Abstract

Purpose – This paper aims to investigate the relationship between capital risk and efficiency of Islamic and conventional banks operating in Bangladesh. In this pursuit, the research attempts to answer these questions: do inefficient banks assume more risk? Is there any major difference between Islamic and conventional banks in terms of efficiency and risk taking behavior?

Design/methodology/approach – The study collects various bank-level data from the audited financial statements of Islamic and conventional banks for the period of 2001 to 2011. Collected data are analyzed using Stochastic Frontier Analysis for efficiency estimation and Seemingly Unrelated Regression (SUR) approach for assessing the relationship between capital, risk, and efficiency.

Findings – Analysis of data shows that conventional banks are more efficient in managing cost than Islamic banks. Moreover, the SUR results show that the relation between capital and efficiency are bidirectional and negative, whereas the relation between capital and risk is also bidirectional but positive for Islamic banks. On the other hand, risk and efficiency are positively related, and the result is bidirectional for conventional banks.

Research limitations/implications – The research concentrates on private-commercial banks as proxy for conventional banks. State-owned banks including specialized banks and foreign commercial banks are excluded from the sample due to various anomalies in reporting of financial data.

Practical implications – There is a lot of room for Islamic banks to increase productive efficiency because cost efficiency of Islamic banks is less than that of the conventional banks. This can be attributed to the relative small size of Islamic banks in Bangladesh. Because there exists a positive relationship between size and efficiency for Islamic banks, they can concentrate on increasing their size to capitalize on economies of scale. Moreover, the analysis shows that inefficient conventional banks assume higher risk which conforms to moral hazard hypothesis. Therefore, regulatory authorities should discourage banks from exercising such practice for the greater stability of the overall banking system in Bangladesh.

Originality/value – A good number of studies is available in the existing literature that compares the performance of Islamic and conventional banks in the case of Bangladesh. However, very few studies are found that examine the relationship between capital, risk and efficiency. Therefore, the research is new for the selected area. As a result, the research is expected to contribute to the existing literature by providing new information.

Keywords Bangladesh, Efficiency, Risk, Capital, Conventional bank, Islamic bank

Paper type Research paper

JEL classification – G21, G28
Introduction

The global financial crisis triggered by the US subprime mortgage crisis has shivered the core principles of free-wheeling capitalism. This unprecedented worldwide financial meltdown not only brought the supremacy of traditional interest-based banking system into question but also doubt has emerged whether conventional banking practice works as an influencing factor for financial mess. While the unending and counterfactual debates on the issue have been going on, scholars are increasingly tending to assess if the profit- and loss-sharing-based Islamic banking can be a sustainable competitor, if not a direct alternative. This assumption has been further heightened by increased popularity of Islamic banking in recent times not only in the Arabic or Islamic countries but also in non-Arabic regions (Al Rajhi, 1999, Iqbal and Molyneux, 2005). Alam (1995) observes that the introduction of Islamic banking principles by various Western bankers has shown positive results, indicating that Islamic banking systems can work effectively in both developed and developing countries, regardless of religious boundary. Responding to this increased demand for Islamic financial services and products, a number of Islamic bank have been increasing rapidly throughout the world. Moreover, conventional banks are also offering the same or almost similar services to the customers through either opening a new branch tagged after “Islamic banking branch” or opening a new window naming “Islamic banking window”. The reason for increased demand is that conventional banks find it profitable to deal with Islamic investment funds such as asset-leasing funds and share-dealing funds (Al Rajhi, 1999). Al-Rajhi further stresses that some conventional banks are trying to improve the management of these funds so as to compete with the Islamic banks.

A similar trend in Bangladesh is pronounced as well. There are several banks known as Islamic banks which have been functioning complying with Shari’ah principles since the early 1980s. At the same time, conventional banks are also offering various newly designed Islamic financial products and services to their existing and new customers. This situation has intensified the competition in the banking sectors between and among Islamic and conventional banks. Moreover, the Government of Bangladesh has recently allowed few more banks to compete in the market, whereas foreign banks are showing their growing presence in the country. As a result, competition in the banking sector has increased which, in turn, has forced banks to strategically manage their income and expenditure to be profitable in operation. For instance, a well-functioning bank should operate close to the best attainable frontier in terms of cost and profit. This leads us to ask questions: how close to the best-attainable frontier do banks in Bangladesh operate? Is there any major difference between Islamic and conventional banks in managing cost or earning profit?

