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Hedging Of Interest Rate Risk with Interest Rate Futures

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Abstract: ***Increased interest rate volatility in the 1970s and 1980s has led to greater volatility in the returns on bonds and other fixed income assets. Consequently, investors in bonds and financial institutions with fixed income assets are now exposed to much greater risk from capital gains and losses. The problem is compounded because managing risks caused by interest rate risks caused by interest rate volatility has traditionally been difficult and costly.***

Keywords: about four key words separated by commas**.**

1. Introduction

During the last 15 years, however, many new financial instruments have been developed to help investors manage risks caused by increased interest rate volatility. One of the most popular type of instrument is interest rate futures contracts. IRF allow investors to protect the value of their Fixed income investments by providing a hedge against interest rate changes. IRF are now an important tool for investors who want to protect themselves from interest rate volatility?

Interest rate futures help in hedging exposure due to interest rate risks. Changes in interest rates will affect value of interest-bearing assets, such as bonds, securities or loans. Interest rate futures will help in offsetting losses by holding such positions, by generating corresponding gains in futures position. In case of losses from futures position, there will be offsetting gains from the holding portfolios, thus futures acting as hedge to interest rate uncertainty.

An IRF is a derivative contract traded on the stock exchanges. It is an agreement to buy or sell an interest bearing underlying instrument at a future date and at a specified price. Investors are allowed to take a bet on the future movement of interest rates by buying or selling IRF.

As per RBI directions on the subject, an IRF is a standardized interest rate derivative contract traded on a recognized stock exchange to buy or sell a notional security or any other interest bearing instrument or an index of such instruments or interest rates at a specified future date, at a price determined at the time of the contract.

Interest rate futures were introduced at the National Stock Exchange (NSE) in 2003, but they did not succeed. The long term IRFs were re-launched on August 31, 2009 at NSE as the 'Notional 10 Years Government of India Securities Futures.'

2. Problem Of The Study:

Interest rate volatility in a liberalized financial regime affects all economic agents across the board – corporates, financial institutions and individuals, underscoring the need for adequate hedging instruments to facilitate sound economic decisions. In this background, OTC instruments such as swaps and FRAs were introduced in the Indian markets in 1999. While the OTC segment of interest rate derivatives are the preponderant segment world-wide, the desirability of exchange-traded products for wider reach with an almost zero counterparty, credit & settlement risks, full transparency etc., are compelling reasons for its introduction as a complementary product. It is noted that the OTC products have had a successful reception in the Indian markets whereas the exchange traded ones - the IRF failed to take off. It is imperative that appropriate steps are now taken to restart the IRF market with a view to providing a wider repertoire of risk management tools and thereby enhance the efficiency and stability of the financial markets.

3. OBJECTIVE OF THE STUDY:

The main objectives of the study are as follows:

- To know about interest rate risk, the reasons for interest rate fluctuations and how manage interest rate risk
- To know the concept of derivatives and its development in India.
- To understand the concept of interest rate futures its application its product design and to why it is a good asset to manage interest rate risk.
- To identify the major participants who trade IRF and what all the benefits they get/ enjoy.
- To show IRF when properly used in a hedging strategy, allow investors to manage interest rate risk.

SCOPE OF THE STUDY:

As the study is on interest rate risk it firstly covers some basic information on interest rate risk and examines it's on investors and institutions. It also covers concept of derivatives its importance, types and its development in India. The study also identify the participants in interest rate futures market and highlights important benefits they are receiving, Later it depicts the core of the topic i.e. introduction to IRF and discuss why they are a good asset for hedging interest rate risk and lastly it shows how investors and institutions can use IRF to manage interest rate risk .

SOURCES OF DATA:

This project work is prepared with the help of secondary data, no where the primary data has been made use.

SECONDARY DATA:

The major reason to use secondary data is that it is cheaper and faster to collect than primary data and that it, depending on the research questions proposed, might provide precise data needed. This research is based on quantitative method and objective statistical data, meaning that only secondary data will be used.

