Use of Interest Rate Derivatives in Indian Banks: An Empirical Study

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ABSTRACT

Interest rate risk can be seen as one of the most important forms of risk, that banks face in their role as financial intermediaries. There are various recent developments and innovation in financial theory, increased computerization, and changes in foreign exchange markets, credit markets and capital markets have contributed to the need to supplement traditional methods to measure and manage interest rate risk with more recent methods. Interest rate risk can thus be controlled optimally by using of derivatives along with traditional methods, in order for banks to experience less interest rate uncertainty, and to increase their lending activities, which can result in greater returns and higher overall profitability. The present study focuses on the theoretical aspect of the use of Interest Rate Derivatives(IDR) and testing empirically on four top tier Indian commercial banks. Our result shows that banks are using the IDRs as a very handy tool for hedging and managing interest rate risks.

Kew Words: *Derivatives, Risk management, Financial intermediaries, Hedging, IDR*

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INTRODUTION:

Commercial banks in nature serve as a financial intermediary in two ways. First, it can serve as a broker, in which it channels funds from surplus units to deficit units without modifying the rate-sensitivities. Second, it can serve as an asset transformer, in which it modifies the rate sensitivities to appease the deficit units. The bank's choice will depend on the uncertainty of interest rates and the cost of funds (Madura & Zarruk, 1995)[1].

Interest rate risk is one of the most important forms of risk that banks face in their role as financial intermediaries (Hirtle, 1996). Nowadays, apart from traditional ways to measure and manage interest rate risk, derivatives are also used. Banks participate in derivative markets especially because their traditional lending and borrowing activities expose them to financial market risk and doing so can help them to hedge or reduce risk and to achieve acceptable financial performance (Brewer & Moser, 2001)[2].

SOURCE OF INTEREST RATE RISK:

Fundamental changes in the regulatory and market environment have made interest rate risk a vital issue (Schaffer, 1991). Interest rate risk is the potential for changes in interest rates to reduce bank's earnings and lower its net worth (Feldman & Smith, 2000).

There are several repercussions of interest rate risk. The primary and most often discussed source of interest rate risk stems from timing differences in the repricing of bank assets, liabilities and off-balance-sheet instruments. These repricing mismatches generally occur from either borrowing short-term to fund long-term assets or borrowing long-term to fund short-term assets (Wright & Houpt, 1996)[3].

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[1] See the details available at http://www.ajol.info/index.php/ajfm/article/view/24348
[2] The web resource is available at http://www1.american.edu/academic.depts/ksb/finance_realestate/rhauswald/seminar/BankLending.pdf
[3] The article is available at http://www.federalreserve.gov/pubs/bulletin/1996/296lead.pdf

Another important source of interest rate risk arises from imperfect correlation in the adjustment of the rates earned and paid on different instruments with otherwise similar repricing characteristics. When interest rates change, these differences can give rise to unexpected changes in the cash flows and earnings spread among assets, liabilities and off-balance-sheet instruments of similar maturities or repricing frequencies (Wright & Houpt, 1996).

It is essential that banks accept some degree of interest rate risk. However for a bank to profit consistently from changes in interest rates requires the ability to forecast interest rates better than the rest of the market (Schaffer, 1991). The challenge for banks is thus not only to forecast interest rate risk, but also to measure and manage it in such a way that the compensation they receive is adequate for the risks they incur (Feldman & Schmidt, 2000). To measure and manage interest rate risk, various instruments, from gap management to derivative, can be used.

TRADITIONAL WAYS TO MANAGE INTEREST RATE RISK IN BANKS:

- **Gap Analysis:**
  Regulators and banks employ a wide variety of techniques to measure and manage interest rate risk (Feldman & Schmidt, 2000). A traditional measure of interest rate risk is the maturity gap between assets and liabilities, which is based on the re-pricing interval of each component of the balance sheet. To compute the maturity gap, the assets and liabilities must be grouped according to their repricing intervals. Within each category, the gap is then expressed as the amount of assets minus those of liabilities. Although the maturity gap suggests how a bank's condition will respond to a given change in interest rates (Schaffer, 1991), and thus permits the analyst to get a quick and simple overview of the profile of exposure (Hudson, 1992), the downside of this approach is that it doesn't offer a single summary statistic that expresses the bank's interest rate risk. It also omits some important factors, for example, cash flows, unequal interest rates on assets and liabilities, and initial net worth (Schaffer, 1991).