Needless to say, increased competition in the market might force some banks to assume more risk expecting a higher volume of profit which is taken away by competition. Unlike other industries, banking is a very sensitive business in the sense that the funds disbursed by banks as loans are actually depositors’ money. As a result, regulatory bodies including the central bank play a guardian-like role. They assure depositors that banks are working with reasonable level of risks. In so doing, regulators encourage banks to increase their capital commensurably with the amount of risk taken. Moreover, under an environment in which increased competition is expected, managers who usually have better information on the quality of the portfolio might aspire to follow an expansionary strategy, which ex post could be shown to be excessively risky...
In this sense, capital and risk are expected to be associated positively. Furthermore, capital and risk are also influenced by the level of efficiency of a bank. It is likely that regulators allow an efficient bank with better management to use more leverage than an inefficient bank. As such, an efficient bank can sometimes work with higher risk. In contrast, a less-efficient bank may require maintaining a prescribed loan-to-deposit ratio because such a firm tends to accept higher risk to compensate for the lost returns. From this analytical framework, we can sense a relation between and among capital, risk and efficiency. This paper, therefore, aims to investigate if such relationships and the degree thereof, exist in the case of commercial banks in Bangladesh. Second, it examines the linkage between risk, efficiency and capital separately for Islamic and conventional banks and then compares the direction of relationship for different cluster of banks.

The existing literature related to Islamic and conventional banks do not take this matter into account as far as Bangladesh is concerned. This research is expected to contribute in the field by providing new evidence and producing new facts concerning the banking industry in Bangladesh. Furthermore, findings of this research would help regulatory authority formulating policies to increase the strength of the banking sector of the country. The paper has been structured as follows: section two surveys the relevant literature on the topic whereas section three enumerates briefly the banking industry and its performance emphasizing separately on Islamic and conventional banks. Data description and methodological issues are described in section four. Result of the analysis is presented in section five which is followed by conclusion and policy recommendations.

**Review of related literature**

Early literature on Islamic finance focuses mainly on highlighting various issues including the basic characteristics of Islamic finance, its distinguishing features from conventional banking and its evolution. Some scholars (Lewis, 2007; Roy, 1991; Venardos, 2006) endeavor to trace the evolution of Islamic banking from the business transactions that prevailed during the medieval period. Ahmed and Hassan (2007a), Khan et al. (2007) forward an elaborate discussion on why Riba (interest or excess of capital) is prohibited in Islam from the Qur’anic perspective, while Qureshi (2003) explains it from the economic perspective. Ahmed and Hassan (2007b) argue that although riba is prohibited in Islam, profit from investment in trade and business is permitted and encouraged as long as the risk of business is also distributed justly. Lewis (2007) provides with the evidence that Islam is not peculiar in prohibiting riba, but rather Hinduism and Christianity also followed the same principle in the past. However, Islam is unique because it has been able to be firm with this principle over the course of its journey to modern times, whereas other religions have deviated from complying with this institution. The key to success of Islam, in this regard, has been attributed to product innovation (Lewis, 2007). This implies that Islamic financial institutions have been able to respond to the demand of time by packaging and repackaging financial products adhering to the Islamic Shari’ah.

Rapid growth of Islamic banking, as well as its successful survival, in the midst of stiff competition from conventional banks has encouraged many scholars to examine the relative competency of Islamic banks vis-à-vis traditional banks from several different dimensions including profit, risk and efficiency. For instance, Iqbal (2001)
compares between Islamic and conventional banks in the nineties and argues that the performance of Islamic banks is superior to that of conventional banks. Brown et al. (2007) find that Islamic banks possess higher levels of equity capital than conventional banks worldwide. They further report that cost efficiency of Islamic banks is higher than conventional banks in the dual banking system. In contrast, Hassan (2006) and Beck et al. (2013) show that Islamic banks are less cost-effective but efficient in generating profit and have a higher intermediation ratio as well as being better capitalized. Higher intermediation ratio of Islamic banks is expected to contribute to achieving cost-efficiency in the long run once they reach the optimal size because the history of most Islamic banks is comparatively new and, therefore, they have not been able to capitalize on economies of scale competing in a market with well-established conventional banks. In this regard, Kiaee et al. (2013) show that, in a competitive market, a banking system that offers lower rates to its customers outperforms the other system. Moreover, Islamic banks perform better than conventional banks if they are asked to charge equal to the customers. The gradual competitiveness of Islamic banking is reported in many studies. For instance, Sardar et al. (2011) in the context of Pakistan and Mokhtar et al. (2006) in the context of Malaysia, show that the efficiency of Islamic banks is improving with the passage of time.

