EXAMINING THE LINKAGE BETWEEN FINANCIAL VARIABLES AND DERIVATIVE USAGE – A CASE OF COMMERCIAL BANKS IN INDIA

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The banking sector worldwide has been experiencing major transformations in its operating and regulatory environment. Accordingly, the participation of banks in the derivatives market has increased tremendously in past years. Although it is well documented that large banks participate more intensively, little is known about other factors underlying a bank's decision to do so. The present study seeks to identify the financial variables characterizing such banks that participate in derivatives market. This can then be used to investigate how banks can impact the volume and density of derivatives market through a variation in the financial variables determining their performance. For this, we use bank level derivatives data of scheduled commercial banks in India for the year ending March 2013. The difference in means and Tobit model is employed and results are presented. Our regression results indicate that derivatives usage is significantly associated with size of banks and ownership status. The other variables that significantly differentiate users from non-users are related to asset quality and management efficiency. Capital adequacy ratio (CAR) and Gap are, however, not found to be significant. The results support the proposition that banks need to have sufficient resources for using derivatives. Ownership status, being a key differentiating variable, reveals how foreign banks are using derivatives to protect themselves and their customers from multitude of risks and also enhance earnings. Asset quality is found to be another significantly differentiating factor. However, the finding is not suggestive of banks using derivatives for credit risk management. The regulatory considerations are also not found to be significantly different between derivative user and non-user banks in India. Further, hedging of balance sheet mismatch does not appear to be a determining factor in Indian banks' participation in derivatives market.

1. INTRODUCTION

The financial derivatives market was generally looked upon favorably before the global financial crisis of 2008. It was believed that the value added of derivatives themselves

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derives from their ability to enhance the process of wealth creation (Greenspan, 1999). Trichet (2007) asserted that "price discovery in credit derivatives market reduces the risk of mispricing loans." However, in the aftermath, the perspective has completely altered as the risks of financial derivatives have become clearly evident. In 2010, Financial Stability Board had observed that "the crisis demonstrated the potential for contagion arising from the interconnectedness of over-the-counter (OTC) derivatives market participants and the limited transparency of counterparty relationships." Accordingly, regulators worldwide are now in the process of finalizing new rules and reshaping the face of derivatives market. Basel III norms have focused on a comprehensive package by introducing new minimum capital requirements, two liquidity measures, a leverage ratio, and charge for credit value adjustment, amongst other things. Meanwhile, the Dodd-Frank Wall Street Reform and Consumer Protection Act has been signed into law in U.S., requiring a large portion of OTC derivative contracts to be cleared through central counterparties.

The banking sector worldwide has also been experiencing major transformations in the operating and regulatory environment. Accordingly, the participation of banks in the derivative markets has increased tremendously in past years. However, as instances of large losses associated with the use of derivatives have come to limelight, it has generated a great deal of academic interest in how banks use these instruments.

An increased inclination towards non-interest income (i.e. fee income) has been found to be one of the key drivers for banks to provide risk management services to clients. This has been coincidental with the declining importance of traditional banking business on a standalone basis. Carter and Sinkey (1998) and Sinkey and Carter (2000) argue that banks use derivatives to lock in the spread between interest income and interest expense. Gunther and Siems (2002) also argue that if Net interest margin (NIM) is assumed to reflect franchise value, then an incentive to protect spread can be indicative of a positive relationship between NIM and derivative usage.

Some of the existing empirical literature supports the financial intermediary theory by Diamond (1984). Gorton and Rosen (1995) found that the change in banks' net income due to changing interest rate scenario is partially offset by the opposing change in net income from the interest rate hedges. Thus, interest rate swaps helped banks hedge most of the systematic risks. In the study by Zhao and Moser (2009a, b) it was found that with both on balance sheet and Off balance sheet (OBS) risk management methods, maturity

gap matching and interest rate derivatives, Bank holding companies (BHCs) effectively reduced their interest rate sensitivity of equity value during 1998-2003. Also, Brewer et al. (1996) found that interest rate risk was lower for derivatives user S&Ls during 1985-1989. However, several empirical works have observed it to be a necessary but not always a sufficient condition to drive banks' participation in derivatives market (Geczy, Minton and Schrand, 1997). In addition, the banks also consider the level of their risk exposure, regulatory environment and the costs that they will have to incur to manage the risks.

