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Interest Rate Risk and Derivatives

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Introduction

Financial risk management by a company is really a process, and not a one-off decision, or even a series of market reactive decisions, made by executives in the course of managing their businesses. Sometimes, corporate executives tend to forget that, and invariably, are reminded of this when the financial markets go through periodic turmoil.

It is perhaps easiest to describe the risk management process by caricature – by first describing what it should not be, but unfortunately, often becomes. A smart consultant looking for advisory fees, or a Bank treasury seeking transaction margins, or an investment banker chasing either fees or a mandate, approaches a company and says "You have this risk and we must manage it. How? You must buy this product!" This naturally worries the company, which transacts the product and is satisfied that it has managed its risk – while the investment banker gets his mandate, the commercial bank treasury gets his transaction margin and the consultant gets his fees!

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Caricature though this may be, it is often not far from reality. However, this is not what a risk management process is about! We discuss below the process of interest rate risk management, which is a significant element of any company's financial risk management, and comment specifically on the role and use of derivatives for interest rate risk management.

The Process of Interest Rate Risk Management

The process of interest rate risk management involves a company determining it's business objectives, understanding the money markets and debt capital markets in which it operates, and within the context of these parameters, recognising and quantifying its appetite for market risk. On this basis, the company can approach a financial consultant, or a commercial bank treasury, or an investment banker, to assist in creating a documented prescription for risk management. Once this document is approved by the Board, it becomes the company's risk management policy. This policy specifies the processes of identifying, measuring and limiting risks, and finally, the procedure for reporting the process of risk measurement and limitation to the top management. On the basis of this policy, the company can carry interest rate risk exposure, and also enter into various risk management transactions to manage that exposure, and measure the results of such transactions within this prescribed framework. This policy-driven approach ensures not only that risks are well understood along the management chain, but also that the company is not caught off guard in periods of adverse volatility, or by the financial impact of risk management transactions.

Interest Rate Risk in India's Money and Debt Markets

Let us examine our markets, the risks that exist therein, and the participants which face these risks. I shall focus on two relevant markets – the bond markets and the money markets. The participants assessed are the corporate issuers, institutions, and banks.

- Banks face risks on their "SLR" portfolios, consisting of dated government bonds and treasury bills. Movements in bond prices are based on interest rate movements. Furthermore, corporate bond investments are also found in the banks portfolios, which, likewise, are subject to interest rate risks.
- Similarly, since large institutional investors and mutual funds are holders of corporate bonds, they also face the price risk on those bonds.
- Corporates themselves face the risk of escalation in interest rates for their short term working capital funding and long term funding through bond market issuance.
- In money markets, most institutions and banks have serious risks at the short end because of balance sheet asset-liability mismatches.

We thus see that interest rate risk is present in almost every situation that we can envisage, and for each of the three major classes of participants in these markets.

Interest Rate Risk Management for Banks in India

Institutions as well as banks presently face interest rate risks in their balance sheet management. Balance sheet mismatches were not a key issue earlier, when loan and deposit rates were dictated by regulation. During that period, coupon rates on Government securities were static and would, once in a while, change by around 1%. Since this was more by *dictat* and not by market forces, little could be done about it by the participants. In addition, this was a period when financial institutions and banks had very large net interest margins which ranged from 4% to 6%, while the usual changes in Government of India (GoI) coupon rates were only about 1%. Therefore, this was not considered a major issue, and in any case, this fluctuation could neither be anticipated nor influenced, as it was dictated by the regulators.

During the same period, there were no systems to recognise embedded losses in interest rates, due to the acceptance of high cost deposits. Since we follow accrual accounting systems, the current or mark-to-market impact of high cost deposits on the balance sheet was not immediately visible, as this was accrued over the following 5 to 7 years.

Today, all this has changed. Interest rate deregulation is more or less complete – except at the very short end – and interest rate volatility is here to stay. The GoI security coupon rates are now determined by the market. Although secondary market demand and supply, as well as the pattern of issuance in the primary market impact these rates, there still exist large bank and institutional investors who are guided largely by the need to maintain a quantum of reserve requirements, with lower priority for price risk management. Therefore, while it is still not a perfect market, it is nevertheless the market which dictates Government of India coupons, and interest rate risk of the order of 2% or more in GoI yields is not unusual.

Competition, coupled with an increased awareness of the market among borrowers and the issuers has led to a narrowing of the net interest margins of financial institutions and banks. This has led to lower margins, at 2% to 3% as against the 4% to 6% range of yore. Therefore, potentially, institutions and banks are betting their entire net interest margin on interest rate risk, which is a very significant change from the past five years.