Very recently, a debate, however, has intensified because major financial institutions, especially banks, are facing monetary catastrophe which sometimes result in instability in the financial system. This monetary catastrophe can be ensued from various micro- and macroeconomic factors. For instance, Matutes and Vives (2000) and Salas and Saurina (2002) attribute the reason of bank’s persistence financial mess to the increased competition. They argue that increased competition reduces market power of banks which, in turn, decreases their charter value. The decline in banks’ charter values coupled with the banks’ limited liability and the existence of “quasi” flat rate deposit insurance could encourage banks to assume more risk which is termed in the literature as “moral hazard”. This hypothesis, in the current context, implies that less efficient banks will have an appetite for higher risk to lever up their return in good condition which is apprehensively a risky approach. When capital comes to the scenario, it also plays almost similar roles, i.e. less capitalized bank tends to take more risk. In this regard, Altunbas et al. (2007) present a dimension among efficiency, capital, risk and moral hazard. They argue that both efficiency and capital are relevant determinants of bank risk-taking and moral hazard incentives. In the similar fashion, Fiordelisi et al. (2010) stress that the moral hazard problem might increase incentives of thinly capitalized banks to augment their level of risk which, in most cases, leads to higher non-performing loans. Likewise, highly capitalized banks may be subject to lower moral hazard problems and more efficient than thinly capitalized institutions. In contrast, as capital is costly, banks with higher capital may, on average, increase their level of risk to maximize revenues. Banks’ moral hazard problem can also be stirred up by regulatory agency. For instance, a flat deposit insurance scheme can encourage banks to take higher risks. Deelchand and Padgett (2009) rightly point out that the moral hazard problem props up when the main regulatory bodies of a country along with its government deem that they will get involved in it to protect an organization and its lenders in case of any collapse.

There exists a rich array of literature that analyses the relation between capital, risk and efficiency for different types of banks in different countries. However, the results are
assorted in nature. For example, Altunbas et al. (2007), analyzing bank data of 15 European countries from 1992 to 2000, show that inefficient European banks hold more capital while assuming less risk. Interestingly, a contradictory result has been seen in a study conducted by Fiordelisi et al. (2010). They find, while analyzing bank data of 26 European Union countries from 1995 to 2007, that better capitalized banks are more likely to reduce their costs compared to their thinly capitalized counterparts. They further argue that cost (and profit) efficiencies are also found to positively Granger-cause bank capital. In other words, more efficient banks seem to eventually become better capitalized and banks with higher capital base also tend to have a positive effect on efficiency levels. It is also reported in their study that greater future risk is positively related with lower efficiency and banks capital position seems to shore up when efficiency increases. The debate is further heightened when Hughes and Mester (1998) relate bank efficiency with risk and capital. They report a unidirectional relation stating that efficiency determines both risk and capital but no argument supporting the reverse causation. Similarly, theoretical arguments are found in the literature providing conflicting results. For instance, Kwan and Eisenbeis (1997) and Berger and De Young (1997) show that bank risk is determined by both capital and efficiency. This situation is explained by Ghosh (2008) postulating that higher capital standards may be offset by increased risk but do not increase the probability of failure. In contrast, Shriives and Dahl (1992) found a positive relation between capital and risk. A negative relationship between risk and capital also occurs when all deposits are insured with a flat premium rate. Hence, we can assume that adequate capital requirement may reduce higher risk. However, some contradictory studies are found in the existing literature as well. For example, Hellmann et al. (2000) argue that higher capital requirement might give an incentive for banks to take more risk. The above contradictions imply that there might not be any direct causal relation between bank risk, capital and efficiency. One reason could be that the relationship of these three factors may depend on some more other factors like agency problem, ownership structure, managerial incentives, asymmetric information and moral hazard incentives (Deelchand and Padgett, 2009; Altunbas et al., 2007). Thus, the relationship between and among capital, risk and efficiency is not linear.

Conditions vary in the perspective of countries’ formal and informal institutions including regulations, people’s perception, customs and traditions, which could bring different result for developing countries in contrast to what we have seen in the case of developed countries. In a developing country like Bangladesh, the banking sector is emerging and the regularity process is still in progress. In these sorts of countries, Islamic and conventional banking structures are not alike. They follow different guidelines for their respective operations. This aspect has been taken into account in various studies focusing on Bangladesh. For instance, Ahmed and Hassan (2007b) show that Bangladesh lacks a well-defined regulatory and supervisory framework for Islamic banks to function by maintaining the basic Shari’ah principles. Despite this obstacle, Islamic financial services that are spawning with the emergence of new financial institutions which are considered economically sound augur well for Bangladesh. Abduh and Chowdhury (2012) maintain that the emergence of Islamic banks in Bangladesh is contributory to its economic development. People are increasingly tending toward Islamic banks and are believed to be driven by their religious faith (Khan et al., 2007; Mamun, 2011). This opportunity paves the way for Islamic banks to
not only grow remarkably but also achieve significant profit compared to their conventional counterparts. Profitability of Islamic banks in Bangladesh can be attributed to many factors including size, market penetration, risk appetite and operational and allocative efficiency. Akther et al. (2013), analyzing Islamic bank data from 2004 to 2008, find an inverted “U” pattern of inefficiency which implies that although inefficiency rose in the middle of the study period, banks were able to revert to efficiency in the later period. This result is supported by Abduh et al. (2013), showing that the efficiency of Islamic banks is improving up until 2010. The existing literature, while concentrates on examining such aspects of Islamic banks in Bangladesh as profitability and its determinants, attributes of bank’s efficiency and comparison between Islamic and conventional banks separately, however, ignores examining the relationship between and among these variables. This paper, thus, attempts to fill this gap by examining the relationship between capital, risk and efficiency in Islamic and conventional banks.

