Mean efficiency in asset transformation, 2003-2005



TE (A) = Technical efficiency in asset transformation. PTE (A) = Pure technical efficiency in assets transformation. SE (A) = Scale efficiency in assets transformation. Efficiency (A) = Efficiency in asset transformation.

Figure 2 shows a downward trend in average TE (A) from 2003 to 2004 (79.6% in 2003 and 62.2% in 2004) and a little recovery to 68.8% in 2005. A similar trend exists for PTE (A); 87.5% in 2003, 69.8% in 2004 and 78.1% in 2005. SE (A) declines from 91.1% in 2003 to 89.0% to 2004, and to 87.4% in 2005. Generally, estimated average efficiency scores for all CRBs show a falling trend throughout the study period. These results suggest that, with respect to efficiency in asset transformation, CRBs do not maximise the usage of their assets and their performance in this area is deteriorating.

Overall, only eight (10% of the sample) CRBs with TE (I) scores of 1.00 could be classified as very strong in terms of the intermediation process where as twenty- two (27% of the sample) CRBs with TE (A) scores of 1.00 were operating at the optimal scale of asset transformation in 2003. The mean of estimated efficiency scores in both models show that most of the CRBs over the study period did not use their inputs efficiently. Mean scores for efficiency in intermediation and efficiency in assets transformation over the study period show a continuous decline. This indicates that the majority of CRBs have become less efficient over the study period. Recorded efficiency scores for both models are well below 100% (TE (I) of 53.2% and TE (A) of 68.8% in 2005), indicating that the majority of the CRBs in the sample did not maintain a high level of intermediation and asset transformation during the study period. These results indicate that CRBs can save more than 30% of their inputs while maintaining the same levels of outputs.

In Sri Lanka, many new financial institutions entered the rural finance market in Sri Lanka and other commercial banks diversified their activities to include microfinance services after 2000. In addition, several structural changes occurred in the financial

sector, along with the establishment of wider operating activities in the commercial banking sector. Many financial institutions introduced innovative service delivery mechanisms in financial services to attract customers (CBSL 2006). However, internal constraints, such as lack of awareness of best practices in microfinance, weak institutional capacity and a negative perception of the commercialisation decision, hamper diversification of activities of MFIs and result in decreasing membership (Charitonenko & De Silva 2002). These circumstances appear to have adversely affected CRBs functions and their efficiency.

Overall, there is no substantive improvement in efficiency in either the intermediation or asset transformation processes. This negative trend in efficiency over the period suggests that on the whole, CRBs have become less efficient. Therefore, H_1 is rejected and it is concluded that as a sector, CRBs in Sri Lanka do not operate efficiently in providing microcredit activities.

5.4 Relationship between efficiency and financial strength

Eight predictions are formulated in this study for the relationship between the financial practices and the efficiency of CRBs. The predicted relationships for efficiency and the financial practices (capital adequacy, liquidity, asset quality, loan to deposit structure, profitability, loan portfolio yield, operational efficiency, and operational self sufficiency) were presented in Table 5 (appendix two). Spearman correlation coefficients are presented in Table 5, which also indicates which hypothesised relationships are supported by the analysis.

Capital adequacy (equity to assets) has the predicted positive correlation with TE (I) and TE (A) but is not significant (Table 5). Capital adequacy (equity to deposits) has a significant positive correlation with efficiency scores from TE (A). However, the predicted sign for the association with TE (I) on the coefficients is achieved but is not significant. These results provide some evidence that CRBs maintaining a higher level of capital (which reflects the higher financial strength) operate at higher efficiency in asset transformation [TE (A)] than CRBs with lower capital ratios.

Higher asset liquidity was predicted to be negatively correlated with efficiency as it reduces the income generating capacity of CRBs. Table 5 shows a negative correlation between liquid assets and the efficiency of CRBs in both models but the associations lack significance. Therefore, these results provide no evidence of a relationship between liquidity ratio and efficiency.

Prior empirical research suggests that asset quality is indicated by the level of the non-performing loans of CRBs. Therefore, a negative correlation is predicted. Table 5 shows that TE (I) and asset quality have a highly significant and moderately sized negative correlation of -0.347. Further, it shows that TE (A), too, has a negative correlation of -0.141 with asset quality but this is not significant. These results indicate that CRBs maintaining well-managed, non-performing loan provisions have greater financial strength and are more efficient in intermediation [TE (I)]. This supports the findings of Berger and Young (1997), Das and Ghosh (2006) that asset quality is closely related to efficiency of a financial institution.

