

Derivative Use by Commercial Banks in Bangladesh

Golam Mohiuddin*

Institute of Education, Research and Training, University of Chittagong, Bangladesh

*E-mail address: gmuddiniert@cu.ac.bd

ABSTRACT

Derivative use by commercial banks operating in Bangladesh is hypothesized to improve their intermediary functions. The study outcome identifies the influence of derivative use on the growth of advances by commercial banks. Bank's participation in advances increases with increase in hedging activities through futures. It has also been found that the Bangladeshi private sector commercial banks have a high exposure of risk and have externalized their risk management practices. Specialized banks of Bangladesh have a low risk exposure level, but still they have moderately externalized their risk management practices. Bangladeshi public commercial banks have large deposit base and high risk exposure but are still internalizing their risk through risk management. The policy implication of this study is that derivative use by commercial banks is likely to increase the intermediary role of banks, i.e., the increase in advances growth rate rather than investment portfolio growth rate. Commercial banks with large deposit base could gain relatively by externalizing their risk management practices since this study reveals that interest rate risk exposure of derivative users is statistically lesser than non-users.

Keywords: Derivative; hedging; risk management; non-performing assets; credit risk

1. INTRODUCTION

Banking sector faces numerous risks and the transit towards risk management practices has become imperative in the present scenario. Present day measured risk could be a potential loss to the bank. Bank measurement of revenue and cost potential of a bank is comparatively apparent while the interest rate risk is not as visible as these tangible revenues and costs. Modeling the interest rate risk management practices for banks has potential incentives to the sector as a whole in the form of improved profits, capital and integration with economic expectations. Bangladeshi commercial banks have long used risk management activities such as duration and gap analysis. Risk management through derivative securities has opened another prospect for banks to refine risk management practices. Similar to other international markets, price and interest rate volatility in Bangladeshi financial markets is high; hence the implications of not hedging the bank portfolio may prove to be disastrous. Derivatives give commercial banks an opportunity to manage their risk exposure and to generate revenue beyond that available from traditional bank operations. The study objectives framed to reiterate the importance of risk management practices through derivatives are to examine the derivative exposures in banks and to determine the influence of derivative exposure on bank's intermediation role.

2. LITERATURE REVIEW

Interest rate volatility and the globalization of capital markets have induced the usage of derivative futures by commercial banks. The competitiveness in the market and the need to identify risk and hedge accordingly requires more coordination in the management of assets and liabilities of these banks. Study on derivatives, especially financial futures, into the balance sheet of banks and as an off-balance sheet hedging tool can be discussed through the works of Ederington (1979), Franckle (1980), Schweser, Cole & D'Antonio (1980), Arak & McCurdy (1980) and Morgan & Smith (1986). They have addressed the use of financial futures and have suggested hedging through interest rate derivatives as an ideal risk management solution. However, focus is more on hedging a cash position in a treasury bill or to hedge an anticipated issue of a Certificate of Deposit (CD). Further studies address multidimensional aspects to financial intermediary's hedging practices under conditions of uncertainty. Morgan, Shome & Smith (1988) considered uncertainties around deposit supply and loan demand as well as random rates of return on loans and CD's. They had also concentrated on the effect of deregulation on interest rate risk borne by financial institutions.

Risk management decisions of banks have been analyzed in detail and specifically with respect to hedging of bank risks. Allen & Santomero (2001), Kashyap (2000), Baker & Ryser (2004) have identified risk management strategies for banks. Supportive works are Benninga & Oosterhof (2004), Cebenoyan & Strahan (2004), Szilagó (2002), Danielsson (2002), Nawalkha (2003), Angbazo (1997). Surveys by Bank for International Settlement (2002), Basle Committee and IOSCO (1996), are a few international market surveys on derivative practices in banks. Patnaik & Shah (2003) have measured interest rate risk of a sample of major banks in India using equity capital and market price. A model of the intermediary role of banks and an explanation as to why derivatives and lending are complementary activities are validated by Diamond (1984). Koppenhaver (1985) and Benninga (1985) use the optimization model for international hedging in commodity and currency forward markets. Kim & Koppenhaver (1992) used bank assets, net-interest margin, derivative dealing, capital-asset ratio and the concentration ratio to test the influence of derivative trading. Brewer, Minton & Moser (2000) examined the relationship between bank participation in derivatives and bank lending and found that banks using interest-rate derivatives experienced greater growth in their commercial and industrial loan portfolios than banks that did not use these financial instruments. Shambaugh & Acharya (1992) and Bernanke & Lown (1992) have related loan growth with capital to asset ratio and quality of loan. A bank with too little capital relative to required amount would not be able to improve its capital position by improving the assets. Similarly the loan quality if good would induce the bank to increase its loan portfolio the next year. Bernanke & Lown (1991), Diamond (1984) and Brewer (2000) proposed that derivative use could have an influence on the loan portfolio growth.

