Research Article

A STUDY ON USAGE OF INTEREST RATE DERIVATIVES AND ITS IMPACT ON INDIAN COMMERCIAL BANKS

Chetan Shetty[1] and Anitha S Yadav[2*]

[1]Department of Management Studies, Global Academy of Technology, RR Nagar, Bangalore 560098
[2]Department of MBA, PES University 100 Feet Ring Road Banashankari Stage III Bengaluru, Karnataka 560085

A R T I C L E   I N F O

A B S T R A C T

The present study makes an effort to provide a comprehensive profile of the international financial derivatives market, with special reference to interest rate derivatives. It has evaluated various issues related to interest rate derivatives in Indian commercial banks. The present research paper would also explore the relationship between interest rate derivatives and Indian commercial banks profitability. To serve this particular objective the study is based on 17 commercial banks i.e. 10 Nationalized Banks, 2 SBI & Associates and 5 Private Banks. Different variables such as Total Asset Size, Qualitative assets, Capitalization, Profitability, Interest Rate Risk (IRR), Interest rate derivatives, etc. have been evaluated for the year 2015 with the help of statistical tools such as Multiple Linear Regression model and ANOVA to find out the extent to which these banks have managed profitability with the help of interest rate derivatives (IRD).

INTRODUCTION

The banking industry is always conformed to various types of financial risk in the highly volatile market. Risk management strategies have turned out to be very important in the present volatile market. The interest rates in thefinancial service industry are fully deregulated by the world commercial banks. But in India, only interest rates on bank's deposits are deregulated excluding savings bank deposits. Likewise, excluding some priority sectors like Micro, Small & Medium enterprises, Agricultural sector and export credit, all other sectors of the bank finance are deregulated. Therefore, Market Forces are now the key players. As a result financial risk management has become a very important factor for the banking industry, in that IRR management covers both liability and asset side of the banks. According to Bagchi S 2005, IRR is a relationship between the volatility in interest rates andits impact on Net Interest Income (NII), Assets, Net Interest Margin, and Liabilities over a period of time.

The Indian commercial banks have been using traditional techniques of IRR management like Traditional gap analysis, Duration gap analysis, Simulation analysis and Year at risk analysis. IRR management through IRD has been another possibility for banks to reduce the financial risk faced by the bank.

Corresponding author: **Anitha S Yadav**
Department of MBA, PES University 100 Feet Ring Road Banashankari Stage III Bengaluru, Karnataka 560085

Interest Rate Swaps are the most popular financial derivative tools used by the commercial bank in India, Jayadev M, 2007. "Interest rate volatility and foreign exchange risks are the main concern for the Indian financial market like other international financial market". Similarly, the banks have adopted derivatives techniques for hedging the bank portfolio risks. Banks with more exposure to financial risks, high net worth and higher loan and assets tend to be the higher user of IRD, Charumathi B, 2010. Financial derivatives give banks a chance to deal with their financial risk exposure and to produce income beyond the traditional banking operations.

Derivative Market-Global and Indian Scenario

In the Indian derivatives market, various changes have been taken place in the recent period. Witnessed the development of the derivative market in line with size, the introduction of different derivative products (IRD and Foreign Currency Derivatives (FCD)), adifferent type of participants and improvements in market infrastructure. Recently the world derivatives market has witnessed tremendous growth.Asper the Survey of Foreign Exchange and Derivative market activity by Central bank, "the interest rate division represents the major share of OTC derivative movement. At end-June 2015, the notional amount of outstanding IRD contracts totaled $435 trillion, which represented 79% of the worldwide OTC derivative market. At $320 trillion, swaps represent the biggest share of this market segment. Notional amount fell sharply in the beginning of 2015, driven by a withdrawal in euro-denominated interest rate contracts. The notional estimation of

euro contracts declined from $167 trillion to $126 trillion between December 2014 and June 2015. The general volume of compressions kept on developing in the beginning of 2015, for the most part influencing IRS cleared through central counterparties. The notional estimation of interest rate contracts in different currencies declined in the beginning of 2015. US dollar contracts reduced from $173 trillion to $160 trillion between December 2014 and June 2015. Yen, sterling, and Swiss franc contracts also reduced, after modification for the effect of exchanged rate movement on the reported US dollar position of IRD denominated in those currencies". The size of the Indian derivative market is clearlysuperficial from the above information, however, compared to the worldwide market, it is still in its early stage. ThisIRR are managed through IRD. In India, RBI is empowered to regulate the markets in IRD, FCD & Credit derivatives.