Thus, there is a clear need to develop an approach to risk management. Since risk originates from maturity mismatches in bank and institutions assets and liabilities, it is highly recommended, particularly in this market, to begin by using the gap management approach. The objective of the approach is to identify the risk and yield preferences of the bank or the institution. However, the gaps of the bank or institution should reflect these preferences, and not merely be the random result of various loans and deposits made or taken over the past several years. Unfortunately, the reality is that the balance sheet's maturity profile is normally the result of corporate and client actions rather than business decisions made by the management of the bank or the institution.

Managing maturity gaps obviously means that a company has to plan its balance sheet growth, and use asset and liability pricing to signal its interest or disinterest in various types of assets and liabilities of various maturities.

The micro objective of asset and liability management in an institution or a bank, is that the system of maturity gap management must be accompanied and supported by an appropriate pricing methodology. This

will ensure that the departments are instructed to accept – or refuse – assets and liabilities, of various maturities, at a particular price. Maturity gap management is however not the only method of managing interest rate risk. There are three broad approaches for managing interest rate risk. These are,

1. *the maturity gap approach* – which has already been described above,
2. *the simulation approach* – which consists of writing out the maturity profile; modelling the expected movements in interest rates (both upwards and downwards); calculating the impact of that on the accrual profit and loss, as well as the marked to market profit and loss; and, then deciding whether the particular balance sheet is appropriate (or otherwise) and can be managed, and,
3. *the duration approach* – which is a way of measuring the effective duration of your assets and liabilities, and, whether you can use hedges and increase or decrease the respective duration of both sides. The objective here is that, if the average duration of both assets and liabilities is matched, if the curve moves in parallel, and if asset and liability interest rates move in tandem, then in theory, there will be no loss – a very tall order indeed in most immature interest rate markets such as India.

We advocate the maturity gap approach in preference to the others because, in our market, the risks do not arise in as orderly or correlated a manner as in mature markets which have a well developed *yield curve*, and the typical instruments that can be used to manage these risks are not available in totality.

Usually, the maturity gap approach is used together with simulation modelling, if there is a defined curve, and there are no real hedges. Participants would use more simulation modelling and the duration gap approach if there are deep and liquid hedge markets and the yield curve is well defined.

Defining a 'Yield Curve' in India

Various interest rates – the SBI's deposit rates, Government of India's borrowing rates, commercial paper, corporate debentures, PSU bonds, etc. – across a variety of maturities, define a yield curve. When we view a yield curve, we see that retail deposits are below the interbank market as they

have to include the grossed up cost of retail deposits. The retail deposit rates, in turn, have to be grossed up for the cost of statutory reserves as also for the cost of mobilising deposits. Therefore, there is normally a large gap between retail deposit rates and the interbank market. The yield curve will further display, below the inter-bank market, the Government benchmark. This is due to the credit and liquidity premium that a Government bond commands over an interbank deposit. There is a credit premium because the Government has a better credit then banks, and, a liquidity premium since Government benchmarks are traded instruments – and are hence liquid – whereas a bank deposit is simply a bilateral deposit, i.e. only a loan against a counterparty's acceptance of it.

Therefore, an Indian yield curve has three key components – retail deposits, and above that the interbank curve, and, somewhere below that, the Government curve. Lending rates or corporate bond rates should be above the interbank curve, since they represent higher risk. These lending rates or corporate asset rates could however be tradeable assets or illiquid assets by way of term loans. Usually, the further out you go in time, the broader is the credit premium – the credit spread between bank and corporate. This is what should be reflected by a proper yield curve.

In India, as we do not as yet have a proper yield curve, the methodologies available to us for interest rate risk management are restricted. We have made some positive progress recently, however, since we are moving towards the setting up of an interbank benchmark. Gradually, as the RBI looks at interest rate swaps, they will effectively be allowing an interbank reference rate to emerge, not just at the call end – which already exists – but across the entire spectrum of maturities. This will be similar to the US market where the money market is really short end (upto one year, and most liquid in the overnight maturity), beyond which it is the dollar interest-rate swaps that effectively dictate an interbank market, which is the interbank rate for all practical purposes.

Let us now consider how a typical developed market would look like, and the kinds of instruments which would then be available for interest risk management, before we return to the Indian situation.