Further, because of a greater probability of financial distress and bankruptcy, highly levered banks are expected to use derivatives than others. Smith and Stulz in 1985, proved how hedging can be used to reduce the probability of bankruptcy through reduction in cash flow variation. In 1999, Whidbee & Wohar also studied how banks' corporate governance and ownership structure influences the use of derivatives.

The importance of size has been well documented in work by Kim and Koppenhaver (1993), Carter and Sinkey (1998), Colquitt and Hoyt (1997), etc. Derivatives being complex instruments call for a careful management and analysis. Secondly, transaction fees decrease with increased volume of purchases. Further, larger banks are more likely to have greater exposure to market risk thus being inclined towards using derivatives.

The regulatory environment has also been seen to be an important factor in how derivatives are used by banks. Merton and Bodie (1992) argued that the required capital serve as a cushion against losses, and thus acts as an alternative to frequent surveillance. Simons (1995) also argues that banks having been managing their risk through use of derivatives because such instruments entail lower capital requirements. Hefferman (2001), however, highlighted the concern of regulators on banks' using derivatives for speculative purposes, posing a threat to the financial system.

The researchers, in recent years, have focused on examining the relationship between financial characteristics and derivative usage by banks in developed countries (Kim and Koppenhaver, 1993; Simons, 1995; Sinkey and Carter, 2000; Brewer, 2000; E. Brewer et al., 2000). While these studies have yielded numerous beneficial results, derivatives usage and its determinants in emerging markets still remain to be thoroughly investigated. The present study thus aims to be a step towards filling this research gap, taking a case of India. Keeping in view the changing landscape in financial sector, Reserve Bank of India (RBI) has been focusing on a globally competitive and robust

banking sector in India. In this context, the study of why banks use derivatives and what are the main drivers assume critical importance.

With this in the background, we investigate whether there is any significant linkage between financial characteristics of banks and derivatives usage by them. For this, we employ two measures of derivatives – notional principal amount of all derivative contracts and notional principal amount of interest rate swaps / forward rate agreements and 8 financial variables (total assets, equity to total assets, NIM to total assets, non-performing assets to net advances, GAP12, operating expenses to total assets, return on equity, and non-interest income to total assets). We conduct the investigation using descriptive statistics and Tobit model, using data of all scheduled commercial banks in India for year ending March 2013.

Our regression results suggest that derivatives usage is significantly associated with size of banks and ownership status. The capital adequacy ratio is, however, found to be insignificant suggesting that regulatory considerations are not important in derivative use by banks. Also, no significant relation is observed between derivative use and IRR management by Indian banks. With respect to management efficiency, the relationship appears to be ambiguous in our study. Further, banks with both strong and weak asset quality are found participating in the total derivative market.

The rest of the paper is organized as follows. In the following section, we present an overview of global developments and Indian scenario in specific context of banks' participation in derivatives market. Section 3 provides details about the data sources, variable definitions and the model specification used in our investigation. The results are being discussed in Section 4 while Section 5 presents the policy implications and gathers concluding remarks of the study.

2. GLOBAL DEVELOPMENTS & INDIAN BANKS' DERIVATIVE USE

With the breakdown of Bretton Woods system and doing away of pegged exchange rate regime, a major structural shift happened in the financial landscape internationally during 1970s. A switch over to floating exchange rates, in particular, led to bank customers seeking risk management services on a routine basis. Also, firms desired to hedge their interest rate risk exposures as the transition happened from a stable inflation and interest rate scenario to a high and volatile one. All these developments required

banks to diversify out of the traditional business operations and start providing fee based services, resulting in higher incomes, though at an increased risk. The mushrooming growth of OBS activities has thus been an obvious outcome for banks providing such services.