The secondary data was collected from manuals, journals, research articles, publications by SEBI and other publications. Some of the information was downloaded from internet.

4. LIMITATIONS OF THE STUDY:

The limitations of the study are as follows:

- The study mainly covers only the positive effect of IRF and doesn't show the adverse effect of it.
- Time was big constraint, to make an in depth study.

Subject to these limitations, the study represents factual findings and analysis

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WHAT IS INTEREST RATE?

The amount charged, expressed as a percentage of principal, by lender to a borrower for the use of assets. Interest rates are typically noted on an annual basis, known as the annual percentage rate (APR). The assets borrowed could include, cash, consumer goods, large assets, such as a vehicle or building. Interest is essentially a rental, or leasing charge to the borrower, for the asset's use. In the case of a large asset, like a vehicle or building, the interest rate is sometimes known as the "lease rate".

When the borrower is a low risk party, they will usually be charged a low interest rate; if the borrower is considered high risk, the interest rate that they are charged will be higher.

CAUSES FOR INTEREST RATE VOLATILITY:

Some of the important reasons for interest rate volatility are as follows:

- Supply and Demand for Funds

Interest rates are the price for borrowing money. Interest rates move up and down, reflecting many factors. The most important among these is the supply of funds, available for loans from lenders, and the demand, from borrowers. For example, take the mortgage market. In a period when many people are borrowing money to buy houses, banks and trust companies need to have the funds available to lend. They can get these from their own depositors. The banks pay 6% interest on five year GICs and charge 8% interest on a five year mortgage. If the demand for borrowing is higher than the funds they have available, they can raise their rates or borrow money from other people by issuing bonds to institutions in the "wholesale market". The trouble is, this source of funds is more expensive. Therefore interest rates go up! If the banks and trust companies have lots of money to lend and the housing market is slow, any borrower financing a house will get "special rate discounts" and the lenders will be very competitive, keeping rates low.

This happens in the fixed income markets as a whole. In a booming economy, many firms need to borrow funds to expand their plants, finance inventories, and even acquire other firms. Consumers might be buying cars and houses. These keep the "demand for capital" at a high level, and interest rates higher than they otherwise might be. Governments also borrow if they spend more money than they raise in taxes to finance their programs through "deficit financing". How governments spend their money and finance is called "fiscal policy". A high level of government expenditure and borrowing makes it hard for companies and individuals to borrow, this is called the "crowding out" effect.

- Monetary Policy

Another major factor in interest rate changes is the "monetary policy" of governments. If a government "loosens monetary policy", this means that it has "printed more money". Simply put, the Central Bank creates more money by printing it. This makes interest rates lower, because more money is available to lenders and borrowers alike. If the supply of money is lowered, this "tightens" monetary policy and causes interest rates to rise. Governments alter the "money supply" to try and manage the economy. The trouble is, no one is quite sure how much money is necessary and how it is actually used once it is available. This causes economists endless debate.

- Inflation

Another very important factor is inflation. Investors want to preserve the "purchasing power" of their money. If inflation is high and risks going higher, investors will need a higher interest rate to consider lending their money for more than the shortest term. After the very high inflation years of the 1970s and early 1980s, lenders had to receive a very high interest rate compared to inflation to lend their money. As inflation dropped, investors then demanded lower rates as their expectations become lower. Imagine the plight of the long-term bond investor in the high inflation period. After lending money at 5-6%, inflation moved from the 2-3% range to above 12%! The investor was receiving 7% less than inflation, effectively reducing the investor's wealth in real terms by 7% each year!

WHAT IS INTEREST RATE RISK?