3. RESEARCH MODEL

Derivative management process of bank management requires reduction of interest rate risk exposure of banks by increasing the volume of loans and decreasing the volume of deposits. Since loan demand and deposit supply is dependent on interest rates offered, banks can achieve this policy by changing loan and deposit rates to attract loans and dissuade deposits. This process internalizes the market incompleteness of a missing risk sharing market namely derivatives. But, if a derivative market is there for the banks to hedge the bank's exposure, then banks have an opportunity to enter into an unbiased derivative market to externalize their risk exposure. When commercial banks enter a derivative market with an

expected contract amount for the futures price quotation in the market, this to a certain extent may not require the bank to alter the interest rates beyond a desired level. Hence, through derivatives, the derivative management process is expected to be more efficient. Banks stand to gain operationally as well as from the derivative exposure. Risk exposure, bank size and certain financial parameters are expected to differentiate the derivative users from non-users. Variables that are expected to influence the intermediation role of banks (Growth in advances (AG)) such as Asset Size (LA), Intermediation cost (IC), Credit risk (LQ), Capital adequacy (CA), Investment deposit ratio (ID), Percentage of assets other than advances (OA), Earnings risk (ER), Interest Margin risk (IMR) and derivative growth (DG) are considered for the empirical model.

$$AG_t = a + b_1 \times LA_{t-1} + b_2 \times IC_{t-1} + b_3 \times LQ_{t-1} + b_4 \times CA_{t-1} + b_5 \times ID_t + b_6 \times OA_t + b_7 \times ER_{t-1} + b_8 \times IMR_{t-1} + b_9 \times DG_{t-1}$$

4. SAMPLE OF THE STUDY

During 2012-2013, 48 commercial banks were operating in Bangladesh. The banks operating in Bangladesh constituted the sample for the study. Financial reports published by banks as made available by the Bangladesh bank constitute the data for the study. Interest rate sensitivity depends to a large extent on the deposit size of the bank. Besides the public sector banks, both foreign and private Indian banks were also included in the sample. The sample had adequate representation on the basis of size and sector (Table 1).

Table 1. Sample Characteristics.

| Deposit size classification | | | Category classification | | | | |
|-----------------------------|--------------|--------|-------------------------|--------------|--------|------------------|--------|
| Bank size | Total sample | | Category | Total sample | | Derivative users | |
| Large banks | 20 | 41.67% | Nationalized bank | 4 | 8.33% | 3 | 6.25% |
| Medium banks | 16 | 33.33% | Private banks | 24 | 50% | 19 | 39.58% |
| Small banks | 12 | 25% | Foreign banks | 20 | 41.67% | 16 | 33.33% |
| Total | 48 | 100% | Total | 48 | 100% | 38 | 79.16% |

Derivative users were identified as those banks that reported financial futures exposure consistently in their books as an off-balance sheet item during the past five years. Commercial banks that did not show any exposure in all the five years were considered as non-users. Additionally when banks had financial futures exposure in only one of the prior five years and no exposure in the current year were considered as partial users and were grouped with non-users. Derivative users were dominant in the sample (79.16%).

5. FINDINGS OF THE STUDY

Derivative users showed significant difference from non-users only on the parameter of interest margin risk, which was lower for the derivative users (Table 2). On all other parameters the derivative users and non-users / partial users did not show any statistical significance. Derivative usage has curtailed the interest rate risk exposure of banks operating in Bangladesh.

Table 2. Parameters Differentiating Derivative Users.

| Parameters | Derivative Users | Derivative Non-users | F-Value |
|------------------------|------------------|----------------------|---------|
| Interest margin risk | 0.391 | 0.621 | 4.494* |
| Solvency risk | 18.071 | 27.480 | 1.654 |
| Credit risk | 4.108 | 2.524 | 0.107 |
| Earnings risk | 1.207 | 0.960 | 0.289 |
| Business per employees | 479.349 | 413.440 | 0.236 |
| Profit per employee | 4.097 | 2.405 | 0.058 |
| Bank asset size | 25,61,692.17 | 7,72,045.10 | 1.101 |

*Statistical significance at 5% level

The application of the proposed model to commercial banks using derivatives had a statistical good fit. The adjusted R square of the model had an explanatory power of the combined variables as 40.00%. Tolerance test and Variance inflation factor (VIF) do not indicate any multicollinearity among the variables. Adequacy of solvency, credit risk, derivative growth and asset size are significant at 1% level. Derivative growth as an explanatory variable for advances growth has an explanatory power of 6.80% while adequacy of solvency is the prominent influencer with 16.20% explanatory power. Credit risk has a significant explanatory power of 8.20% (Table 3). Standardized beta coefficients are useful when the independent variables representing the model are of different units as in this case. Assuming all other variables of the model are held constant, the beta for derivative growth indicates that for every one-unit change in advances growth, banks enter into a derivative position to the extent of 0.4191 units.