Risk Management in Developed Markets

Let us consider the most developed market, viz. the US market and US Treasuries (known as T-Notes for 2 to15 year issues, and T-Bonds for the longest or 30 year tenor). There is a multi-trillion Dollar bond market in the US Government issuances. The US Treasury market has given rise to the markets for US Treasury bond futures which are a means of hedging interest rate risks for those who have investments in US Treasuries. They can always short the future if they wish to hedge their risk on the Treasury. For those who want to be more sophisticated in hedging, they can purchase an option on the US Treasury futures, from among the host of options available on CBOT. All this is available at the long end of the curve.

Various corporate issuances are made and traded at credit spreads against the US treasuries of corresponding maturities. If someone wants to hedge the interest rate risk element of his corporate bond holding, then he can also short a US T-note future. This leaves him with the credit risk spread between the corporate asset and the US treasury – which he shorted by selling a future. The credit risk itself is volatile. For instance, over the last few weeks, the movement in the Indian issuers US–denominated paper and spreads have widened by almost 100 points, whereas, paper which was trading at 100-120 over is now trading at 190-220 over corresponding Treasuries. This movement is credit related and it is influenced by the negative Asia perception that prevails in the international debt and capital markets today. It has nothing to do with interest rate risk per se, because the US treasuries are roughly at the same place today as they were a fortnight ago.

As far as the money market is concerned, we always begin at the short end – the three months eurodollar deposit – which in 1984, became the underlying of the Eurodollar futures. These futures were effectively forward rates on forward-to-forward three month deposits, and from those futures arose the interest rate swap markets which could also be used as hedges for US Treasuries because there was clearly a spread – the credit and liquidity premium – called a ‘swap spread’ between the US Treasuries and the interest rates swaps. From the forward interest rates arose interest rate guarantees and interest rate caps and floors, and from interest rate swaps arose options on the swaps in other words, swaptions – i.e. the families of

options on interest rates. Thus there was a kind of organic growth process, beginning at both the short end (the money market), and the long end (the Government bond market), going into derivatives of those and then second order derivatives, the whole family growing organically in response to market demands.

I believe that the Indian market should also be gradually encouraged to move in this direction. The question could be asked – why? What is the use of derivatives? Why can the same risk management objectives not be achieved through underlying or physical markets? The answer is yes, it is true that we could, if shorting of Government bonds were permitted, and – with adequate systems and safeguards, although we are a long way from that – if shorting of corporate bonds were also permitted. On the money market side, if there were a deep and liquid money market going out to a year (and we are very far from that, too) if someone to hedge a three month against six month gap, he could do so by borrowing three months and lending six months – if he wanted to hedge against the movement in three months interest rate in three months time.

There are, of course, always physical alternatives to the derivative, hence the word 'derivative'. But the point is that the derivative is more efficient in many crucial ways. Its advantages over physical instruments, as far as interest rate risk management is concerned, are that credit risk is less and settlement risk is less. Credit risk – because there is no physical money passing hands, there is no borrowing or lending taking place. Settlement risk – because settlement of derivatives is normally on a 'net' basis. As an example, consider the 3-against-6 month gap hedge referred to above, a forward deposit and a loan. The hedger is lending money to his counterpart, who is in turn lending money to the hedger, and therefore both are at risk of default. However, if the hedger buys a 3's against 6's FRA (Forward Rate Agreement) then there is no such risk. For banks this aspect becomes very critical because the size of the bank's balance sheet is such and the gaps are so huge that if the bank were to just physically lend and borrow in the money market, then it would end up ballooning the balance sheet substantially and increasing it's usage of capital. However, if the bank uses derivatives on interest rates then the capital usage would be 1 or 2 percent

as against the 100% which would be required for lending money. That is due to the low risk weight of short term interest rate derivatives. And finally, for those who are traders and intermediaries, the cost of trading a derivative in order to take the same interest rate view is much, much less than the cost of actually buying a CP or buying a CD or actually physically lending out money – if you think the rates are going down, or physically borrowing money – if you think the rates are going up.

In the case of a forward rate agreement (FRA) used either to hedge or to take a position on interest rates, there is no outright default risk on the principal amount because the users are all referencing interest rates to the amount of the FRA, and are not actually paying or receiving money. Secondly, there is hardly any settlement risk because one is not borrowing or lending hundreds of crores, one is only settling the net difference of interest on a hundred crores, which is very far removed from the principal amount. Secondly, as against a borrowing or a lending where one settles the interest coupon in the end, here is a net upfront settlement – so one has a collection of the interest immediately.