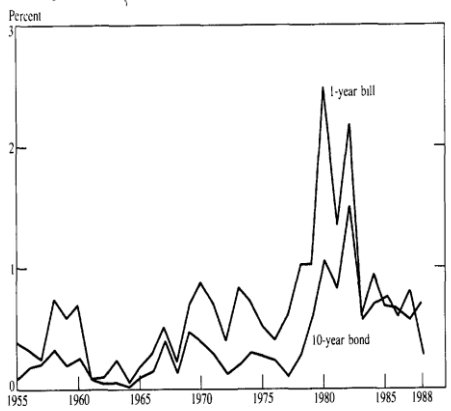
Investment in fixed assets, such as bonds, are risky because the volatility of their prices can lead to unexpected capital gain and losses. The risk of an asset can be measured by the volatility of its return, which is the sum of the income flows from the assets plus any changes in its price. Since, the income flows from a fixed income asset, such as the coupon payments and maturity value of a coupon bond, are fixed, the riskiness of the asset depends only on its price volatility. For example, as the volatility of a bond's price rises, the bond's riskiness rises because unexpected capital gain or losses are more likely.

Interest rate risk affects the value of bonds more directly than stocks, and it is a major risk to all bondholders. As interest rates rise, bond prices fall and vice versa. The rationale is that as interest rates increase, the opportunity cost of holding a bond decreases since investors are able to realize greater yields by switching to other investments that reflect the higher interest rate. For example, a 5% bond is worth more if interest

rates decrease since the bondholder receives a fixed rate of return relative to the market, which is offering a lower rate of return as a result of the decrease in rates.

Interest rate volatility has risen sharply in recent years. Chart 1 shows the volatility of interest rates on 1-year and 10-year Treasury security from 1955-1988. Interest rate volatility in each year is measured by standard deviation of the monthly interest rates during that year. The average standard deviation of 1- year interest rates over the 1979-1988 period was more than the twice that of the 1955-1978 period, rising from 0.5 percent per month over the 1955-1978 period to 1.2 percent over the 1979-1988 period. The relative increase in the volatility of 10- years rates was even sharper. The average standard deviation of 10- years interest rate over the 1979-1988 period was more than three times higher than that over the 1955-1978 period, rising from 0.25 percent to 0.8 percent. The rise in interest rate volatility over those periods is not limited to 10- year rates, but is typical of the volatility of interest rates at all maturities.

CHART 1
Interest rate volatility



Note: Annual standard deviations of monthly constant maturity rates for 1-year U.S. Treasury bills and 10-year U.S. Treasury bonds.

Source: Board of Governors of the Federal Reserve System.

SOURCES OF INTEREST RATE RISK:

1. Repricing risk:

As financial intermediaries, banks encounter interest rate risk in several ways. The primary and most often discussed form of interest rate risk arises from timing differences in the maturity (for fixed rate) and repricing (for floating rate) of bank assets, liabilities and off-balance-sheet (OBS) positions. While such repricing mismatches are fundamental to the business of banking, they can expose a bank's income and underlying economic value to unanticipated fluctuations as interest rates vary. For instance, a bank that funded a long-term fixed rate loan with a short-term deposit could face a decline in both the future income arising from the position and its underlying value if interest rates increase. These declines arise because the cash flows on the loan are fixed over its lifetime, while the interest paid on the funding is variable, and increases after the short-term deposit matures.

2. Yield curve risk:

Repricing mismatches can also expose a bank to changes in the slope and shape of the yield curve. Yield curve risk arises when unanticipated shifts of the yield curve have adverse effects on a bank's income or underlying economic value. For instance, the underlying economic value of a long position in 10-year government bonds hedged by a short position in 5-year government notes could decline sharply if the yield curve steepens, even if the position is hedged against parallel movements in the yield curve.

3. Basis risk:

Another important source of interest rate risk (commonly referred to as basis 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 between assets, liabilities and OBS instruments of similar maturities or repricing frequencies. For example, a strategy of funding a one year loan that reprices monthly based on the one month U.S. Treasury Bill rate, with a one-year deposit that reprices monthly based on one month Libor, exposes the institution to the risk that the spread between the two index rates may change unexpectedly.