Performance of Islamic and conventional banks

Banks in Bangladesh are widely known as intermediaries that accept deposits and provide loans, as well as offer some other ancillary services like payment of utility bill, security brokerage, fund management, fund transfer and financial guarantee and financial instrument underwriting. They take part in most financial transactions. As of December 2012, there were 78 financial institutions of which 47 were schedule banks. Of them, four development financial institutions and four commercial banks are owned by the state. Among the remaining 39 banks, 9 are foreign commercial banks (FCBs) and the remaining 30 are privately owned local commercial banks, of which 7 banks are Islamic banks. Besides these 7 full-fledged Islamic banks, 16 conventional banks are engaged in Islamic banking activities through their Islamic banking branches.

According to Bangladesh Bank (the central bank of Bangladesh) statistics, currently 8,059 branches of all schedule banks are working in Bangladesh. This scenario gives us a view to forecast a sound, efficient and stable financial system. The combined banking sector assets amounted to BDT (the local currency of Bangladesh) 5,867.6 billion in 2011 which shows an overall increase of 20.9 per cent compared to 2010 (Table I). In contrast, the overall liability in 2011 was BDT 5,867.6 billion, of which the total deposit contributed to 76.9 per cent of the amount. Moreover, to boost this sector, as well as to increase the credibility worldwide, Bangladesh Bank has recently issued promulgation, encouraging banks to expand their corporate social responsibility initiatives and has

<table>
<thead>
<tr>
<th>Bank types</th>
<th>No. of banks</th>
<th>No. of branches</th>
<th>Total assets (BDT, billion)</th>
<th>% of industry assets</th>
<th>Deposits (BDT, billion)</th>
<th>% of deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCBs</td>
<td>4</td>
<td>3,437</td>
<td>1,629.2</td>
<td>27.8</td>
<td>1,235.6</td>
<td>27.4</td>
</tr>
<tr>
<td>DFIAs</td>
<td>4</td>
<td>1,406</td>
<td>328.8</td>
<td>5.6</td>
<td>214.4</td>
<td>4.8</td>
</tr>
<tr>
<td>PCBs</td>
<td>30</td>
<td>3,055</td>
<td>3,524.2</td>
<td>60.0</td>
<td>2,787.5</td>
<td>61.8</td>
</tr>
<tr>
<td>FCBs</td>
<td>9</td>
<td>63</td>
<td>385.4</td>
<td>6.6</td>
<td>272.2</td>
<td>6.0</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>7,961</td>
<td>5,867.6</td>
<td>100</td>
<td>4,509.7</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Bangladesh Bank (2012)
placed specific focus on adopting enlarged Green Banking operations (Bangladesh Bank, 2012).

While the total banking sector is experiencing an increasing trend, Islamic banking activities are also spawning. The history of Islamic banking in Bangladesh can be traced back as early as 1974 when the Bangladesh Government, as a founder member of Islamic Development Bank, made an initiative to conduct research for enabling banking activities that is consistence with Islamic Shari’ah. In 1982, Islamic Development Bank helped establishing a joint venture Islamic operation in Bangladesh. Eventually, Islamic Bank Bangladesh Limited (IBBL) was established in 1983 as the first Islamic bank in southeast Asia. Over the past decade, noticeable changes took place in the Islamic banking sector in Bangladesh. This industry showed continuous improvement and sharp growth in various fields, especially assets and investments. Bangladesh Bank statistics shows that Islamic banks are having an increased share of the pie in the total market share of banking industry in terms of assets, financing and deposits. In 2011, total deposit of Islamic banks (contribution from only seven full-fledge banks) amounted to BDT 773.15 billion which was 22.58 per cent of all schedule banks’ deposit. If we include deposit contributed by 16 Islamic banking windows of conventional banks, the contribution rose to BDT 818.9 billion which was almost 24 per cent of the total banking sector deposit. At the same time, contribution of these banks to the total investment as loans and advances amounted to BDT 738.8 billion in 2011 which was 20.3 per cent in the total banking sector’s investment. Taking into consideration only seven full-fledge Islamic banks, the total credit amounts to BDT 674.17 billion compared to BDT 3,476.77 billion from rest of the banking system.