The higher the ratio of loans to deposits, the more the bank is relying on relatively more expensive borrowed funds. Hence, a negative relationship is predicted for this ratio and CRB efficiency. Table Five shows positive correlations between TE (I) and TE (A) and the loan to deposit structure of CRBs. As the coefficients lack significance and are not in the expected direction, the hypothesised relationship is rejected.

More profitable CRBs are predicted to be more efficient. This analysis reveals that the correlation coefficient for profitability and TE (I) is positive but not significant. Further, there is no evidence to support the predicted relationship for profitability and TE (A) (Table 5). Therefore, the hypothesised relationship is rejected.

A negative correlation between loan portfolio yield and the efficiency of CRBs is predicted. The associations of portfolio yield and efficiency are highly significant, although the association is stronger for intermediation (TE (I), $\rho = -0.517$ than TE (A), $\rho = -0.272$). These results indicate support for the hypothesised relationship.

The higher operational cost to loans and higher operational cost to deposits ratios are predicted to have negative relationships with efficiency. The results in Table 5 show that TE (I) and TE (A) scores have highly significant negative correlations for operational cost to loans with efficiency. The correlation coefficient is larger ($\rho = -0.641$) in the intermediation model compared to that for the assets transformation model ($\rho = -0.393$). The operating cost to deposit ratio has a highly significant negative correlation with efficiency in the intermediation model. However, while the predicted negative correlation is observed for the asset transformation model, it is not significant. Overall, these results indicate strong relationships for operational efficiency measured as the ratio of operating costs to loans and TE (I) and TE (A) measures of efficiency. When measured as operational costs to deposits, efficiency is associated with TE (I) but not TE (A). A positive correlation between operational self-sufficiency (defined as the ratio of income to expenses) and efficiency is predicted. As shown in Table Five the correlation coefficient is highly significant for the intermediation model but not for the asset transformation model. Therefore, the evidence for the hypothesised relationship is mixed.

Overall, the correlation coefficients presented in Table 5 indicate asset quality, loan portfolio yield, operational efficiency, and operational self-sufficiency are correlated with the overall efficiency of CRBs when efficiency in intermediation is measured. However, the asset transformation model efficiency measures show significant associations only with capital adequacy (the ratio of equity to deposits), loan portfolio yield, and operational efficiency (the ratio of operating costs to loans). Overall these correlations confirm that the greater the financial strength the higher the efficiency of CRBs in Sri Lanka. Hypothesis Two (H_2) of this study; that CRBs with higher financial strength will have higher levels of efficiency has strong support for the TE (I) efficiency measures. The evidence is less compelling for the TE (A) efficiency measures.

6. Conclusion and policy implications

The main objective of this study is to investigate the efficiency of CRBs in Sri Lanka. Further, to investigate financial practices and their affect on efficiency of these SFIs. From the hypotheses were generated on CRBs' specific characteristics financial practices and overall efficiency. Having obtained the efficiency measures, finally, a correlation analysis is made to explain variation in estimated efficiency scores to explanatory variables; specific characteristics and financial practices.

With regards to financial practices, the level of expectations and knowledge of best practices within the majority of CRBs are below the benchmarks. Particularly, their liquidity position and assets quality were not in the acceptable level. In this context, the level of risk exposure of these CRBs is very high. Therefore, the possibility of a consequential failure of going concern may be expected, especially at the time of global financial crises impacting all financial institutions. However, they maintain capital adequacy, return on assets and achieve operating self-sufficiency as compare to the accepted norms.

The empirical analysis in this study shows that several financial practices have significant associations with the efficiency of CRBs in Sri Lanka. This confirms that efficient CRBs maintain good financial practices which contribute to the higher levels of efficiency. These findings point to policy recommendations that will formulate good financial practices to enhance efficiency. Thus, policy makers should consider the following recommendations for financial practices to enhance the efficiencies of CRBs. Further, these practices will provide a self-regulation mechanism as well as supervisory tools for regulators.

The results of this research show that non-performing loans to total loans ratio is significantly correlated with efficiency in intermediation. The levels of the non-performing loans of a majority of CRBs are well below the benchmark. Hence, it is recommended that CRBs increase their efforts to maintain control over loans. In addition, CRBs should monitor their ratios progressively to control loan losses, and cease making loans when this ratio exceeds the benchmark level. Further, it is preferable to provide loan-loss provisions on an individual loan basis rather than as a general provision. Results also show that the liquidity positions of CRBs are poor. Managing liquidity is essential for CRBs since client withdrawal demands may be higher than other commercial banks. Thus, recommendation nine is that an appropriate level of liquidity be set for CRBs and be monitored by District Unions.