4. Optionality:

An additional and increasingly important source of interest rate risk arises from the options embedded in many bank assets, liabilities and OBS portfolios. Formally, an option provides the holder the right, but not the obligation, to buy, sell, or in some manner alter the cash flow of an instrument or financial contract. Options may be stand alone instruments such as exchange-traded options and over-the-counter (OTC) contracts, or they may be embedded within otherwise standard instruments. While banks use exchange-traded and OTC-options in both trading and non-trading accounts, instruments with embedded options are generally most important in non-trading activities. They include various types of bonds and notes with call or put provisions, loans which give borrowers the right to prepay balances, and various types of non-maturity deposit instruments which give depositors the right to withdraw funds at any time, often without any penalties. If not adequately managed, the asymmetrical payoff characteristics of instruments with optionality features can pose significant risk particularly to those who sell them, since the options held, both explicit and embedded, are generally exercised to the advantage of the holder and the disadvantage of the seller. Moreover, an increasing array of options can involve significant leverage which can magnify the influences (both negative and positive) of option positions on the financial condition of the firm.

EFFECTS OF INTEREST RATE RISK:

As the discussion above suggests, changes in interest rates can have adverse effects both on a bank's earnings and its economic value. This has given rise to two separate, but complementary, perspectives for assessing a bank's interest rate risk exposure.

1. Earnings perspective:

In the earnings perspective, the focus of analysis is the impact of changes in interest rates on accrual or reported earnings. This is the traditional approach to interest rate risk assessment taken by many banks. Variation in earnings is an important focal point for interest rate risk analysis because reduced earnings or outright losses can threaten the financial stability of an institution by undermining its capital adequacy and by reducing market confidence.

In this regard, the component of earnings that has traditionally received the most attention is net interest income (i.e. the difference between total interest income and total interest expense). This focus reflects both the importance of net interest income in banks' overall earnings and its direct and easily understood link to changes in interest rates. However, as banks have expanded increasingly into activities that generate fee-based and other non-interest income, a broader focus on overall net income - incorporating both interest and non-interest income and expenses - has become more common. The non-interest income arising from many activities, such as loan servicing and various assets securitisation programs can be highly sensitive to market interest rates. For example, some banks provide the servicing and loan administration function for mortgage loan pools in return for a fee based on the volume of assets it administers. When interest rates fall, the servicing bank may experience a decline in its fee income as the underlying mortgages prepay. In addition, even traditional sources of non-interest income such as transaction processing fees are becoming more interest rate sensitive. This increased sensitivity has led both bank management and supervisors to take a broader view of the potential effects of changes in market interest rates on bank earnings and to factor these broader effects into their estimated earnings under different interest rate environments.

2. Economic value perspective:

Variation in market interest rates can also affect the economic value of a bank's assets, liabilities and OBS positions. Thus, the sensitivity of a bank's economic value to fluctuations in interest rates is a particularly important consideration of shareholders, management and supervisors alike. The economic value of an instrument represents an assessment of the present value of its expected net cash flows, discounted to reflect market rates. By extension, the economic value of a bank can be viewed as the present value of bank's expected net cash flows, defined as the expected cash flows on assets minus the expected cash flows on liabilities plus the expected net cash flows on OBS positions. In this sense, the economic value perspective reflects one view of the sensitivity of the net worth of the bank to fluctuations in interest rates.

Since the economic value perspective considers the potential impact of interest rate changes on the present value of all future cash flows, it provides a more comprehensive view of the potential long-term effects of changes in interest rates than is offered by the earnings perspective. This comprehensive view is important since changes in near-term earnings - the typical focus of the earnings perspective - may not provide an accurate indication of the impact of interest rate movements on the bank's overall positions.

3. Embedded losses:

The earnings and economic value perspectives discussed thus far focus on how future changes in interest rates may affect a bank's financial performance. When evaluating the level of interest rate risk it is willing and able to assume, a bank should also consider the impact that past interest rates may have on future performance. In particular, instruments that are not marked to market may already contain embedded gains or losses due to past rate movements. These gains or losses may be reflected over time in the bank's earnings. For example, a long term fixed rate loan entered into when interest rates were low and refunded more recently with liabilities bearing a higher rate of interest will, over its remaining life, represent a drain on the bank's resources.