Table 3. Empirical Model Results.

| Variable | Beta | t-value | R square change | | Tolerance | Variance inflation factor |
|--------------------------|---------|---------|-----------------|--------|-----------|---------------------------|
| Constant | 1.2418* | 1.2418* | | | | |
| Investment deposit ratio | -0.1819 | -1.89** | 0.035 | 3.50% | 0.6060 | 1.1922 |
| Intermediation cost | 0.0973 | 1.09 | | | 0.7767 | 0.9314 |
| Adequacy of solvency | 0.3655 | 3.79* | 0.162 | 16.20% | 0.3608 | 2.0020 |
| Credit risk | 0.3608 | 3.47* | 0.082 | 8.20% | 0.5587 | 1.2931 |
| Derivative growth | 0.4191 | 4.08* | 0.068 | 6.80% | 0.5807 | 1.2442 |
| Other assets growth | -0.0357 | -0.31 | | | 0.4765 | 1.5159 |
| Bank asset size | 0.0002 | 2.26* | 0.053 | 5.30% | 0.3485 | 2.0724 |
| Interest margin risk | -0.0172 | -0.16 | | | 0.5343 | 1.3521 |
| Earnings risk | -0.0617 | -0.62 | | | 0.6254 | 1.1552 |
| | | | 0.40 | 40.00% | | |

Dependent variable: Advances growth; *-Statistical significance at 1% level; **-Statistical significance at 5% level;

Commercial banks with low capital to asset ratio adjust their lending to meet some predetermined target capital to asset ratio, hence a positive relationship could be expected between capital to asset and advances growth. This has been affirmed in the case of banks operating in Bangladesh. Brewer (2000) reported a positive coefficient between capital to total asset and loan growth. Loan quality if good enables a bank to increase its loan portfolio for the next year. The larger the non-performing assets (NPA), the lower the loan quality and hence the expectation is a negative relationship between loan quality to the advances growth

next year. However, the positive credit risk coefficient in the model indicates that banks have a higher credit risk exposure and have not improved the loan assessment and recovery process. Lagged total asset is expected to influence advances growth positively. This iterates the experience of bank in lending activities. The beta coefficient in the current model is significant and positive. Investment deposit ratio has a negative beta coefficient as is theoretically expected. Traditionally commercial banks have viewed loans and investment securities as substitutable assets. Consequently, when loan growth strengthens, hypothetical assumption is that banks hold less investment securities. Conversely, larger investment leading to increase in assets results in a negative loan growth. Interest margin risk and earnings risk have the expected negative sign in the equation but are not significant variables. The specific influence of variables could vary due to size differences among banks and also in terms of types of banks operating in Bangladesh due their unique operational policies and governance.

6. LOAN GROWTH INFLUENCERS IN TERMS OF BANK DEPOSIT SIZE

The model was applied separately for banks with larger deposit size, medium deposit size and smaller deposit size. All three models established statistically good fit, but as was expected significant variables were different for each model. Credit risk is the only variable common in all three models (Table 4). Derivative growth was a significant influencer only for the small deposit size banks. The coefficients in all the models had the similar sign as in the overall model.

Table 4. Model Results – Banks Classified on the basis of Deposit Size.

| Large size banks | Medium size banks | Small size banks |
|------------------|----------------------|----------------------|
| Credit risk | Credit risk | Credit risk |
| | Earnings risk | Adequacy of solvency |
| | Intermediation cost | Derivative growth |
| | Adequacy of solvency | |

7. LOAN GROWTH INFLUENCERS IN TERMS OF BANK TYPE

Three models were built to examine specific influencers of advances growth in terms of bank type. All these models showed statistically good fit. Adequacy of solvency was the only variable that influenced advances growth in all the three models. Public sector banks in addition emphasized intermediation cost for determining the growth of advances. Foreign banks in addition considered interest margin risk and percentage of other assets. Specialized banks exposure in terms of advances and investments as bank assets is low compared to other assets. This could be the reason for the negative statistical significance of other assets in the model for specialized banks. Bangladeshi private commercial banks model results are similar to the overall model (Table 5). Operationally, Bangladeshi private commercial banks seem to dominate the banking sector advances growth. This could be due to the competitive environment and introduction of best practices in bank operations.