The derivatives market further saw major changes since the collapse of Lehman brothers in September 2008. Reforms have since then been continuously under way and the Basel Committee on Banking Supervision has recently published the final text of Basel III and has advised banks to hold more capital against over the counter derivative exposure. Meanwhile the Dodd-Frank Wall Street Reform and Consumer Protection Act signed into law in US in 2010, now require a large portion of the OTC derivative market to be cleared through central counterparties and may also ask banks to transfer certain commodities desks to affiliates.

In specific context of India, pre-liberalization, the market risk was not much of a concern for banks as a high Statutory Liquidity Ratio (SLR) meant that banks investment in Government paper ensured them a steady stream of (interest) income. Moreover, with the ceiling on borrowing in call money market and the regulated interest rate regime, balance sheets of banks were provided sufficient liquidity. At the same time, the prescription to keep foreign exchange positions square at the end of the day insulated banks from the dangers arising out of liquidity or margin mismatches on account of volatile rates. However, as the administered regime has given way to deregulation, integration and increased competition, the banking sector also has increasingly become susceptible to the dynamics of the global operating environment. Also, heightened competition from newer market participants has been putting pressure on their interest margins.

Further, as what is basic to the business of banking is the dichotomy in the structure of liabilities (deposits) and assets (loans), wherein the liabilities are fixed *vis-à-vis* the floating rate character of the loan portfolio, thus exposing the banks' balance sheet to interest rate risk. Also, with the growing integration of foreign exchange markets and banks being allowed to create liabilities and assets in multiple currencies, foreign exchange risks have come to the forefront. Thirdly, with banks being given freedom to invest in bonds, shares and debentures of corporates, equity price risk has become an area of concern and consideration. More so, with spreads coming under stress, banks have been diversifying into newer domains of operations to boost their non-interest

income. As a result, off balance sheet exposures have gained prominence.

At present, the structure of Indian banking industry is characterized by 4 broad categories of commercial banks. There are two types of public sector banks – nationalized banks and State Bank of India group. The other two categories are foreign banks and other Scheduled Commercial Banks (SCBs). The other SCBs group consists of old and new domestic private banks. Together, they fall under the Reserve Bank of India classification of SCBs. They are so called as they are included in the second schedule of Reserve Bank of India Act, 1934.

Table I highlights the off balance sheet exposure items of SCBs in India for 2012-13. From the table, it is observable that foreign exchange contracts constitute 80.54% of the total contingent liabilities of all scheduled commercial banks taken together. Looking at the exposure to foreign exchange contracts bank group wise, state bank group exposure is 5.24% whereas nationalised banks in the public sector banks group is 12.93%.

Table I: Off Balance Sheet Exposures of Scheduled Commercial Banks in India (as on March 31, 2013)

(Amounts in Rs. billion)	Foreign exchange contracts [@]	Guarantees given	Acceptances, endorsements etc. [#]
Public sector banks	19408	5346	6350
State bank group	5599	1989	3095
Nationalised banks	13809	3357	3254
Private sector banks	18504	2382	6308
Old private sector banks	1878	252	207
New private sector banks	16625	2130	6101
Foreign banks	68868	964	4453
Total (all SCBs)	106780	8692	17111

(Source: Statistical Tables Relating to Banks in India, an annual publication of Reserve Bank of India)
[@] Includes all derivative products (including interest rate swaps) as admissible.
[#] Includes inter alia items like (a) claims against the bank not acknowledged as debt, (b) Liability for partly paid investments, (c) Bills re-discounted and (d) Letters of credit.

The maximum exposure is of foreign banks i.e. 64.49% with private sector banks (both old and new) having almost the same exposure i.e. near about 17%.

In India, different financial derivatives instruments are permitted and regulated by various regulators, like Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI) and Forward Markets Commission (FMC). Broadly, RBI is empowered to regulate the interest rate derivatives, foreign currency derivatives and credit derivatives.