Current Regulatory Framework In India

Understanding the nature and risk of these complex instrument is very vital to the customer. To use the structured products and to understand the risk, after extensive consultation with market participants RBI has issued comprehensive rules and regulations in April 2007. "Major guidelines include i) Functional categories i.e. Market makers and Users. ii) The purpose for undertaking derivative transactions. While for Market makers to act as counter parties and for users to hedge the risk". The IRD market in India has grown rapidly with participation from corporates and commercial banks. The rupee IRD presently permissible are FRA, IRS, and IRF.

payment of a premium amount to hedge unexpected risk that may incur in future".

RBI has presently permitted usage of following derivative instruments for banks:

- **Interest rate derivatives** – Interest Rate Swaps (IRS), Forward Rate Agreements (FRA), and Interest Rate Futures (IRF).
- **Foreign Currency derivatives** – Foreign Currency Forwards, Currency Swaps, and Currency Options

Generally, banks use FRA/ IRS to hedge the risk borne by them due to variations in interest rates due to changes in asset or liability on their balance sheet. They also use IRF to hedge risk on their investments in government securities. IRS and FRA arederivative contracts which authorize the players to exchange the fixed interest rates and floating rates linked to the contract.

Rupee IRD is flexible in nature, can be freely canceled and rebooked. As per RBI, guidelines customers can use rupee IRD to hedge IRR on both the sides of thebalance sheet.The customersshould have a genuine underlying exposure that should be satisfied by the bank's regulations.

Interest Rate Swap

Swaps have turned out to be dominant financial derivative instruments all over the world in the recent years. A swap is asettlement between two or more parties to exchange the cash

Table 1 The following table shows the cluster-wise and instrument wise derivatives of scheduled commercial banks for the year 2014 and 2015

(Amount in `Billion)						
Bank Group	**SBI & Associates**		**Private Sector Banks**		**Nationalized Banks**	
	2015	**2014**	**2015**	**2014**	**2015**	**2014**
1. Foreign exchange contracts	7017.8	6580.2	18313.7	13670.1	14771.5	11329.6
➤ Forward forex contracts	6830.5	6520.7	17673.0	13197.9	14650.5	11270.8
➤ Currency options purchased	187.4	59.6	640.7	472.2	121.0	58.8
2. Futures & Swaps	201.7	183.9	946.6	892.6	203.4	150.4
➤ Currency futures	-	-	2.0	-	78.6	-
➤ Cross currency interest rate swaps	201.7	183.9	944.6	892.6	124.9	150.4
3. Interest rate related contracts	398.7	662.8	6701.2	6175.4	604.3	607.3
➤ Forward rate agreements	-	-	8.8	8.3	-	-
➤ Interest rate options	-	-	15.4	22.4	-	-
➤ Interest rate futures	-	0.0	33.9	2.6	9.5	-
➤ Single currency interest rate swaps	398.7	662.8	6597.3	6105.4	594.6	607.3
➤ Basis swaps	-	-	45.9	36.7	0.2	-
➤ Total -Contracts/Derivatives	7618.2	7427.0	25961.5	20738.1	15579.2	12087.3

Table 1 shows that Nationalized and Private Banks are the major players in the derivatives market to manage the volatility. The total derivative contract used by the nationalized banks is 12,087 billion in 2014 and increased to 15,579 billion in the year 2015. Likewise, Private Banksused derivatives contract 20,738 billion in 2014 and it increased to 25,961 billion in the year 2015. SBI & Associates are the less users of derivative instruments, i.e. 7,427 billion in 2014 and it increased to 7,618 billion in the year 2015.