Table 5. Model Results – Banks Classified on the basis of Type.

| Nationalized commercial banks | Private commercial banks | Specialized banks |
|-------------------------------|----------------------------|--------------------------|
| Intermediation cost | Intermediation cost | Adequacy of solvency |
| Adequacy of solvency | Interest margin risk | Derivative growth |
| | Percentage of other assets | Credit risk |
| | Adequacy of solvency | Investment deposit ratio |
| | | Bank size |

8. RISK EXPOSURE AND RISK MANAGEMENT OF BANKS

Sub-models built on the basis of deposit size and bank type were integrated together to identify the risk exposure and risk management practices through correspondence analysis. Private commercial banks are small deposit size banks and have high risk exposure and have externalized their risk management practices (Figure 1). Bangladeshi nationalized commercial banks though have a high-risk exposure with a large deposit base have not externalized their risk management practices and are more traditional in this respect. Specialized banks have low risk exposure and their risk exposure to certain extent have been externalized.

9. CONCLUSION

The study highlighted the use of derivatives in a bank portfolio as an influencer of advances growth. There is a positive relationship between derivative growth and advances growth. Derivative growth significantly influences the advances growth of small deposit size banks and Bangladeshi private commercial banks. However in all the models derivative growth had a positive sign and this could be inferred as derivatives being used by even nationalized commercial banks and specialized banks as a tool to foster lending activities. Hence, restrictive policy regulations with respect to bank's derivative activities may lead to lower loan growth rate. Bangladeshi banks report their overall commitment of futures position in their financial reports. However, the distinct usage of different types of derivative products needs to be known to understand the attributes of bank's hedging requirements. A policy on mere usage of derivative products may not be as convincing as a policy that is based on knowledge of usage as well as implications of the derivative product usage on the operations of bank. This study tests only the implications of the derivative use. This could be further corroborated through the type of derivatives used to hedge bank portfolio risk. Further the effect of derivatives use on earnings of banks can be established. This would help in determining whether derivative use has resulted in value addition for banks.

References

- [1] Allen, F. & A.M.Santomero. What do financial intermediaries do? *Journal of Banking and Finance*, 25(12), (2001) 271-294.
- [2] Angbazo Lazarus. Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking. *Journal of Banking and Finance*, 21(1), (1997) 55-87.
- [3] Arak, M. & C. McCurdy. Interest rate futures. *Quarterly Review*, Federal Reserve Bank of New York, 4, (1980) 33-46.
- [4] Bank for International Settlements. *Foreign exchange and derivatives market activity in 2001*. Triennial Central Bank Survey (2002).
- [5] Basle Committee on Banking Supervision and the Technical Committee of the International Organization of Securities Commissions. Survey of disclosures about trading and derivatives activities of banks and securities firms (1996).
- [6] Bauer, W. & M. Ryser. Bank risk management strategies for banks. *Journal of Banking and Finance*, 28(2), (2004) 331-352.
- [7] Benninga, S.R., R. Eldor & I.Zilcha. Optimal International Hedging and Output Policies in Commodity and Currency Forward Markets. *Journal of International Money and Finance*, (1985) 537-552.
- [8] Benninga, Simon Z. & Casper M. Oosterhof. Hedging with forwards and puts in complete and incomplete markets. *Journal of Banking and Finance*, 28(1), (2004) 1-17.
- [9] Bernanke, B.S. & C.S. Lown. The credit crunch. *Brookings Papers on Economic Activity*, 2, (1991) 205-239.
- [10] Booth, J.R., R.L.Smith & W.Smith. The use of interest rate futures by financial institutions. *Journal of Bank Research*, (1982) 15-20.
- [11] Brewer, E., Bernadette A.Mason, & J.T.Moser. Interest-rate derivatives and bank lending. *Journal of Banking and Finance*, 24(3), (2000) 353-379.
- [12] Broll, U. & T.W.Guinnane. Interest rate futures and bank hedging. *OR Spectrum*, 21(1), (1999) 71-80.
- [13] Cebensan, A. Sinan & Philip E. Strahan. Risk management, capital structure and lending at banks. *Journal of Banking and Finance*, 28(1), (2004) 19-43.
- [14] Clifford S. W. Charles W.Smithson & Lee M.Wakeman. The market for interest rate swaps. *Financial Management*, 17(4), (1988) 34-44.
- [15] Danielsson, Jon, Bjorn N. Jorgensen & Casper G. de Vries. Incentives for effective risk management. *Journal of Banking and Finance*, 26(7), (2002) 1407-1425.
- [16] Diamond, D W. Financial intermediation and delegated monitoring. *Review of Economic Studies*, 51(3), (1984) 393-414.
- [17] Ederington, L. The hedging performance of the new futures markets, *Journal of Finance*, 34(1), (1979) 157-70.
- [18] Franckle, C.T. The hedging performance of the new futures markets: Comment. *Journal of Finance*, 35(5), (1980) 1273-79.