At present, the following types of derivative instruments are permitted, subject to certain conditions:

a. Interest rate derivatives – Interest Rate Swap (IRS), Forward Rate Agreement (FRA), and Interest Rate Future (IRF).

b. Foreign Currency derivatives – Foreign Currency Forward, Currency Swap and Currency Option.

The use of derivatives for hedging is governed by the hedge policy approved by Asset Liability Management Committee (ALCO). Subject to the prevailing guidelines by RBI, banks accordingly deal in derivatives for hedging fixed rate, floating rate or foreign currency assets & liabilities.

Further, specific to the position taken by the participant in the transaction, the comprehensive guidelines on derivatives by RBI classifies participants into two functional categories – market makers and users. Market makers undertake derivative transactions to act as counterparties in derivative transactions with users and also amongst themselves. As against this, the users undertake derivative transactions primarily to hedge (i.e. to reduce or extinguish an existing identified risk on an on-going basis during the life of derivative transaction) or transform a risk exposure. Looking at the banks participation in derivatives activity (Table II), we see that interest rate swaps / forward rate agreements constitute an important element of total derivative contracts (notional amount outstanding). To be precise, the notional principal amount outstanding of interest rate swaps / forward rate agreements are 62.11% of the notional principal amount outstanding of total derivative contracts (which include both interest rate and currency derivatives).

Table II: Bank Group Wise Participation in Derivative Activity (2012-13)

Name	Not Irsfra*	%	Totder**	%
State Bank Group	160585.79	0.606487	547088.11	1.283265
Other Nationalised Banks	112565.09	0.425126	307842.94	0.722085
Old Private Sector Banks	199386.37	0.753026	260782.071	0.611698
New Private Sector Banks	1331778.31	5.029748	3373037.162	7.911892
Foreign Banks	24673718.16	93.18561	38143747.8	89.47106
All Banks (Total)	26478033.72	100	42632498.08	100

(Source: Notes to accounts section of Annual report of individual banks)
** NOT IRSFRA represents the notional principal amount outstanding of interest rate swaps / forward rate agreements (in Rs crores) as on 31 March 2013.*
*** TOTDER represents the notional principal amount outstanding of interest rate and currency derivatives (in Rs crores) as on 31 March 2013.*

3. RESEARCH METHODOLOGY

This section discusses the data sources, variable definitions and the model specification used in our investigation.

3.1. Data Sources

The data used in the study has been collected from various sources. The data has been collected for all scheduled commercial banks in India (SBI group, Nationalized banks, Old private sector banks, New private sector banks and Foreign banks) for the year ending 31 March 2013.

The bank level derivatives data has been collected using Prowess (CMIE database). For the data on various financial variables, the sources used are – Statistical tables relating to banks in India (RBI database), BSE Capitaline Plus and www.indiastat.com.

The total sample size is 89 banks.

3.2. Description of Variables

This section defines and explains the dependent and independent variables as used in the study. Figure 1 below describes the different aspects defining banks' financial characteristics incorporated in the study. A brief explanation for each of the dependent and independent variables as used in the study follows.

Derivative usage

In our study, the dependent variable employed is bank's notional principal amount outstanding of derivative contracts (for the year ending 2013) scaled by total assets. We use two inputs of derivatives - Notional principal amount of all derivative contracts (i.e. both Interest rate derivatives and Currency derivatives) and Notional principal amount of Interest rate swaps / Forward rate agreements.

Figure 1: Aspects Defining Banks' Financial Characteristics

The data for bank level derivatives is obtained from the 'Notes to Accounts' section of the annual reports of individual banks for the year 2012-13.

Bank size

As noted in several researches in the past, size is introduced to account for economies or diseconomies of scale, as existing in the market. This is to say that banks need to have sufficient resources for using derivatives. Simons (1995) and Sinkey and Carter (2000) have also argued that there are costs associated with initially learning as to how to use derivatives and maintaining a risk management programme.

The total assets of the banks are taken as a proxy for size in our model. We use log of total assets as expressed in millions (Rs) in our regression model.