Interest Rate Derivatives

According to RBI guidelines, " Interest rate derivatives were introduced in the year2003, on NSE. This has authorized the Indian commercial banks, corporates, and other financial institutions to hedge theirinterest risk on underlying on

flows in the future date.Under the swap contract, different terms like the dates when the money streams are to be paid, the currency in which to be paid and the method of settlement are resolved and settled by the parties.There are two important types of swap contracts, i.e., IRS, and currency swaps.

IRS have turned into an essential part of the fixed income market.These type ofderivativecontracts, which commonly trade – or swap – fixed rate interest payments for floating rate payments, are animportant financial tool for investors who use them to hedge and to mitigate the risk. AnIRS is acontract between two parties to trade one stream of interest payment for another, over a set timeframe.Swaps are derivative contract and OTC in nature.The widely traded and most liquid IRS are known as Plain Vanilla Swaps, which exchange fixed rate for floating rate payments on LIBOR base.

Table 2 The following table shows the Interest rate OTC derivatives trade volumes from 2007- 08 to 2014-15

| Period | IRS Trade Summary (Rs. in Bn) | | | | | | | |
| | MIBOR | | MIFOR | | INBMK | | TOTAL | |
	Trades	Notional Amount	Trades	Notional Amount	Trades	Notional Amount	Trades	Notional Amount
2007-08	79495	47281	18139	6476	385	144	98019	53901
	81.10%	87.72%	18.51%	12.01%	0.39%	0.27%		
2008-09	40912	26448	4,799	2,237	132	66	45843	28751
	89.24%	91.99%	10.47%	7.78%	0.29%	0.23%		
2009-10	20352	14,521	1,050	539	77	51	21479	15111
	94.75%	96.10%	4.89%	3.56%	0.36%	0.34%		
2010-11	33642	23,597	1291	749	150	88	21479	15,111
	95.82%	96.58%	3.74%	3.07%	0.43%	0.36%		
2011-12	33642	24,510	2101	1100	14	9	35757	25619
	94.73%	95.67%	5.88%	4.29%	0.04	0.03%		
2012-13	22713	20,216	1252	754	11	6	23976	20977
	94.73%	96.37%	5.22%	3.60%	0.05%	0.03%		
2013-14	25514	22967	1437	798	1	4	23976	20977
	94.67%	96.63%	5.33%	3.36%	0.00	0.01%		
2014-15	21153	20292	1932	1198	5	3	23090	21493
	91.61%	94.42%	8.37%	5.57%	0.02%	0.01%		

Source: RBI-Publications-Reports

The London Inter-bank Offered Rate (LIBOR) is a yardstick for short-term floating interest rates and is fixed daily. The plain vanilla swaps cover majority share in the market compared to other types of IRS, such as those that trade one floating rate for another. Under swap contract, the party who agree to receive a fixed rate and pay floating rate is called as areceiver and the party who receives floating rate for fixed rate is a payer. In the swap contract, both the receiver and payer are called as counterparties.

Forward Rate Agreement

FRA is anover the counter contract between two parties to exchange interest payments for a pre-determinednotional amount on a predetermined date from contract start to end date. FRAs are settled in cash for interest rate contract and traded among the international banks in the Eurodollar market. In Indian scenario commercial banks, Primary brokers and other financial institutions are free to enter any FRA/IRS contracts to mitigate the financial risk or for their own balance sheet management and they can also offer these products for their corporate customers for hedging balance sheet exposures. No explicit authorization is required to undertake FRA/IRS from RBI. When participants start undertaking such contracts will be required to abide the reporting requirements as per RBI's regulations.

REVIEW OF LITERATURE

In areview of theliterature, we attempt to take a glance at banks' various purpose to utilize derivative instruments particularly IRD as a technique to deal with the IRR by evaluating work done in this area.