Figure 1 summarizes the contribution of Islamic banking to the total banking system in terms of loans and deposits. The graph shows that contribution of Islamic

![Figure 1. Contribution of seven Islamic banks to the total banking system's loans and deposit](image)

**Notes:** Deposit includes demand deposit and time deposit whereas credit includes advances and bills  
**Sources:** Constructed by authors compiling data from Bangladesh Bank statistics (2012); Bangladesh Bureau of Statistics (2011); annual reports of Islamic banks (various years)
banks to the total banking system is very much influential. For instance, in 2001, all Islamic banks contributed around 7 per cent of the total banking system’s loans and advances which rose to 20 per cent in 2011, an increase of around threefold. At the same time, deposits increased to about three times from 9 per cent in 2001 to 23 per cent in 2011. Facts and figures presented above provide with the evidence that only seven Islamic banks are capturing more than one-fifth of the total banking sector deposits and loans. Because the share of Islamic banks increased over the year, the share of conventional banks in the pie decreased at the same pace. This is a clear manifestation that activities and acceptance of Islamic banks in Bangladesh have been increasing at an acclaiming rate. This postulation is further manifested by the fact that Islamic banks are ahead of earning profits than conventional banks. For instance, operating profit for conventional banks shows an increasing trend from 2008 to 2010. Although it shows a stable trend in 2011, total amount of profit declined in 2012. In contrast, profit of Islamic banks has been rising gradually. For example, operating profit of all Islamic banks in 2008 amounted to BDT 15.9 billion which was 30 per cent of the profit earned by all conventional banks. This phenomenon can be attributed mainly to the stock market crash in December 2010. Needless to say, conventional banks used to earn a handsome amount of profit from investing in stock markets. Second, worldwide financial crisis motivated people to switch from conventional banks to Islamic banks. As a result, we observed a sharp rise of operating profit for Islamic banks. In 2012, the operating profit of conventional banks increased to BDT 86.34 billion, whereas for Islamic banks, the amount rose to BDT 38.75 billion which is 45 per cent of the conventional banks.

Data and methodology

Model specification

There are different competing ways to determine the efficiency of banks. However, data envelopment analysis (DEA) and stochastic frontier analysis (SFA) are widely used in the literature. The DEA approach avoids distributional assumptions by using linear programming techniques to estimate frontiers that connect the input requirements of the efficient firms. Unfortunately, it does so through the ad hoc assumption that there is no random error or, in other words, all variations which cannot be attributed to inputs are treated as reflecting inefficiency. If random error does exist, it can have a large cumulative effect on aggregate inefficiency because this measure is determined by comparing the few fully efficient firms on the frontier with all other firms not on the frontier. Unlike the non-parametric DEA approach, the parametric SFA attributed to Aigner et al. (1977), and Meeusen and van den Broeck (1977) considers production frontier as a random shock. The models of stochastic production frontier address technical efficiency and recognize the fact that observed deviations from the production function could arise from two sources:

1. productive inefficiency that would necessarily be negative; and
2. idiosyncratic effects that are specific to the firm.

A number of different functional forms such as those of Cobb-Douglas (linear logs of outputs and inputs), Quadratic (in inputs), Normalized quadratic and translog functions are used in the literature to model production function. However, translog function
which is a generalization of the Cobb-Douglas function is commonly used. In this paper, the translog cost function is used to calculate the cost inefficiency of banks. The estimation of banks’ relative efficiency using panel data is performed by estimating a cost function of the general form:

\[ y_{it} = x_{it} \beta + v_{it} + u_{it} \]  

(1)

where \( y_{it} \) is the total cost in the logarithm form of bank \( i \) in period \( t \), \( X_{it} \) is a matrix of outputs and of input prices in logarithm form, \( v_{it} \) is a random error term and \( u_{it} \), which satisfies the condition, \( u_{it} > 0 \), is the technical inefficiency term. The specific form used for the cost function is a standard translog specification, which can be written as:

\[
\ln TC_{it} = \alpha + \sum_{j=1}^{2} \alpha_j \ln Q_{jit} + \sum_{m=1}^{2} \beta_m \ln P_{mit} + \frac{1}{2} \sum_{j=1}^{2} \sum_{k=1}^{2} \delta_{jk} \ln Q_{jit} \ln Q_{kit} \\
+ \frac{1}{2} \sum_{m=1}^{2} \sum_{n=1}^{2} \gamma_{mn} \ln P_{mit} \ln P_{nit} + \sum_{j=1}^{2} \sum_{m=1}^{2} \rho_{jmQ_{jit}P_{mit} + v_{it}} \]  

(2)

where, TC is the natural logarithm of total cost, \( Q_j \) and \( Q_k \) are output quantities and \( P_m \) and \( P_n \) are input prices of bank \( i \) in year \( t \). In estimating equation (2) with this specific functional form, we impose constraints on symmetry, \( \delta_{jk} = \delta_{kj} \) and \( \gamma_{mn} = \gamma_{nm} \) for all \( j, k, m \) and \( n \). Any sensible cost function must be homogenous of degree 1 in input prices. This, in the translog function described above, requires that \( \Sigma_{m=1}^{2} \beta_m = 1 \). The composite error term also takes a specific functional form. The random components, \( v_{it} \) are independently and identically distributed according to standard normal distribution, \( N(0, \sigma^2_v) \), while the bank inefficiency components, \( u_{it} > 0 \) are independently but not identically distributed according to a truncated-normal distribution. The SFA assumes that the inefficiency component of the error term is positive; that is, higher bank inefficiency is associated with higher cost.