- [19] Guay, W.R. The impact of derivatives on firm risk: An empirical examination of new derivative users. *Journal of Accounting and Economics*, (1999) 319-326.
- [20] Ho, T. & A.Saunders. Fixed rate loan commitments, take down risk and the dynamics of hedging with futures. *Journal of Financial and Quantitative Analysis*, 16, (1983) 499-516.
- [21] Kashyap, A.K., R. Rajan & J.C. Stein. Banks as liquidity providers: An explanation for the coexistence of lending and deposit-taking. *Journal of Finance*, 57(1), (2002) 33-73.
- [22] Kim, S. & G.D. Koppenhaver. An empirical analysis of bank interest rate swaps. *Journal of Financial Services Research*, 7, (1992) 57-72.
- [23] Koppenhaver, G.D. Bank funding risks, risk aversion, and the choice of futures hedging instrument. *Journal of Finance*, 40(5), (1985) 241-255.
- [24] Moonis, S. A. & Shah Ajay. *A natural experiment in the impact of interest rate on beta* (2002).
- [25] Morgan, G.E., D.K Shome & S.D.Smith. Optimal futures positions for large banking firms. *Journal of Finance*, 43(1), (1988) 175-195.
- [26] Morgan, G.E., & S.Smith. Basis risk, partial take down and hedging by financial intermediaries. *Journal of Banking and Finance*, 10, (1986) 469-499.
- [27] Mozumdar, A. Corporate hedging and speculative incentives: Implications for swap market default risk. *Journal of Financial and Quantitative Analysis*, 36, (2001) 221-250.
- [28] Nawalkha, Sanjay K., Gloria M. Soto & Zhang. Generalized M-vector models for hedging interest rate risk. *Journal of Banking and Finance*, 27(8), (2003) 1581-1604.
- [29] Patnaik Ila & Ajay Shah. *Interest rate volatility and risk in Indian banking*. Technical Report 04/17, NCAER and Ministry of Finance, (2004).
- [30] Rajan, Raghuram & Ajay Shah. *Directions in Indian financial sector policy*. Technical report, University of Chicago and Ministry of Finance, (2003).
- [31] Santomero, A.M. Modeling the banking firm: A survey. *Journal of Money Credit and Banking*, 16, (1984) 591-602.
- [32] Schrand, C., P. Unal. Hedging and coordinated risk management: Evidence from thrift conversions. *Journal of Finance*, 53(3), (1998) 979-1013.
- [33] Schwartz, E.D. & C.W.Smith. *The handbook of currency and interest rate risk management*. New York, New York Institute of Finance (1990).
- [34] Shively, D.C., J. Cole & I.D'Antonio. Hedging opportunities in bank risk management programs. *Journal of Commercial Bank Lending*, 62(1), (1980) 29-41.
- [35] Sealey, C.W. Deposit rate setting, risk aversion and the theory of depository financial intermediaries. *Journal of Finance*, 35(5), (1981) 1139-1154.
- [36] Sharpe, S.A. & S. Acharya. Loan losses, bank capital and the credit crunch. Federal Reserve Board of Governors, Washington DC (1992).
- [37] Stulz, R.M. Rethinking risk management. *Journal of Applied Corporate Finance*, 9, (1996) 8-24.

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- [38] Thomas, Susan, Ajay Shah & R.L Karandikar. Does the stock market get it before the rating agencies? Some evidence on the Merton model (2002).
- [39] Szego, Giorgio. Measures of risk. *Journal of Banking and Finance*, 26(7), (2002) 1253-1272.
- [40] Venkatachalam, M. Value relevance of banks' derivatives disclosures. *Journal of Accounting and Economics*, 22, (1996) 327-355.
- [41] Williams-Stanton, S. The effects of risk-based capital on wealth and risk-taking in banking. Working Paper, Ohio State University, Coloumbus (1996).
- [42] Wong, K.P. On the determinants of bank interest margin under credit and interest rate risks. *Journal of Banking and Finance*, 21(2), (1997) 251-271

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