5. WHO IS AFFECTED BY RISING INTEREST RATE VOLATILITY?

Many investors and business firms are exposed to greater risks because of the increase in interest rate volatility in recent years. Examples include individual and institutional investors in government and corporate bonds, depository institutions such as banks and savings and loans, securities dealers, mortgage banks, and life insurance companies to name a few.

One group of investors exposed to greater risks is investors in bonds. The rising risk of holding bonds is clear from Chart 2, which shows the volatility of returns on U.S. Treasury bonds from 1950 to 1987. Bond market volatility in each year is measured by the standard deviation of the monthly percentage returns on a long-term U.S. Treasury bond index during that year.3 Bond market volatility rose from an average annual standard deviation of 1 percent per month over the period from 1950 to 1965 to 2.25 percent over the period from 1966 to 1978. Bond market volatility rose further from 1979 to 1987, averaging 4.1 percent per month.

Rising interest rate volatility has also increased the risk exposure of depository institutions, such as banks and S&Ls. When interest rates rise, the market value of their net worth generally fells; when interest rates fall, the market value of their net worth generally rises. The market value of an institution's net worth is the difference between the market values of its assets and liabilities. The effect of a change in interest rates on the market value of a firm's net worth depends on the relative interest rate sensitivities of its assets and liabilities, which primarily depend on their relative maturities.

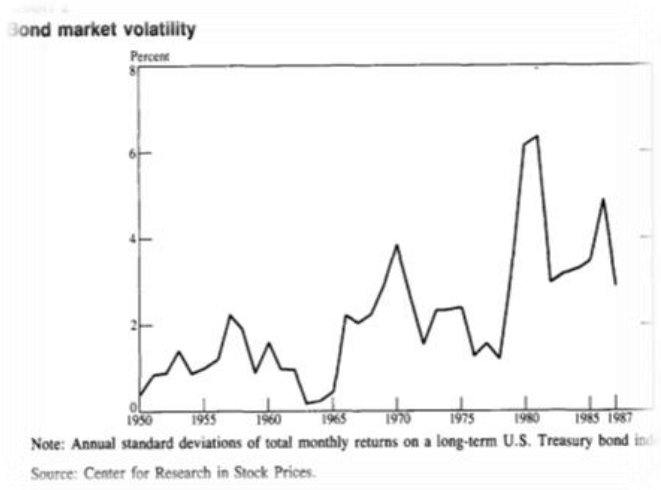
Because the assets of banks and S&Ls generally take longer to mature than do their liabilities, the value of their assets is more sensitive to changes in interest rates than the value of their liabilities. As a result, when interest rates rise, for example, the net worth of a depository institution falls because the value of its assets falls more than the value of its liabilities.

Securities dealers are also exposed to greater risks due to rising interest rate volatility. When interest rates rise, securities dealers suffer losses like other bondholders because the value of the bonds they are holding in inventory falls.4 Securities dealers can also suffer losses when interest rates fall, however, because they often commit themselves to delivering bonds at a future date for a fixed price when they do not have the bonds in inventory or the funds to purchase them immediately. If interest rates fall before a dealer purchases the bonds, he will suffer a loss because the price he has to pay for the bonds he has to deliver will be higher than he had expected when he made the initial commitment.

Mortgage banks are also exposed to greater interest rate volatility. A mortgage bank originates mortgages and then sells them to other investors. In general, mortgage banks hold very few mortgages on their balance sheet. They can suffer losses if interest rates rise, however, because they typically commit to a mortgage rate before the mortgage is actually closed and sold.

If interest rates rise between the time they commit to a rate and the time the mortgage is sold, the value of the mortgage will fall; and mortgage banks will get a lower price man they had expected when they made the initial commitment.