To estimate the relationship between capital, risk and efficiency, we specify a system of equations and estimate these using Zellner’s (1962) Seemingly Unrelated Regression (SUR) approach. This allows for simultaneity between banks’ risk, capital and efficiency while also controlling for important other bank-specific factors. The system of equations estimated is as follows:

\[
PLL_{it} = \alpha + \beta_1 ETA_{it} + \beta_2 EFF_{it} + \beta_3 LTA_{it} + \beta_4 LNTA_{it} + \beta_5 ROA_{it} \]  

(3)

\[
ETA_{it} = \alpha + \beta_1 EFF_{it} + \beta_2 LTA_{it} + \beta_3 LNTA_{it} + \beta_4 ROA_{it} + \beta_5 PLL_{it} \]  

(4)

\[
EFF_{it} = \alpha + \beta_1 LTA_{it} + \beta_2 PLL_{it} + \beta_3 LNTA_{it} + \beta_4 ROA_{it} + \beta_5 ETA_{it} \]  

(5)

Where, \( PLL_{it} \) is provisions for loans and leases for bank \( i \) in year \( t \); \( ETA_{it} \) is equity to assets ratio for bank \( i \) in year \( t \); \( EFF_{it} \) is cost efficiency for bank \( i \) in year \( t \) (derived from stochastic cost frontier approach); \( LTA_{it} \) is loans to total assets for bank \( i \) in year \( t \); \( LNTA_{it} \) is natural log of total assets for bank \( i \) in year \( t \); and \( ROA_{it} \) is return-on-assets for bank \( i \) in year \( t \).
For measuring efficiency using stochastic frontier model, we need to identify input and output of banks in the right-hand side of the equation and total cost in the left hand side. Depending on the measure of the output and input, the components of total cost are determined. There is long-standing disagreement among scholars in the question of what it is that banks produce. Three major approaches are widely discussed in the literature (Berger and Humphrey, 1992). These include the asset approach or intermediation approach, the user cost approach and the value-added approach. In intermediation approach, banks are considered only as financial intermediaries between liability holders and those who receive bank funds. In this approach, banks are viewed as an intermediary of financial services rather than producers of loan and deposit account services, and the value of loans and investments is used as output measures and labor and capital are inputs to this process; hence, operating costs plus interest costs are the relevant cost measure, whereas deposits may be either input or output (Colwell and Davis, 1992). In contrast, the user cost approach developed by Donovan (1978) and Barnett (1980) determines input and output based on its net contribution to bank revenue. If the financial return on an asset exceeds the opportunity cost of funds or if the financial costs of a liability are less than the opportunity cost, then the instrument is considered to be a financial output. Otherwise, it is considered to be a financial input. The value-added approach, on the other hand, identifies any balance sheet item as output if it absorbs a relevant share of capital and labor, otherwise it is considered an input or non-relevant output.

In this paper, we use an intermediary approach in deciding output and input, as well as total cost components. The logic is that this approach appears to be preferred to other approaches in inter-bank studies (Colwell and Davis, 1992; Fries and Taci, 2005). As such, total cost in the left-hand side of the equation comprises total operating costs and cost of deposit. We consider loans and deposit as output (as mentioned earlier, deposit can be considered both input and output of a bank), whereas cost of labor and capital is used as input price to determine the cost efficiency of banks.

Once cost efficiency is determined, we need to check the relation between capital, efficiency and risk. In this regard, we apply SUR. Three regression equations are specified for SUR estimation. The first model equation (3) explains banking sector risk, the second model equation (4) checks bank capital levels and the final model equation (5) examines the determinants of bank cost inefficiency. The first model uses provision for loans and leases (PLL_it) as the ratio of total loans, as a proxy for banking risk as dependent variable, whereas in the second model, capital (ETA_it) is the dependent variable and, finally, in the third model bank cost inefficiency (INEFF_it) is the dependent variable. A variety of bank-specific variables are also included which are also believed to explain the variation in bank risk, capital and inefficiency across Islamic and conventional banks in Bangladesh. Provision for loans and leases as a fraction to total loans (PLL_it) is used as a measure of banking risk derived from accounting information. Higher levels of provisions are suggestive of greater banking risk. Capital is calculated simply as the ratio of equity to total assets (ETA_it). Individual bank efficiency (EFF) is obtained as the distance of a firm’s observed operating costs to the minimum or “best-practice” efficient cost frontier and are derived using the stochastic frontier approach.
Relevant data mentioned above are collected from the audited financial statement for 20 conventional banks and 7 Islamic banks for 2001 to 2011. Because some banks started their operations after the threshold year considered in this study, our sample is an unbalanced panel comprising 197 observations for the conventional banks and 62 observations for Islamic banks combining a total of 295 observations. Descriptive statistics of data are presented in Table II.