Bank profitability

While maintaining profitability is non-negotiable for maintaining the financial soundness of banking sector, efficient financial intermediation is important as well. The net interest margin, operating expenses and non-interest income are accordingly crucial in determining profitability of the banking sector.

NIM indicates the margin taken by the banking sector while doing banking business. From efficiency point of view, there is a need to bring down NIM. However, from a

profitability point of view, there is a need to increase it. A balanced approach would then call for bringing down NIM, which will improve efficiency of financial intermediation, along with an increase in non-interest income and reduction in operating expenses to maintain profitability (Subbarao, 2010). Also, return on equity is frequently used to judge the performance of top management. Empirical studies have shown that derivative user banks enjoy higher return on equity as compared to non-users.

We accordingly account for NIM to total assets, ROE and Non-interest income to total assets in our study to investigate whether these can be viewed as determinants of derivative usage by banks.

Capital adequacy

To measure the creditworthiness of a bank, a commonly used measure is capital adequacy ratio (CAR) i.e. ratio of bank equity to total assets. A higher ratio indicates that the bank is well capitalized with respect to its perceived risk thereby confirming long term bank solvency (Kasman, Tunc, etc. 2010). The results w.r.t the relationship between CAR and extent of derivatives usage by banks have however been mixed.

We use the ratio of equity capital to total assets as a measure of capital adequacy in our regression model.

Interest rate risk

A bank's use of interest rate derivatives is expected to be related to its exposure to fluctuations in interest rates. We thus use GAP (difference between risk sensitive assets and risk sensitive liabilities) as a proxy measure for banks' interest rate risk exposure. It is calculated as the difference between rate sensitive assets (RSA) and rate sensitive liabilities (RSL) by grouping them into time buckets as per residual maturity. The sign and magnitude of GAP can then be used to assess the potential earnings volatility arising from changes in interest rates.

In this paper, we calculate GAP for 12 months to observe whether there is a linkage between banks' exposure to interest rate risk and its use of derivatives.

Management efficiency

Another financial variable that finds a significant place in literature related to banks is

operating expenses ratio. Operating expenses are an important determinant of management quality and are closely related to the notion of efficient management. Banks with lower efficiency levels could thus look for higher derivative activity to cover for their higher operating costs.

We thus use Operating expenses to total assets ratio as a proxy to establish relationship between management efficiency and extent of derivatives usage by banks.

Asset quality

A bank's use of derivatives is also expected to be related to its credit risk exposure. If banks are practicing coordinated risk management, as described by Schrand and Unal (1998), then the use of derivatives can also be linked to the extent of bank's credit exposure. This is to say that banks with higher exposure to credit risk could be using derivatives to mitigate the same.

We use Nonperforming assets to net advances ratio, to account for bank's exposure to credit risk.

Ownership

Another important issue is whether the ownership status of a bank impacts the extent of derivative usage. To account and test for the same, we introduce ownership dummy, taking note of distinction between domestic and foreign banks. It is represented as dummy taking value 'zero' in case of a domestic bank (Indian) and value 'one' in case of foreign bank. The domestic banks include SBI group, nationalised banks, old private sector banks and new private sector banks.

Table III below summarizes the variables used in the study with their definitions.

Table III: Variable Symbols and Definitions

S.No.	Variables	Definition
1.	LTA	Log of Total assets
2.	EQTA	Equty capital to Total assets
3.	NPANADV	Non-performing assets to Net advances
4.	GAP12TA	GAP12 to Total assets
5.	OPEXTA	Operating expenses to Total assets

6.	ROE	Return on equity
7.	NIMTA	Net interest income to Total assets
8.	NONIITA	Non-interest income to Total assets
9.	OWNDUM	Ownership dummy
10.	TDER	Notional principal amount outstanding of interest rate and currency derivatives
11.	IRSFRA	Notional principal amount outstanding of interest rate swaps and forward rate agreements

3.3. Model Specification

To determine whether there is a linkage between financial characteristics of banks and their use of derivatives, we use difference in means and regression (Tobit) analysis. The difference in mean values for selected financial variables between users and nonusers of derivatives are tested for being significantly different using independent samples t-test. In creating the groups, '0' is taken for non-user banks and '1' for user banks.