A final example of a group of firms exposed to greater risks due to rising interest rate volatility is life insurance companies. For example, changes in interest rates affect life insurance companies because when interest rates fall the spread earned on Guaranteed Interest Contract (GIC) commitments falls. In recent years, life insurance companies have become heavy issuers of GICs, which are securities that guarantee a fixed interest rate on invested funds over a several-year period. GICs are generally purchased by long-term investors, such as pension funds and company thrift plans. Often, a life insurance company will commit to a rate on a GIC for a short time period before it receives the funds. Life insurance companies can suffer losses if interest rates fall during the commitment period because when they receive the funds from the GIC, they will have to invest the funds at a lower rate than they had expected when they committed to the GIC rate. As a result, the spread earned on the GIC falls.



Note: Annual standard deviations of total monthly returns on a long-term U.S. Treasury bond in
Source: Center for Research in Stock Prices.

MANAGING AND HEDGING OF INTEREST RATE RISK:

Investors and business firms manage risk by choosing the amount of risk to which they want to be exposed. The choice of how much risk to bear varies with every investor. For example, some investors will choose to accept the increased price volatility of fixed income investments of recent years, while others will take actions to reduce the riskiness of their fixed income investments. In general, though, investors will not choose to minimize risk because there are costs to reducing risk. The most important cost is that the expected return on their investment also falls when risk is reduced. , Traditionally, investors have found it difficult and costly to reduce risks caused by interest rate volatility- Investors in bonds, for example, typically could reduce interest rate risk only by selling some of their bonds and buying short-term money market instruments. Financial institutions exposed to interest rate risk had to rely on balance sheet restructuring to reduce the mismatch between the maturities of their assets and liabilities.

In recent years new financial instruments-such as interest rate futures, options on interest rate futures, and interest rate swaps—have been developed mat allow investors in fixed income assets to manage interest rate risk at a relatively low cost by hedging. In general, hedging is a risk management strategy in which investors choose assets such that changes in the prices of the assets systematically offset each other. Fixed income investors can hedge the interest rate risk of an asset, such as a Treasury bond, by buying or selling hedging assets whose values change in the opposite direction to the value of the Treasury bond when interest rates change. The interest rate riskiness of a hedged Treasury bond is lower than the interest rate riskiness of the unhedged bond because the change in the value of the hedging asset, due to a change in interest rates offsets at least some of the change in the value of the bond. It is important to realize, however, that hedging reduces price volatility because it offsets increases as well as decreases in the price of the Treasury bond.

For any given fixed income asset, the best hedging instrument for reducing interest rate risk is the one whose price is most closely related to the price of the asset when interest rates change. The more closely the prices are related, the larger the reduction in risk that is possible because changes in the price of the hedging asset are more likely to offset changes in the price of the asset being hedged.

While hedging can reduce risk, it generally cannot completely eliminate risk. Hedging will completely eliminate risk only if the values of the portfolio and hedging asset are perfectly related. However, the prices of the assets being hedged and the hedging asset are rarely perfectly related because of differences in factors such as credit quality, liquidity, maturity, and call or prepayment options. Thus, as a practical matter, hedging is an activity that permits investors to manage, but not eliminate, risk.

6. INTEREST RATE FUTURES:

Interest rate risk is one of the most basic common risks faced by market participants today. The volatility in interest rates has increased in the liberalized competitive environment. Interest rate futures help in hedging exposure due to interest rate risks. Changes in interest rates will affect value of interest-bearing assets, such as bonds, securities or loans. Interest rate futures will help in offsetting losses by holding such positions, by generating corresponding gains in futures position. In case of losses from futures position, there will be offsetting gains from the holding portfolios, thus futures acting as hedge to interest rate uncertainty.

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7. BRIEF OVERVIEW OF INDIAN DEBT MARKET

Debt market comprises the primary as well as the secondary market for debt instruments - both sovereign and corporate. A well functioning debt market is critical for inter-temporal resource allocation and is therefore significant for all economic agents.