Results and discussion
We first estimate the cost efficiency of 20 conventional banks and 7 Islamic banks by applying SFA. Our analysis shows (Figure 2) that Islamic banks are less efficient than conventional commercial banks in terms of managing cost of production. For instance, the average cost efficiency of Islamic banks is 69.41 per cent which implies that they are incurring 30.59 per cent more costs than is required in an ideal situation to produce the same level of output. In contrast, the average cost efficiency of conventional banks is about 80 per cent which means that they are operating 20 per cent below the production frontier. Average cost efficiency of conventional banks shows a decreasing trend during the sample period, decreasing from 85 per cent in 2002 to 82 per cent in 2011. Moreover, cost efficiency of all Islamic banks falls into the range of 72-67 per cent. Efficiency trend of this class of banks shows increasing trend in 2005 and 2006 which falls thereafter until the end of the sample year (Table III). This result conforms to the findings of Beck et al. (2013). Moreover, the result of cost efficiency in Islamic banks in Bangladesh is very much consistent to the finding of Hassan (2006) for international data. Lower level of efficiency of Islamic banks compared to conventional banks can be attributed to the fact that majority conventional banks have been operating relatively longer period than most Islamic banks. Therefore, conventional banks have already grown to an optimum size which helped them squeeze operating costs. However, except IBBL, all Islamic banks are new in operations. As a result, they could not yet reach to a level so that expected economies of scale can be achieved.

Model summary of SUR for both Islamic and conventional banks is provided in Table IV. The table shows that except equation (3) for conventional banks, all other equations are statistically significant. Specifically, all three equations for Islamic banks possess very high explanatory power, whereas the first two equations for conventional banks possess a satisfactory level of explanatory power.

The result for risk equation derived from simultaneous estimation is reported in Table IV. Result shows that risk is positively influenced by the level of capital for Islamic banks at the 5 per cent level of significance which means that a bank with higher base of capital assumes more risk. The coefficient of the variable indicates that an additional unit rise in capital to asset ratio will force Islamic banks to provide a provision for loans and leases equal to 14 per cent. This can be attributed to the common notion that a bank that accumulates higher levels of capital has an extended amount of cushion to safeguard against any adversaries ensuing from excessive risk-taking. This relationship denies the existence of moral hazard problem for Islamic banks in Bangladesh but found in the case of Japanese cooperative banks (Deelchand and Padgett, 2009) and Chinese commercial banks (Tan and Floros, 2013). Also risky Islamic banks are required to maintain a higher level of capital. Therefore, the relation between capital and risk is bidirectional for Islamic banks. In the case of conventional banks, no statistically significant relation between capital and risk is found which supports the
<table>
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<tr>
<th>Statistical indicators</th>
<th>Deposit (ML BDT)</th>
<th>Loans (BDT, million)</th>
<th>Total assets (BDT, million)</th>
<th>Total cost (BDT, million)</th>
<th>Personnel cost (BDT, million)</th>
<th>Capital cost (BDT, million)</th>
<th>PLL (BDT, million)</th>
<th>Equity (BDT, million)</th>
<th>ROA (in %)</th>
<th>ROE (in %)</th>
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<td><strong>Conventional banks</strong></td>
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<td>62</td>
<td>62</td>
<td>62</td>
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finding of Floquet and Biekpe (2008) in regard to banks in emerging markets. This result is not surprising considering Bangladesh as an emerging economy. On the other hand, the relation between efficiency and capital is negative for Islamic banks. This finding is unswerving with foremost part of the literature including Fiordelisi et al. (2010). Moreover, the relation is bidirectional for Islamic banks, whereas efficiency is not significantly related to capital for conventional banks. Negative relation between efficiency and capital conforms to the regulatory hypothesis that a regulator might
allow more efficient banks to operate with comparatively lower level of capital, and less-efficient banks are required to maintain higher capital-base. One example of regulatory difference between Islamic and conventional banks in Bangladesh is that conventional banks are required to preserve 19 per cent statutory liquidity reserves (SLR) of which 6 per cent is cash reserve ratio, whereas Islamic banks as well as Islamic window of conventional banks are required to maintain SLR equivalent to 11.5 per cent with no cash reserve requirement.

For conventional banks, there exists a negative relation between risk and efficiency and the relation is bidirectional. This implies, in accordance with the common convention, that inefficient conventional banks accept higher risk again conforming to moral hazard hypothesis similar to the case of Japanese cooperative banks (Deelchand and Padgett, 2009). Also banks with higher risks are less efficient which confirms to the findings of Karim et al. (2010) in the context commercial banks in Malaysia and Singapore. This is because, inefficient banks require more resources to monitor and manage existing portfolio which increase their operating cost. As a consequence, they have less available resources to be disbursed as loans. Therefore, they accept higher risk. No statistically significant relation between risk and efficiency for Islamic banks exists.