Further, the functional relationship between derivatives usage and financial characteristics is expressed in form of a regression equation as follows:

$$DER_i = \beta_0 + \beta_1 LTA_i + \beta_2 EQTA_i + \beta_3 GAP12TA_i + \beta_4 NIMTA_i + \beta_5 NPANADV_i + \beta_6 OPEXTA_i + \beta_7 ROE_i + \beta_8 NONIITA_i + \beta_9 OWNDUM_i + \varepsilon_i$$

In order to capture and test the relationship using alternate measures of derivatives, we arrive at two regression equations. Model 1 uses notional principal amount of total derivatives i.e. both interest rate derivatives and currency derivatives (TDER) as scaled by total assets as a dependent variable and Model 2 uses notional principal amount of interest rate swaps / forward rate agreements (IRSFRA) as scaled by total assets as a dependent variable.

The two models are accordingly specified as follows:

$$TDER_i = \beta_0 + \beta_1 LTA_i + \beta_2 EQTA_i + \beta_3 GAP12TA_i + \beta_4 NIMTA_i + \beta_5 NPANADV_i + \beta_6 OPEXTA_i + \beta_7 ROE_i + \beta_8 NONIITA_i + \beta_9 OWNDUM_i + \varepsilon_i \quad \textbf{(MODEL 1)}$$

$$IRSFRA_i = \beta_0 + \beta_1 LTA_i + \beta_2 EQTA_i + \beta_3 GAP12TA_i + \beta_4 NIMTA_i + \beta_5 NPANADV_i + \beta_6 OPEXTA_i + \beta_7 ROE_i + \beta_8 NONIITA_i + \beta_9 OWNDUM_i + \varepsilon_i \quad \textbf{(MODEL 2)}$$

Since, a large number of banks are observed to be not using derivatives and are

accordingly assigned the value '0' while the user banks' derivative figures take a positive value, estimation using OLS method shall produce biased results. We thus estimate the two equations (Model 1 and Model 2) using Tobit model, as developed by Tobin (1958).

As highlighted in Table II, the notional principal amount of interest rate swaps / forward rate agreements constitute approximately 62% of total derivative contracts (both interest rate and currency derivatives). It thus becomes important to empirically test the relationship between derivative usage and various financial characteristics of banks using different models – one taking interest rate swaps / forward rate agreements as the dependent variable and second, taking total derivatives as the dependent variable. The objective is to see whether the results significantly differ with a change in the measure of derivative usage, each reflective of banks' involvement in derivatives market.

4. EMPIRICAL RESULTS AND DISCUSSION

This section presents the results of our empirical analysis. Our results first tested the variables for multi-collinearity using Variance inflation factor (VIF). Table IV presents the results of the correlation among the various independent variables used in the study. None of the two independent variables are highly correlated and hence there is no problem of multi-collinearity in the variables chosen for our analysis.

Table IV : Correlation amongst Independent Variables

	EQTA	GAP12TA	LTA	NIMTA	NONIITA	NPANADV	OPEXTA	ROE
EQTA	1.000000							
GAP12TA	0.523941	1.000000						
LTA	-0.765590	-0.380862	1.000000					
NIMTA	0.548351	0.358075	-0.575458	1.000000				
NONIITA	0.100155	0.290943	-0.309569	-0.139216	1.000000			
NPANADV	-0.233606	-0.076388	0.121652	-0.119096	0.175530	1.000000		
OPEXTA	0.027438	0.267960	-0.162743	0.258812	0.306827	0.116130	1.000000	
ROE	-0.567101	-0.216638	0.569938	-0.289507	-0.112272	-0.049600	0.420583	1.000000

4.1. Descriptive and Group Statistics (Difference in Means)

Table V presents the descriptive statistics for the variables chosen for the study while Table VI shows the results of t – test and presents the group statistics for banks using derivatives vis-à-vis those that do not.