The development of financial markets started in the early 1990's. Since then, a series of reforms - both structural as well as institutional – have been initiated with a view to having market determined interest rates. The other objectives of these reforms have been to improve transparency, efficiency and accessibility of the debt market.

The Government started the reforms by borrowing from the market at rates determined through auctions. Previously, this was being carried out at pre-announced rates. Other reforms include introduction of new instruments such as - zero coupon bonds, floating rate bonds, capital index bonds; establishment of specialized institutions such as Discount and Finance House of India (DFHI) and Securities Trading Corporation of India (STCI), setting up of the Negotiated Dealing System (NDS), implementation of the Patil Committee recommendations for corporate bonds, etc.

While these reforms have resulted in increased trading volumes in the debt market (total turnover in Government of India (GoI) dated securities increased from Rs. 1,770,980 crore in 2006-07 to Rs. 2,957,070 crore in

2007-08), yet the trading volume has remained low in comparison to the developed markets. There is a strong need to further deepen and widen the market by offering a wide range of products.

WHAT IS INTEREST RATE FUTURES?

An interest rate futures contract is an agreement between two parties to buy or sell a fixed income asset, such as a Treasury bond or Treasury bill, at a given time in the future for a predetermined price. For example, if in January a person buys March Treasury bond futures, he is simply agreeing to buy Treasury bonds in March. On the other hand, if in January he sells March Treasury bond futures, he is simply agreeing to sell Treasury bonds in March. Nothing is exchanged when the futures contract is written because it is only an agreement to make an exchange at a future date. The price of a futures contract is the price the buyer agrees to pay the seller for the asset when it is delivered.

Delivery of the asset in a futures contract rarely occurs, however. The reason is futures traders can always close out the contracts they have bought or sold by taking an offsetting position in the same futures contract before delivery occurs. For example, rather than taking delivery, a buyer often March Treasury bond futures can settle his position by selling ten March Treasury bond futures. Similarly, a seller often March Treasury bond futures can set his position by buying ten March Treasury bond futures. In 1988, Treasury bonds were delivered in less than 0.1 percent of all Treasury bond futures traded at the Chicago Board of Trade, which are one of the most widely traded interest rate futures.

Since a future trader who has settled an initial position has both bought and sold futures, his profit depends on the prices of the futures he has bought and sold. Just like any other trader, futures traders make a profit when they buy futures at a price lower than they sell futures, and they suffer a loss when they buy futures at a price higher than they sell futures. Whether a person makes a profit or suffers a loss, therefore, depends on two conditions: first, whether he initially bought or sold futures, and second, whether the price of the futures rises or falls between the time he enters the initial contract and the time he takes an offsetting position.

A buyer of futures makes a profit when the futures price rises and suffers a loss when the futures price falls. Suppose, for example, on January 10 a person buys a March Treasury bond futures contract for $95 per $100 face value of Treasury bonds, and on February 15 he settles his position by selling a March Treasury bond futures contract for $97. Under these circumstances, the person would make a profit of $2 per $100 face value of Treasury bonds because he has one agreement to buy Treasury bonds in March for $95 and another agreement to sell Treasury bonds in March for $97. On the other hand, if the price falls to $92 on February 15, he would lose $3 per $100 because he has one agreement to buy Treasury bonds for $95 and another agreement to sell Treasury bonds for $92.

In contrast, a seller of futures suffers a loss when the futures price rises and makes a profit when the futures price falls. This time, suppose on January 10 a person sells a March Treasury bond futures contract for $95, and on February 15 he settles his position by buying a March Treasury bond futures for $97. The person would suffer a loss of $2 because he has one agreement to sell Treasury bonds in March for $95 and another agreement to buy Treasury bonds in March for $97. On the other hand, if the price falls to $92 on February 15, he would make a profit of $3 because he has one agreement to sell Treasury bonds for $95 and another agreement to buy Treasury bonds for $92.