Ali Bendob. (2015), examined that the use of thederivative contract is positively accompanying with liquidity and negatively with asset quality. NobuhisaH. (2014), analyzed the use of derivative as a whole has no impact on bank risk, but the use of derivatives usedfor hedging purpose reduces bank risk. Shaofand Li. (2014), provided evidence that the relationship between financial derivatives and banks' exposure to systematic risk are positively and significantly related. Excess use of IRD, ERD & Credit derivatives correspondents to greater systematic IRR, ERR & CR. Charumathi B.(2010), examined that the larger banks (aggregate resources) and profitable banks (PBT to TAR) don't appear to have any

near favorable position to utilizing IRS for hedging reason more seriously than smaller banks. On the other hand, it is found that the banks with more introduction to IRR, high total assets, and higher advances to asset ratio have a tendency to be bigger clients of IRS. Chirag T. (2007), the results suggest that the size, profitability, credit worthiness and interest rate risk profile of the bank are the bank-specific factors that place a major role in the banker's decision to take interest rate swap position in the market and the extent of the notional amount is dependent on these. Katie H. (2000), in her study, large commercial banks with assets equal to or more than $500 million. According to this study, the banks with a greater proportion of IRR and credit risk are more prospective to use financial derivatives and also large banks are using the more derivative contract to hedge their financial risks compared to small banks.Srivastasva (2010), investigates that a negative correlation has been found in SBI, i.e. variable increases and the investment in IRD decreases and in the case of ICICI bank the result shows a positive correlation. They have employed Ratios, Correlation, and ANOVA to find out the extent to which these banks have managed the adverse movement in interest rate with the help of IRD. AppalaM. (2016), considered the role of off-balance sheet activitiesin generating other income in the balance sheet.The risk connected with the introduction of OBS is high and any default will influence the whole banking system particularly those of the new private sector banks and stimulates to systemic risk.

Scope of the Study

Although IRD has been the fastest growing off-balance sheet product in emerging markets, limited research has been conducted on the analysis of the specific characteristics, which describes the use of IRD by the Indian banks and which of the interest rate derivative contracts are widely used to mitigate the financial risk faced by the bank. Other than the bank-specific factors like size, profitability, stock price, credit worthiness and interest rate risk profile of the bank, the economy-wide factors used are financial market index and interest rate volatility. Although banks don't disclose much about their strategy of portfolio management, this study analyses the relationship between various factors of bank and economy and the position ofthebank in an interest rate derivatives.

Objectives of the Study

- To explore the use of Interest Rate Derivatives by the Indian commercial Banks
- To determine the impact of Interest Rate Derivatives on commercial banks profitability in India.

RESEARCH METHODOLOGY

Period of study: The study of ALM involves data for the year 2015.

The source of data: Only the secondary date is used in this study. i.e., Annual Reports of the bank, Financial Statements and RBI- Banking Statistics - Basic Statistical Returns of selected commercial banks and personal discussion with bank managers to get insights on various aspects of ALM.

Sample Size: To examine the application and importance of IRD, an in-depth study of 17 Indian commercial banks i.e. 10 Nationalized Banks, 2 SBI & Associates and 5 Private Banks, *out of 47 Indian commercial banks i.e., 21 Nationalized, 6SBI & Associates and20 Private Banks* are selected based on the IRD contract entered by the banks for hedging purpose.

Tools: The Multiple Linear Regression models is employed in this study. For this purpose, the following variables are selected such as Total Asset size, Qualitative Asset, Capitalization, Profit, Interest Rate Risk are regressed against the notional value of the IRD which are used for the hedging purpose.

Variables selected

Individualities	Representation variable
Total Asset Size	Log of TA
Qualitative Asset	Net Loans & Advances/ TA
Capitalization	Net worth/ TA
Profit	NII/Total Income
Interest Rate Risk	PBT/TA
Interest Rate Derivatives	IRS/TA

Where Interest Rate Derivatives isthedependent variable. IRD is the notional amount for hedging only. The independent variables are Total Asset Size, Qualitative Asset, Capitalization, Profit and Interest Rate Risk.

Hypotheses

H01: There is no association between bank's total asset size and the size of IRD contract as a hedging instrument.

H02: There is no association between qualitative assets ofabank and use of IRD as a hedging instrument.

H03: There is no association between Capitalization and use of IRD as a hedging instrument.

H04: There is no association between profitability and use of IRD as a hedging instrument.

H05: There is no association between the use of IRD as a hedging tool and IRR.