Overnight Index Swaps in Rupee

Another example, which is also for the short end of the curve, is the use of an Overnight Index Swap in Indian Rupees. Again, let us consider banks and financial institutions as potential users of derivatives for risk management. Consider two counterparties, one is a financial institution and the other is a bank treasury. The financial institution (FI) is a lender in the call money market. The FI's management may have a policy to keep a liquidity buffer because they have got withdrawals taking place and they need liquidity – they need cash to be available. Therefore they are surplus cash – the liquidity buffer – which they have to deploy. Now unfortunately, if they deploy this in the 'call' or overnight money market, which is the only way they can deploy it while still remaining liquid, then all they will earn on that is the call money interest rates which are 6% to 7%. As they want to be liquid, they cannot deploy this in the term market, i.e. they cannot lend this cash to someone for six months and earn 10%, a term interest rate. What they would like to do is earn 10% but only lend it on an

overnight basis. So the FI's aim is to delink it's liquidity management from it's interest rate risk profile.

The other party is a bank's treasury department, which is funding itself at the margin in the money market. The bank actually has term assets, which are six month assets, and yet because there is no lender for six month money, the bank would probably borrow in the call market and face the interest rate risk of the call borrowing going up for the next six months. Due to the lack of a market, the bank is obliged to be in the call (overnight) market. They want to pay fixed rates but are forced to pay call rates which today may be an advantage, but comes at an unacceptable risk.

What these counterparties can do is enter into what is described as an Overnight Index Swap, or in this particular case, a MIONA Swap referenced against the Mumbai Interbank Overnight Rate ('MIOR' – a REUTERS index of Call Money rates taken on the basis of a participant poll at 10 a.m. each day). In other words, the financial institution strikes an agreement with the bank counter party by which the FI receives 10% and pays the MIOR or Mumbai Interbank Overnight Rate on a compounded average basis. The bank does the opposite – effectively it agrees to pay a fixed rate of 10% to the institution and it will receive MIOR.

In terms of who is lending or borrowing in the Call money market, absolutely nothing has changed. The institution continues to lend in the call market, the bank continues to borrow in the call market. However the cost of the banks call borrowings, and separately, the earning on the institutions call lending are neutralized against one leg of their MIONA swap. At the end of the day all that is happening is that the institution is earning 10% fixed for three months and the bank is paying 10% fixed for three months.

Thus, the institution has achieved its objective which is to earn a term interest rate while keeping it's liquidity and keeping it's cash because it is still lending in call, and the bank has achieved it's objective which is to lock into a fixed interest rate and not be fully exposed on its borrowing at call interest rates. Nothing has changed in terms of who is *lending* money or who is *borrowing* money and from which market. The call borrower counterparty (bank) still borrows from its usual 'call' lenders, and the call

lender counterparty (FI) still lends to its usual counterparties. All that happens is that the interest rate risk profile of each has changed, whereas the liquidity profile has remained completely unaffected.

Is interest rate risk being managed using this derivative? The answer is an emphatic 'yes'. Specifically, if we look at it from the point of view of the lender – the financial institution – it's interest rate risk is that it may not earn the high interest rate that it was looking for to set off its cost of funds. The three month fixed interest rate which it has received through the swap covers this risk.

Conversely, for the bank treasury in this example, their interest rate risk is that they are exposed to 'call' rates going up and eating into an otherwise healthy spread on a six-month corporate term asset. By using the swap the bank treasury *has locked into a fixed rate* and thus eliminated any chance of variability in net interest margin on this particular asset.

I end this session with this example, which illustrates how an appropriate derivative can indeed be used in India, with appropriate RBI / regulatory clearances, to address interest rate risk management. Asset and liability management is a key concern at both banks and financial institutions, and a key risk component is interest rate risk management.

In India, we must all work collectively for the evolution of our market because we are at a stage where we do not have either the requisite transparency and the depth in the yield curve, nor the availability of the instruments that really go towards enabling us to have the full spectrum of instruments that are eventually required for effective and efficient risk management.

I end with my habitual mention of a collection of market participants, many of them are present here in the audience, and who are working to form an organisation called FIMMDA (Fixed Income, Money Market, and Derivatives Association of India) whose role will be to move our market forward in the direction described. We shall strive to achieve this through the process of speaking with regulators, defining best market practice, and progressing new developments and instruments which enable a healthier and more efficient financial market. It is hoped that, through this process,

we will achieve a marketplace which has some of the depth, liquidity, and range of risk management instruments which we have discussed today.