- **Duration Analysis:**
  Duration can also be used and is usually presented as an account's weighted average time to repricing, where the weights are discounted components of cash flow. A bank will be perfectly hedged when the duration of its assets, weighted by value of assets, equals to the duration of its liabilities, weighted by value of liabilities. The difference between these two durations is called the duration gap, and the larger the bank's duration gap is, the more sensitive a bank's net worth will be to a given change in interest rates (Schaffer, 1991). The advantages of duration analysis is that it provides a simple and accurate basis for hedging portfolios, it can be used as a standard of comparison for business development and funding strategies, and it provides the essential elements for the calculation of interest rate elasticity and price elasticity (Cade, 1997). Several technical factors however, make it difficult to apply duration analysis correctly. First, the detailed information on cash flows required for duration analysis presents a computational and accounting burden. Second, the true cash flow patterns are not well known for certain types of accounts, such as demand de- posits, and they are likely to vary with the size or timing of a change in market interest rates, making it harder to quantify the associated interest rate risk. Finally, a more complex version of duration is needed to reflect the fact that, long-term interest rates are not always equal to short-term interest rates and may move independently from each other (Schaffer, 1991).

- **Simulation Analysis:**
  Some banks simulate the impact of various risk scenarios on their portfolios (Schaffer, 1991). In other words, simulation analysis involves the modelling of changes in the bank's profitability and value under alternative interest rate scenarios (Payne et al., 1999). The advantages of this technique are that it permits an easy examination of a bank's interest rate sensitivities and strategies (Cade, 1997), and it replicates the same bottom line as duration theory while bypassing the more sophisticated mathematical deviations. The drawback of this approach is that the need for detailed cash flow data for assets and liabilities are not satisfied and computers alone cannot solve the problem of forecasting cash-flow patterns for some assets and liabilities (Shaffer, 1991).

- **Scenario Analysis:**
  Another approach is to choose interest rate scenarios within which to explore portfolio effects (Schaffer, 1991). Different scenarios must thus be set out and it must be investigated what the bank stand to lose or gain under each of them. Advantages of this approach are that it can be applied to most

kinds of risks and that it is less limited by data availability. Schaffer (1991) states, this approach are thus more flexible and it requires less effort.

Unfortunately traditional measures of interest rate risk, while convenient, provide only rough approximations at best and derivatives are the advanced techniques must be used in addition.

DERIVATIVE APPROACH FOR INTEREST RATE RISK MANAGEMENT:

Innovation in financial theory and increased computerization, along with changes in the foreign exchange markets, the credit markets and the capital markets over time, have contributed to the growth of financial derivatives.

Financial derivatives are instruments whose value is derived from one or more underlying financial assets. The underlying instruments can be a financial security, a securities index, or some combination of securities, indices and commodities.

Derivatives in their simplest form include forwards, futures, options and swaps and they can be defined as follows:

- *Forward contract:* This is a legal agreement between two parties to purchase or sell a specific quantity of a commodity, government security or foreign currency or other financial instrument at a price specified now, with delivery and settlement at a specified future date.
- *Futures contract:* This is an agreement to buy and sell a standard quantity and quality of a commodity, financial instrument, or index at a specified future date and price.
- *Interest rate swap:* This is an agreement between two parties to exchange interest payments on a specified principal amount for a specified period.
- *Option:* This is a contract conveying the right, but not the obligation to buy or sell a specified item at a fixed price within a specified period. The buyer of the option pays a non-refundable fee, called a premium, to the writer of the option and the maximum loss is the premium paid for the option. Options can be divided into caps, collars and floors:
  - *Cap:* This gives the purchaser protection against rising interest rates and sets a limit on interest rates and amount of interest that will be paid.
  - *Floor:* This sets a minimum below which interest rates cannot drop.
  - *Collar:* By purchasing a cap and simultaneously selling a floor, a bank gives up some potential downside gain to protect against a potential up-side loss.