We further estimate the effects of other bank-specific variables to banks’ capital, risk and efficiency. The results show that profitability is significantly related to capital for both Islamic banks (at 10 per cent level) and conventional banks (at 1 per cent level) with positive sign. On the other hand, size and capital are positively related for both classes of banks. This implies that larger banks are required to operate with a higher level of capital. For Islamic banks, the relation between loan growth and risk is negatively related at 10 per cent level of significance. For conventional banks, this relation is not statistically significant. This implies for Islamic banks that they are more cautious in expanding new loan so that risky ventures are not financed. This finding is consistent with the above-stated condition that Islamic banks are not required to maintain cash reserve provision because the financing pattern of this class of banks appears to be less risky than that of conventional banks. Also there is a positive relation between profitability and risk for Islamic banks and negative relation for conventional banks. Negative relation between profitability and risk construes that banks with higher profit have less appetite for risk. However, for Islamic banks, it seems that more profitable banks are more risky.

On the other hand, size appears to be positively related to capital requirement for Islamic banks as well as conventional banks. This can be true because a major share of bank’s asset appears in the form of loans. Thus, banks with higher level of loan portfolio usually tend to have larger capital to keep the leverage ratio optimum. We also confirm the findings of Berger (1995) and Scholtens (2000) that capital levels and profitability are strongly, positively related for both Islamic banks (at 10 per cent level) and conventional banks (at 1 per cent level). Moreover, asset size of Islamic banks appears to have a positive influence on efficiency, confirming the theory that a larger Islamic bank can capitalize on economies of scale. However, we cannot draw any concrete inference for conventional banks based on equation (3) because the model does not have any explanatory power ($R^2 = 2.21$ per cent) (Tables V and VI).
Conclusion

Efficiency issue of banks is an important dimension which needs to be considered carefully. It is more so when a country like Bangladesh experiences multifaceted banking system such as Islamic and conventional banks simultaneously. Furthermore, determining the relationship between and among efficiency, risk and capital is crucial to provide proper guidelines for the financial intermediaries for sound and efficient financial intermediations. Toward this, the paper examines the relationship between capital, risk and efficiency for both conventional and Islamic banks analyzing bank-level data from 2001 to 2011. In so doing, the paper applies SFA for determining efficiency of Islamic and conventional banks. Results thus obtained are used to establish the relationship between risk, efficiency and capital using seemingly unrelated regression. The research finds that conventional banks are more cost-efficient than Islamic banks. Furthermore, Islamic banks are diverse in terms of cost efficiency, whereas conventional banks are mostly uniform. It is also evident from the analysis that cost efficiency of both Islamic and conventional banks is in the declining phase, although not at a greater scale. In determining the relation between risk and various bank-specific variables, the research finds that there is a difference between Islamic and conventional banks in the sense that efficient conventional bank is less risky but the relation for Islamic bank is inconclusive. However, the similarity between Islamic and conventional banks is that profitability is positively linked to capital for both types of banks. A profitable bank has higher level of capital and vice versa. In assessing the relation between efficiency and various bank-specific variables, the research finds differences

Table V.

<table>
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<tr>
<th>Parameters</th>
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Note: *** significant at 1% and 10% levels, respectively

Table VI.

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</table>

Note: *** significant at 1% and 5% levels, respectively
between Islamic and conventional banks, in that more profitable, conventional banks are less efficient, but the result is not true for Islamic banks. However, the analysis fails to find any significant effect of economies of scale for conventional banks on efficiency. On the other hand, the result confirms the existence of economies of scale for Islamic banks in terms of efficiency. As we stated earlier, most conventional banks have already reached an optimum level of size. Therefore, efficiency cannot be enhanced by simply increasing the size for conventional banks. But Islamic banks have the opportunity to benefit from the economies of scale.

Based on the findings of this research, some policy recommendations can be offered. First, there is a lot of room for Islamic banks to increase productive efficiency because not only cost efficiency of Islamic banks is less than that of conventional banks but also efficiency has been declining during the study period which is alarming. As such, Islamic banks need to identify cost drivers that are responsible for increasing cost of production. In so doing, a comparative study between Islamic and conventional banks in terms of output and input prices can be performed. Because efficiency is inversely related to risk for conventional banks, an increase in efficiency is expected to enhance the overall stability of the banking system. Moreover, cost efficiency will definitely help banks boost their profit up which is found to be positively linked for both types of banks to capital base. Therefore, equity multiplier, an indicator of banking sector risk, can be reduced. Second, Islamic banks should focus on increasing the product line and to gain the benefit which is reaping by the conventional banks. This research concludes stating that most Islamic banks in Bangladesh are new to say. As a result, they need little time to improve their efficiency. And the sign of hope is that there is enormous latitude for Islamic banks to increase efficiency in commensuration with conventional banks.

References


Further reading

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