Empirical analysis suggests that average loan to deposit ratio is not at an acceptable level. Even though they maintain high liquidity on loans they do not use deposits productively. Loans however, increased by only six-fold. This difference reveals a huge surplus in savings in CRBs. It is recommended that the loan to deposit ratio is increased to an acceptable level and again monitored by District Unions. Further, the empirical analysis suggests that the operating cost to loan and income to expenses ratios have highly significant correlations with efficiency in intermediation of CRBs. Therefore, to maintain an effective monitoring system, it is necessary to establish benchmarks for these standard financial ratios. An analytical procedure using the agreed benchmarks should be applied periodically by CRBs as self-regulations. Such

a process will increase the regulator's understanding of CRB profitability, solvency, and risk management processes. Any significant deviations from the predicted ratios should be discussed with management as part of the supervisory mechanism by District Unions or some other authority. It is therefore recommended that district unions be involved in this process, using the ratios as a supervisory tool.

The findings of this study, although only suggestive of certain correlations, could help bank managers and other authorities to understand the underlying problems for efficiency of these CRBs and policy makers to establish more comprehensive policy settings for promoting SFIs in rural finance sector in Sri Lanka. In particular, given that there are no proper guidelines currently available for financial management of SFIs. Finding from this study could provide guidance to help accounting and finance professionals increases their knowledge to targeted practices that specifically support SFIs. It can be concluded that findings from this study could help to provide some right directions for developing efficient financial services in the rural finance sector which is one way to alleviate poverty in the country. Moreover, these findings may provide information for future studies to refine the measurement efficiency of SFIs.

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Appendix One- Equations

Equation One: The basic CCR formulation (dual problem/envelopment form)

$$Min\theta - \varepsilon\left(\sum_{j=1}^{m} s_j^{-} + \sum_{r=1}^{s} s_r^{+} \right)$$

Subject to:

$$\sum_{j=1}^{n} \lambda_j x_{ij} + s^{-} = \theta x_{io} \quad (i = 1, \ldots\ldots\ldots\ldots\ldots\ldots\ldots, m)$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^{+} = y_{ro} \quad (r = 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots, s)$$

$$\lambda_j \geq 0 \qquad (j = 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots, n)$$

Source: Zhu (2003, p.13)

Equation two: The basic BCC formulation (dual problem/envelopment form)

$$Min\theta - \varepsilon\left(\sum_{j=1}^{m} s_j^{-} + \sum_{r=1}^{s} s_r^{+} \right)$$

Subject to:

$$\sum_{j=1}^{n} \lambda_j x_{ij} + s^{-} = \theta x_{io} \qquad (i = 1, \ldots\ldots\ldots\ldots\ldots\ldots\ldots, m)$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^{+} = y_{ro} \qquad (r = 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots, s)$$

$$\lambda_j \geq 0 \qquad (j = 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots, n)$$

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

Source: Zhu (2003 , p.13)

Equation Three: Relationship between TE, PTE and SE

$$TE_{CRS} = PTE_{VRS} * SE$$

where

TE_{CRS} = Technical efficiency of constant returns to scale

PTE_{VRS} = Technical efficiency of variable returns to scale

SE = Scale of efficiency

Source: Coelli, Rao and Battese (1998)

Appendix Two-Tables

Table 1: Input-output specifications

Variables	Definition	Intermediation approach
		Input/ Output
Total expenses	Amount paid as interest on deposits, wages and other benefits to employees, and expenses incurred on other facilities	Input
Loans	Amount of loan provided	Output
Pawning	Amount of advances provided on pawning	Output
Interest income	Income received on investments as interest	Output
Other income	Income received on other investments	Output
Variables	**Definition**	**Assets Transformation approach**
		Input/ Output
Deposits	Amounts collected as deposits	Input
Other funds	Funds received from other sources	Input
No. of employees	Full time workers in the bank	Input
Loans	Amount of loans provided	Output
Pawning	Amount of advances provided on pawning	Output
Investments	All investments in the banks	Output