Commercial banks have become market makers (intermediaries) in interest rate risk management products, such as, futures contracts, forward rate agreements, interest rate swaps, and options such as caps, collars and floors. Banks will thus intermediate between long and short positions and they can assume the role of the clearinghouse, hedging residual exposure resulting from an imbalance between the opposing sides in the transaction. The bank thus transforms the nature of its sources and uses of funds. This transformation takes place on several dimensions: denomination, maturity, interest payment, and rate reset periodicity among others. The bank will also tailor the contracts to meet the needs of its depositors as well as its borrowers and it will design contracts that stand between those firms which seek to hedge against rising rates and those which seek to hedge against falling rates.

According to Sinkey (2002) the idea behind hedging interest rate risk with derivatives is to offset or reduce losses in cash or spot markets with gains in derivative markets and hedging can be applied to individual assets (a micro hedge) or to a bank's balance sheet (a macro hedge). An example of micro-hedging on the liability side of the balance sheet occurs when a financial institution attempting to lock in the cost of funds to protect itself against a possible rise in short-term interest rates, takes a short (sell) position in futures contracts on certificates of deposit or treasury bills. It will be best to pick a futures or forward contract whose underlying deliverable asset is closely matched to the asset (or liability) position being hedged, to prevent basis risk (uncorrelated prices).

There are several hedging strategies that can be used to manage interest rate risk:

- *Cash flow hedge:* This is a hedge against forecasted transactions or the variability in the cash flow of a recognized asset or liability (Landsberg, 2002, p. 11). In this hedge, a variable rate loan can, for example, be converted to a fixed rate loan. It can also hedge the cash flows from returns on securities to

be purchased in the future, the cash flow from the future sale of securities, or the cash flow of interest received on an existing loan (Rasch & Colquitt, 1998).

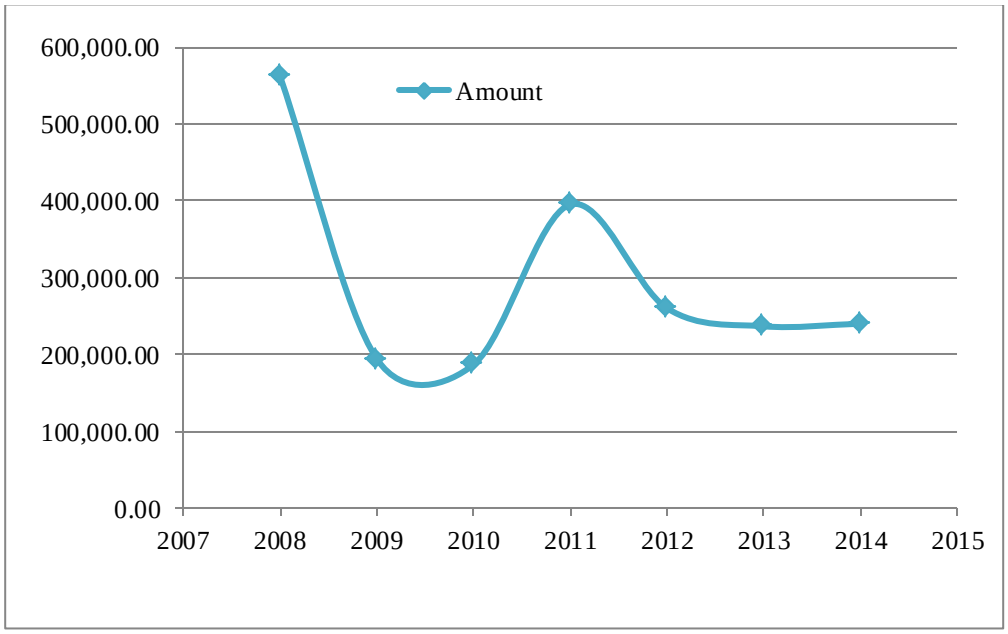
- *Market value hedge:* This is a hedge against exposure to changes in the value of a recognized asset or liability (Landsberg, 2002). In this type of hedge a fixed-rate can, for example, be converted to a variable rate (Rasch & Colquitt, 1998).
- *Foreign currency hedge:* A forward contract entered into to sell the foreign currency of the foreign operation would, for example, hedge the net investment. Therefore, if the exchange rate decreases, the net investment would also decrease. The forward contract would however increase in value because the currency could be purchased at a lesser amount than the locked-in selling price (Jones et al., 2000).