Table V : Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
TDER	89	.0000	265.7007	19.304397	53.6578187
IRSFRA	89	.0000	181.7482	10.406649	30.3194183
LTA	89	2.7482	7.1949	5.208493	1.1145993
EQTA	89	4.2971	99.2349	22.439605	24.1014362
NIMTA	89	-1.2300	10.4400	3.398539	1.7495574
GAP12TA	89	-49.9549	97.4253	-1.891175	25.3295106
NONIITA	89	-.7400	23.8600	1.845506	3.2369585
OPEXTA	89	-3.3900	8.8000	2.446629	2.1444850
ROE	89	-17.8600	24.8100	9.690899	7.8072562
NPANADV	89	.0000	9.7100	1.178202	1.6195795
Valid N (listwise)	89				

The results (Table VI) show that for users compared to non-users, the mean values for 2 variables (Size and CAR) is significantly different at 1% level, for intermediation profitability at 5% level and for GAP at 10% level.

Table VI : Differences in Means of Select Financial Variables of SCBs in India: Users vs. Non Users of Derivatives

Variable	Group means		Difference in means	
	Users	Non users	Non users - users	t-statistic
LTA	5.844597	4.586524	-1.2580734	-6.457*
EQTA	12.863605	31.802805	18.9392001	4.048*
NIMTA	2.941364	3.845556	.9041919	2.527**
GAP12TA	-7.062856	3.165580	10.2284355	1.945***
NONIITA	1.295682	2.383111	1.0874293	1.616
OPEXTA	2.319091	2.571333	.2522424	.556
ROE	11.006591	8.404444	-2.6021465	-1.586
NPANADV	1.117727	1.237333	.1196061	.347

*values are significant at 1% level of significance. ** values are significant at 5% level of significance
*** values are significant at 10% level of significance.

4.2. Empirical Results and Discussion

The coefficient estimates for the relationship between derivatives usage and financial characteristics as specified in each of the two models is presented in

Table VII. Probability values are shown in parenthesis. Model 1 uses notional principal amount outstanding of both interest rate derivatives and currency derivatives (TDER) as scaled by total assets as a dependent variable while Model 2 is a variation of Model 1 in that it uses notional principal amount of interest rate swaps / forward rate agreements (IRSFRA) as scaled by total assets as a dependent variable. Overall, our results for the 2 models are similar and are consistent with the results of prior research.

Size of banks and ownership is significantly and positively related to derivative usage. Both the variables are significant at 1% level of significance. As can be observed from Table VII, the results for size suggest that economies of scale and scope exist in the derivatives market and only larger banks can participate in the derivatives market.

Ownership is represented by a dummy variable in our study. Though, the empirical literature offers mixed result as far as the relationship between performance and ownership is concerned (Antoniadis etc, 2010), our study supports the view that ownership is a significant factor and affects the decision of banks to participate in the derivatives market.

Return on equity (ROE) is used in our paper as one of the measures of profitability. The variable is significant at 5% for Model 1 and 1% for Model 2. Thus it is the profitable banks that are entering the derivative market and our results suggest that only banks with sufficient resources can hope to participate. Further, banks are also entering the derivatives market in response to the risks being faced by them as part of their traditional business activities.

Capital Adequacy Ratio may have either a positive or a negative effect on derivative usage. In our paper, capital adequacy is measured as a ratio of bank equity to total assets and is used as a proxy for the regulatory environment under which the banks operate. Our results in Table VII reveal that capital adequacy ratio has a negative relation with the derivatives market in both the models and the variable is not significant. According to Sinkey and Carter (2010), a negative relationship suggests that banks could be using derivatives as a tool of risk management and helping them reduce the probability of default when capital adequacy is low. The insignificance of the variable suggests that regulatory

consideration is not a distinguishing factor in derivative usage by banks in India.

The estimates for GAP are negative and insignificant in both the models, suggesting that derivative usage may not always be significantly related to interest rate risk management by banks. Our results are consistent with Sinkey and Carter (2010) who found no positive relationship between GAP and the use of the derivatives. This indicates that hedging of balance sheet is not an important reason for Indian banks' participation in the derivative market.