Analysis and Interpretation

Descriptive statistics

Table-3 provides some preliminary descriptive statistics for the variables used in the empirical analysis. A sum of 17 observations of the banks has been utilized. The notional amount of IRD utilized for asset liability management averaged Rs.37,629 Crores and ranged from Rs.140 crores (SBT) to Rs.4, 63,793 crores (ICICI). The Bank size as measured by the asset size had anaverage of Rs.4,73,357 crores, however, the majority of the banks in the sample have a lower amount of assets. The largest bank in the sample is SBI with a total amount of assets of Rs.27,00,110 crores, though the smallest bank is SBT bank with aggregate resources of Rs.1,05,595 crores. The subjective Asset on average is 0.613%. The profitability of Axis bank is highest at 0.029% with the average profitability of the sample of the banks is just 0.018%.

The R-square of the model equivalents 88.4% and the R-square adjusted of the model equivalents to 83.1%, which are both reliable. This implies that 83.1% of the changes in the IRDare due to thevariation of the independent variable utilized as a part of the model. This is the result of the good selection of the variables.

Size of the Bank

The regression results in table 6 demonstrate that there is a positive relationship between the size of IRD contract and total asset size. The beta coefficient value for this variable is positive and substantial for both 1% and 5% certainty level with a derived P-value of 0.70. The calculated t-test value is 2.009 which is greater than the table value. The variable's aggregate coefficient has a positive sign and equivalents to 1.301 in its regression coefficient and is a critical variable. So we should reject the null hypothesis and acknowledge that 'Relationship exists between the use of IRD as afinancial risk management tool and the size of the bank'. It can be expected that the size and the ability, and in addition expertise, that might be certainly accessible to large banks, give a near favorable position to these elements in IRD for hedging.

Qualitative Asset

The Beta coefficient value for this variable is negative and not significant for both 1% and 5% certainty level with a derived P-Value of 0.263. The calculated t-test value is -1.17 which is lesser than the critical value. Therefore null hypothesis H02 is accepted. As its standardized coefficient Beta value is – 0.484, keeping all other variables constant, if qualitative assets ratio increases by 100, then IRD ratio will decrease by 4.84.

Table 3 Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Total Assets	17	105595.4400	2.7001E6	5.010828E5	6.0627915E5
Profit B4 Tax	17	1372.16	38913.50	8179.3971	9117.90165
Net worth	17	5726.3800	161387.5400	3.279589E4	3.8243579E4
Net loans &Advances	17	68720.6100	1.6922E6	3.065888E5	3.7777999E5
NII	17	2283.1361	55015.2506	1.058659E4	1.2284470E4
Total Income	17	10583.3900	174972.9600	3.903332E4	3.8237946E4
Notional Value	17	140.0000	463792.9000	3.762896E4	1.1104119E5
Valid N (listwise)	17				

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.940[a]	.884	.831	.056711

a. Predictors: (Constant), NW/TA, Adv/ TA, PBT/TA, Ln of Asset, NII/TI

Table-5 ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.269	5	.054	16.745	.000[a]
	Residual	.035	11	.003		
	Total	.305	16			

a. Predictors: (Constant), NW/TA, Adv/ TA, PBT/TA, Ln of Asset, NII/TI

Table 6 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	-1.251	1.153		-1.084	.301
	Ln of Asset	.217	.108	1.301	2.009	.070
	Adv/ TA	-1.743	1.479	-.484	-1.178	.263
	PBT/TA	1.196	9.897	.050	.121	.906
	NII/TI	2.743	2.525	.961	1.086	.301
	NW/TA	4.436	1.763	.901	2.517	.029

a. Dependent Variable: IRD/TA

From the above analysis, it is concluded that there is no substantial relationship between qualitative assets ratio and the usage of IRD as a hedging tool.

Profitability

The regression results bring about the table demonstrate that there is a positive relationship between the utilization of IRD and profitability of the bank. The variable's coefficient has a positive sign and equivalents to 1.196 in its regression coefficient. The benefit of a bank turns out to be a substantial variable in the use of IRD with p-value 0.906. So we should dismiss the null hypothesis and acknowledge that a substantial relationship exists between the utilization of IRD as an ALM method and the EBT to TA proportion of the bank.