EMPIRICAL EVIDENCE OF USE OF INTEREST RATE DERIVATIVES:

We have verified the fact of use of interest rate derivatives by commercial banks empirically. For that purpose we have taken three private sector banks (ICICI, HDFC, and AXIS) and one public sector bank (SBI). The data has been analysed for 7 years from the year 2014. For analysis, we have used the annual reports of the respective banks and the relevant data has been extracted from the schedules forming the part of accounts. For assessing the extent use of Interest Rate Derivatives(IRD), we have used the year end outstanding notional value of Forward Rate Agreement(FRA) and Interest Rate Swaps(IRS). From our findings, it has been observed that all the sampled banks are extensively using interest rate derivatives for hedging the interest rate risks. As interest rate derivative banks use rupee interest rate swaps, foreign currency interest rate swaps and forward rate agreements. From the data analysis it is quite intuitive that in the year 2009, there is a sudden decrease in use if IRD probably because of global financial meltdown in the year 2008. But after that there is a smooth recovery in all the four firms and more particularly in case of AXIS Bank and SBI, there is a constant increase in the level of use of IRD year after year. The following tables and graphs will show the use of interest rate derivatives by the banks.

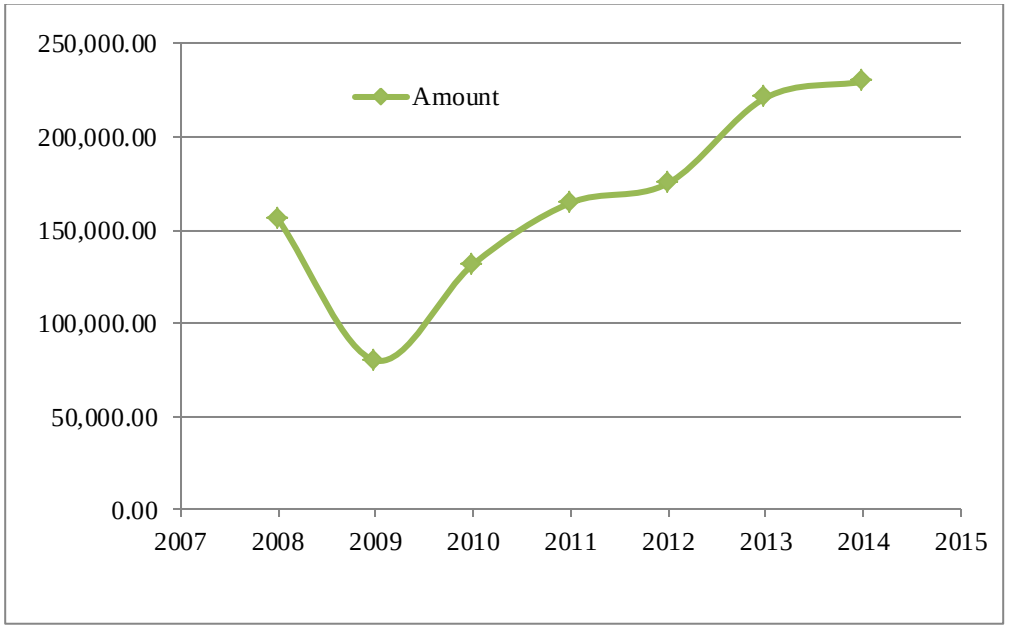
ICICI BANK

Year	Amount of IRD
2008	5,61,812.26
2009	1,94,252.89
2010	1,87,081.91
2011	3,95,252.23
2012	2,60,314.30
2013	2,36,806.94
2014	2,40,199.31