Table 2: Descriptive statistics for financial practices of CRBs

Financial practices	Number	Minimum	Maximum	Mean	Median	Standard Deviation	Kolmogorov-Smirnov test	
							Z value	*p*-value
Capital adequacy on assets	48	-11.27%	36.04%	12.23%	10.15%	11.82%	7.53	0.622
Capital adequacy on deposits	48	-16.55%	64.50%	19.27%	12.42%	20.32%	1.10	0.177
Liquidity of assets	96	-3.52%	13.35%	3.01%	2.34%	2.92%	1.72	0.005
Assets quality	78	0.00%	98.21%	26.19%	18.53%	25.36%	1.33	0.056
Loan to deposit	102	4.11%	131.32%	47.21%	39.77%	28.15%	1.33	0.058
Return on assets	104	-2.90%	9.57%	1.77%	1.68%	1.91%	1.97	0.001
Loan portfolio yield	102	0.67%	36.85%	13.26%	12.94%	8.01%	1.12	0.159
Operational efficiency on loans	102	0.63%	31.05%	11.94%	11.48%	7.16%	0.731	0.659
Operational efficiency on deposits	105	0.78%	25.11%	8.02%	7.62%	4.57%	.811	0.527
Operational self-sufficiency	108	63.50%	245.52%	129.07%	123.78%	30.05%	1.38	0.043

Table 3: Summary of efficiency analysis in intermediation

Description	2003			2004			2005		
	TE(I)	PTE(I)	SE(I)	TE(I)	PTE(I)	SE(I)	TE(I)	PTE(I)	SE(I)
No. of evaluated CRBs	78	78	78	97	97	97	101	101	101
No. of efficient CRBs	8	24	8	5	18	5	6	18	7
No. of inefficient CRBs	70	54	70	92	79	92	95	83	94
Mean score	0.660	0.802	0.820	0.597	0.774	0.780	0.532	0.637	0.860
Standard deviation	0.194	0.195	0.120	0.172	0.184	0.150	0.194	0.231	0.170
Maximum score	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Minimum score	0.336	0.352	0.510	0.213	0.223	0.380	0.163	0.236	0.270

TE (I) = Technical efficiency in intermediation. PTE (I) = Pure technical efficiency in intermediation.

SE (I) = Scale efficiency in intermediation.

Table 4: Summary of efficiency results in asset transformation

Description	2003			2004			2005		
	TE(A)	PTE(A)	SE(A)	TE(A)	PTE(A)	SE(A)	TE(A)	PTE(A)	SE(A)
No. of evaluated DMUs	83	83	83	102	102	102	100	100	100
No. of efficient DMUs	22	40	23	17	25	19	18	31	21
No. of inefficient DMUs	61	43	60	85	77	83	82	69	79
Mean score	.796	.875	.911	.622	.698	.890	.688	.781	.874
Standard deviation	.220	.163	.151	.249	.239	.153	.249	.208	.185
Maximum score	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Minimum score	.067	.486	.067	.089	.222	.089	.084	.265	.084

TE (A) = Technical efficiency in asset transformation. PTE (A) = Pure technical efficiency in assets transformation. SE (A) = Scale efficiency in assets transformation.

Table 5: Spearman correlation coefficients for financial practices and efficiency

Financial practices	Definition	Hypothesised correlation to	Correlation coefficient	Support the hypothesis	Correlation coefficient	Support the hypothesis

		efficiency	TE (I)		TE (A)	
Capital adequacy	Equity to total assets	Positive	0.199	No	0.263	No
	Equity to deposits	Positive	0.265	No	**0.310***	Yes
Liquidity	Liquid assets to liabilities	Negative	-0.147	No	-0.174	No
Asset quality	Non-performing loans to total loans	Negative	**-0.347****	Yes	-0.141	No
Loan to deposit structure	Loans to deposits	Negative	0.006	No	0.108	No
Profitability	Return on total assets	Positive	0.180	No	-0.052	No
Loan portfolio yield	Interest income to loans outstanding	Negative	**-0.517****	Yes	**-0.272****	Yes
Operational efficiency	Operating cost to loans	Negative	**-0.641****	Yes	**-0.393****	Yes
	Operating cost to deposits	Negative	**-0.590****	Yes	-0.042	No
Operational self-sufficiency	Income to expenses	Positive	**0.672****	Yes	0.169	No

** Correlation is significant at the 0.01 level
* Correlation is significant at the 0.05 level
TE (I) = Technical efficiency in intermediation. TE (A) = Technical efficiency in asset transformation.