Interest Rate Risk Exposure

The Beta coefficient value for this variable is positive and substantial for both 1% and 5% certainty level with a derived P- Value of 0.301. The calculated t-test value is 1.086 which is greater than the table value. Hence the alternative value is accepted. As its coefficient Beta value is 0.961, keeping all other variables constant, if the capitalization ratio increases by 100, IRD ratio will also increase by 96.1. From the above analysis, it is concluded that there is a substantial relationship between the IRR and usage of IRD as a hedging tool. Hence banks with higher net interest income are considered as wide users of IRD.

Capitalisation

The Beta coefficient value for this variable is positive and substantial for both 1% and 5% certainty level with a derived P- Value of 0.029. The calculated t-test value is 2.517 which is greater than the table value. Hence the alternative value is accepted. As its coefficient Beta value is 0.901, keeping all other variables constant, if the capitalization ratio increases by

100, IRD ratio will also increase by 90.1. From the above analysis, it is concluded that there is a substantial relationship between the capitalization ratio and usage of IRD as a hedging tool. Hence banks with high net worth are considered as wide users of IRD.

Limitations of the Study

- The sample size is limited to only 17 commercial banks operating in India.
- The study period is restricted to the financial year 2015.
- The IRD for thetrading purpose is excluded from this study.
- The study is limited to theonly public sector and private sector banks which are taking an active part in the derivative market to reduce the risk and may not be applicable to other banks which are not dealing with the derivatives.

CONCLUSION

The study concludes that banks with higher profitability manage their risk better than other banks and hence take bigger positions in the IRD market. The banks with more acquaintance to IRR, high total assets, and higher advances to resource proportion have a tendency to be a bigger user of IRD. The study also concludes that to alter the balance sheet risks, banks relies on the use of capital market instruments such as IRS, IRF, IRO, FRA, FCF, CS and CO. Among these instruments, IRD are considered to be the widely used instrument for hedging against IRR. In perspective of the fast development of IRDmarket in India and narrowing of offer spreads, it is normal that the interest of banks in the derivative market will be significant than ever before.

References

Ali B. (2015). The effect of financial derivatives uses on the performance of the commercial banks- ananEmpirical study in GCC countries during 2000-2013. *Research Journal of Finance and Accounting, Vol.6*, No.18.

Amith K., &Joydip D. (2014). An Empirical analysis & comparative study of Liquidity ratios and Asset Liability Management of Banks operating in India. *International Journal of social, Management, Economics & Business engineering*, pp 357-363.

Appala R. (2016). Off-Balance Sheet Exposure - Performance Analysis and Risk Measurement of Indian Banks. *Archives of Business Research,* Vol.4, No.1, pp 112-117.

Bagchi S. (2005). Treasury Risk Management. Jaicob Publishing House, 1e, pp 35-48

Chirag T. (2007). Use of Interest Rate Swaps by Commercial Banks: An Analysis of Determinants. IIMB, pp 1-19

Chuang C. (2012). The Effect of Financial Derivatives Usages on Commercial Banks Risk and Value: Evidence from European Markets. pp 1-33

Database on Indian Economy, www.dbie.rbi.org.in.

Dr.Charumathi B. (2008). ALM in Indian Banking Industry-With special reference to interest rate risk management in ICICI bank. *Proceedings of the world congress on Engineering*, Vol II

Gyekyi S. (2011). The effects of asset liability management on profitability of national investment bank in the new jab eng municipality, pp 1-60

Kanhaiya S. (2013). Asset Liability Management in Banks- A Dynamic approach. *AIMA Journal of Management & Research*. Vol 7, Issue 2/4.

Mihir D, Ravi P., (2008). Canonical correlation analysis of asset and liability management of Indian banks.

Prathap B. (2013). An Empirical Study of Asset Liability Management by Indian Banks, *Asia Specific Journal of Research*, Vol 2, Issue 4.

Sheela P. (2015). Asset-Liability-Management– A Comparative Study of a Public and Private Sector Bank, *IRJBM*, Vol No – VIII, Issue – 1, pp 34-44.

Soretha B. (2004). The use of derivatives to manage interest rate risk in commercial bank *Journal of Investment Management & Financial Innovations, pp* 60-74.

Xuan S. (2013). Financial Derivatives and Bank Performance (Thesis), Auburn University.

****