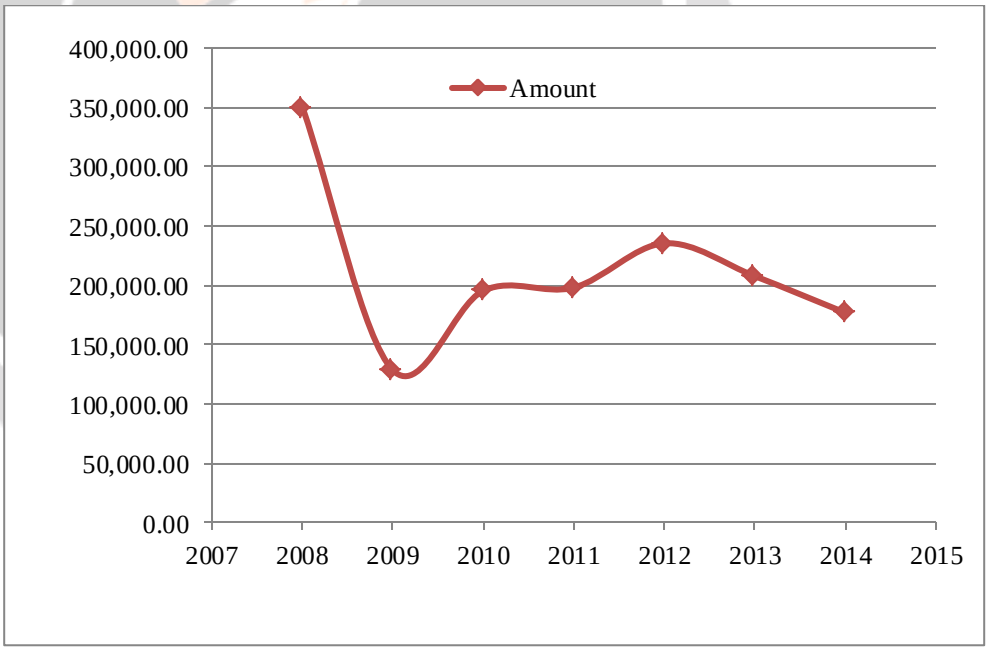
AXIS BANK (` CRORE)

Year	Amount of IRD
2008	1,55,918.50
2009	80,177.66
2010	1,31,696.28
2011	1,64,697.20
2012	1,75,249.08
2013	2,21,054.14
2014	2,29,690.75



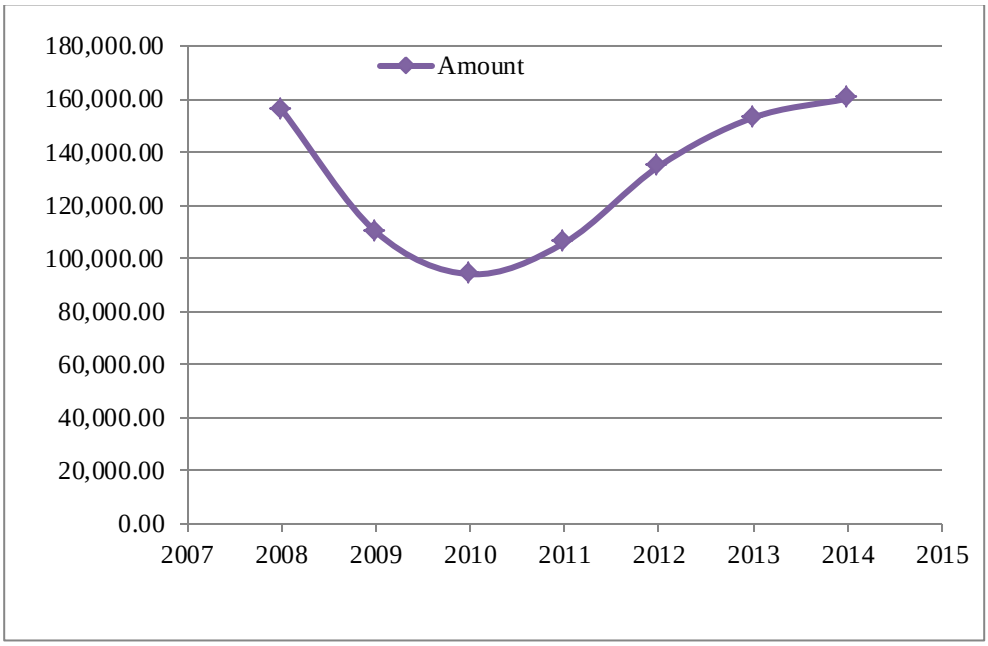
HDFC BANK

Year	Amount of IRD
2008	3,50,090.00
2009	1,28,231.80
2010	1,95,322.94
2011	1,97,950.87
2012	2,35,233.55
2013	2,07,507.18
2014	1,76,666.72