Management efficiency, measured as a ratio of operating expenses to total assets, is positive for both the models, significant at 5% level for Model 1 and insignificant for Model 2. The existing literature asserts a positive relationship as banks with lower efficiency levels are expected to be users of derivatives to cover up for higher operating costs. However, as per our results, the relationship between derivative usage and management efficiency is not clear.

The estimates for NIM and non-interest income to total assets are insignificant for both the models suggesting that bank profitability is not significantly related to derivative usage.

Table VII: Tobit Estimates on Derivatives Usage by SCBs in India

Variable	Model 1	Model 2
C	-239.9043** (0.0076)	-243.4432** (0.0006)
LTA	45.66515* (0.0005)	50.11808* (0.0000)
EQTA	-1.014171 (0.1511)	-0.845121 (0.1826)
GAP12TA	-0.483341 (0.1959)	-0.265381 (0.3912)
NPANADV	-8.476151*** (0.0948)	-18.04484* (0.0092)
OPTA	12.79354** (0.0235)	7.271796 (0.1639)
ROE	-3.796956** (0.0284)	-3.999312* (0.0051)
NONIITA	-1.820193 (0.5888)	-5.989503 (0.4227)
NIMTA	-3.962882 (0.6073)	-1.332263 (0.8320)
OWNDUM	106.7565* (0.0000)	73.46598* (0.0000)

Prob values in parenthesis.
*Significance is shown as: * Significant at 1%; ** Significant at 5%; *** Significant at 10%.*

We use Nonperforming assets to net advances ratio, as a measure of asset quality to account for bank's exposure to credit risk. The coefficient for asset quality is negative and significant for both the models. The finding suggests that the use of derivatives is perceived risky by regulators and thus banks with weak asset quality are being discouraged from using derivatives in India.

5. CONCLUSIONS AND RECOMMENDATIONS

Using data from 89 banks for the year 2013, we have analyzed whether a statistically significant linkage can be established between the financial characteristics of banks and their extent of derivative usage by employing a Tobit regression model. Two models are used in this paper. First, we find that derivative usage is significantly and positively associated with size of banks and ownership status. Our study supports the view that ownership is a differentiating factor and seems to affect the decision of banks to participate in the derivatives market. As international banks are exposed to a multitude of risks, it has been well established in existing literature that they use derivatives to protect themselves and their customers from such risks and also use it to enhance earnings. This notion is reasserted in the results of our study. Second, profitable banks are entering the derivatives market and our results suggest that only banks with sufficient resources can hope to participate in the derivatives market. Third, the insignificance of the capital adequacy ratio suggests that regulatory considerations are not a determining factor in derivative usage by banks in India. Fourth, derivative usage is also not found to be significantly related to interest rate risk management by Indian banks. This is to say that hedging of balance sheet does not appear to be an important reason for Indian banks' participation in the derivative market. Finally, the relationship between derivative usage and management efficiency is not clear in our study. The results of the two models (using different measures of derivative usage) are similar with the exception of management efficiency variable.

The present study thus puts light on such financial variables, which can be viewed as playing an important role in growth of Indian derivatives market through bank participation. Banks, being an important constituent of financial system, can accordingly be used to impact the volume and density of derivatives market through a variation in such variables. It would also have important policy implications as various policy announcements have been redefining the financials of banks like NIM, GAP, CAR, NPAs etc.

However, this study does not account for how banks could be managing their risk exposure through on balance sheet adjustments, rather than using derivatives. Two such ways are – by investing in more liquid (safer) assets and limiting dividend payouts. Also, the influence of banks' corporate governance and ownership structure on its use of derivatives remains to be investigated into. Thus there lies a greater scope of research in the area of banks' using derivatives. More so, as Indian derivatives market is expected to become more sophisticated in coming years, an in-depth analysis and understanding about the same shall assume critical importance. Further, the conclusions of our study are tentative and final conclusions can be drawn using data of a longer time span.

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