SBI

Year	Amount of IRD
2008	1,55,928.42
2009	1,09,936.12
2010	93,984.43
2011	1,05,850.77
2012	1,34,671.34
2013	1,53,015.27
2014	1,60,156.94



OTHER ADVANTAGES OF USING DERIVATIVES IN BANKS:

Apart from using derivatives for interest rate risk management (hedging against interest rate risk), they can also be used to:

a) Lower funding cost;
b) Diversify sources of funding;
c) Hedge debt;
d) Hedge changes in foreign currency exchange rates;
e) Manage the risk related to day-to-day operations ;
f) Manage the balance sheet and results; and
g) Take open or speculative positions to benefit from anticipated market movements.

Using financial derivatives has the following advantages:

(i) Risk, which could not be easily avoided previously, can now be insured;
(ii) Derivatives provide a relatively inexpensive means for banks to alter their interest rate risk exposure;
(iii) Derivatives provide a means for banks to more easily separate interest rate risk management from their other business objectives;
(iv) Banks that use derivatives can increase their business lending faster than banks that do not use derivatives and derivative usage thus fosters more loan making or financial intermediation;
(v) Managing interest rate risk through derivatives may be preferable to balance-sheet adjustments using securities and loans because it lessens the need to hold expensive capital, implying that derivative usage allows banks to substitute inexpensive risk management for expensive capital;
(vi) Banks can use derivatives to transform almost any aspect of their business and of the structure of their financial statements. They can consider cutting out unprofitable activities and making up the gap with appropriate financial instruments, they can deal financially rather than physically with commodities and they can easily rearrange their financial activities in such a way as to apportion risks and returns exactly as they require;
(vii) Derivatives have the potential to enhance profitability and reduce volatility when used properly, and can thus increase the potential for banks to move towards their desired level of interest rate risk exposure; and

(viii) Derivatives have the potential to enhance the safety and soundness of banks and to produce a more efficient allocation of financial risks.

Using financial derivatives, unfortunately, also has disadvantages. They include the following:

a. Derivatives transactions can affect the bank's overall risk exposure, and derivatives can thus be seen as a potential source of increased solvency exposure;
b. Knowing more about the derivatives position of a bank may not allow outside stake- holders to determine the overall riskiness of the bank. Banks invest in many non- derivative instruments that are illiquid and opaque. Thus even if the value of their derivatives positions were known, it would be hard to know how subject to interest rate and other risks the bank will be; and
c. There is a fixed cost associated with initially learning to use derivatives. Large banks are more willing to incur this fixed cost because they will be more likely to use a larger amount of derivatives and the fixed cost can thus be spread among opportunities.

CONCLUSION:

Banks encounter interest rate risk in several ways, with the most important being, the re- pricing differences between assets and liabilities. Banks must accept some form of interest rate risk, because banks profit from taking risks. It is therefore not only important for banks forecast interest rate risks but also to measure and manage it appropriately. Traditional ways to measure and manage interest rate risk include gap analysis, duration analysis, simulation and scenario analysis. Nowadays derivatives are however used in addition to the traditional approaches, because of all the changes that have taken place in the financial market place recently and to make interest rate risk management more effective. Using derivatives can thus be considered as a part of any bank's interest rate risk management strategy and also its total risk management strategy to ensure optimal financial performance.

Apart from interest rate risk management by means of hedging, derivatives can also be used for other important purposes, for example, speculation. Despite the advantages of derivatives in the management of banks they unfortunately also have disadvantages, for which banks must be prepared, to ensure that the use of derivatives will be more beneficial than detrimental.

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