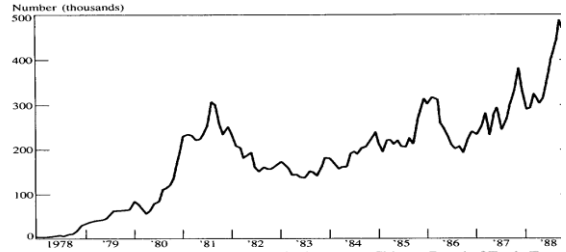
Interest rate futures are relatively new financial instruments. While futures on commodities have been trading on organized exchanges in the United States since the latter half of the 1860s, the first interest rate futures contract did not start trading until October 1975, when the Chicago Board of Trade (CBT) introduced futures on Government National Mortgage Association (GNMA) certificates. Since then, futures on many different fixed income assets have been developed- However, there are still many fixed income assets, such as corporate bonds, on which no futures are traded.

The assets on which interest rate futures are traded span the maturity spectrum—interest rate futures on short-term, medium-term, and long-term assets are traded on several futures exchanges in the United States and abroad. The first futures contract on a short-term asset was the Treasury bill futures contract, which was introduced on the International Monetary Market (IMM) exchange in 1976. Since then, interest rate futures on other short-term assets, such as Eurodollar time deposits and 30-day interest rates, have begun trading on several exchanges, with the IMM Eurodollar futures being the most popular. Interest rate futures on medium-term assets, such as Treasury notes, are also traded on several exchanges. Finally, there are interest rate futures on long-term assets, such

as Treasury bonds and a municipal bond index, with the CBT Treasury bond futures being the most popular.

The success of interest rate futures is shown in Chart 3. One measure of activity in a futures market is a contract's open interest—the number of contracts not yet offset by opposite transactions or delivery. Chart 3 shows the open interest in the CBT Treasury bond futures contract from 1978 to 1988. Although open interest in Treasury bond futures is fairly volatile, the trend is clearly upward. Chart 3 also shows open interest rose sharply in 1980 and 1981—the two peak years in bond market volatility (Chart 2)—suggesting that investors took advantage of the futures market for managing risk.

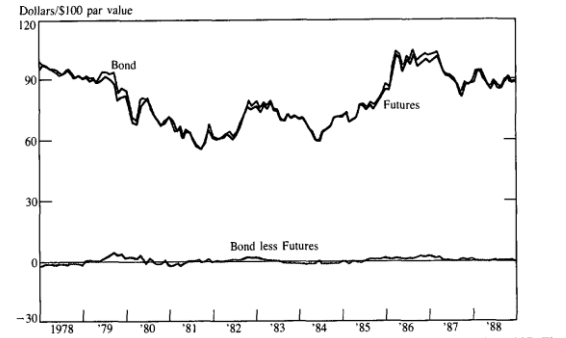
CHART 3
Treasury bond futures open interest



Note: Values are monthly averages of daily open interest in the nearest Chicago Board of Trade Treas contract with at least one month until expiration.

Source: Data Resources Inc.

CHART 4
Treasury bond futures price and treasury bond price



Note: The bond price is the price of the 9¼ percent 30-year Treasury bond that matures in November 2007. The price is the price of the nearest Chicago Board of Trade Treasury bond future with at least one month until exp

Source: Data Resources Inc.

NEED FOR INTEREST RATE FUTURES

Interest rate risk affects not only the financial sector, but also the corporate and household sectors. As observed in the Report on Interest Rate Futures, banks, insurance companies, primary dealers and provident funds bear a major portion of the interest rate risk on account of their exposure to government securities. As such these entities need a credible institutional hedging mechanism. Today, with a large stock of household financial savings on the assets side and an increasing quantum of housing loans on the liabilities side, interest rate risk is becoming increasingly important for the household sector as well. Moreover, because of the Fisher effect, interest rate products are the primary instruments available to hedge inflation risk which is typically the single most important macroeconomic risk faced by the household sector3. In this context, therefore, it is important that the financial system provides the household sector greater access to interest rate risk management tools through Exchange-Traded interest rate derivatives.

8. OVERVIEW OF IRF

- Interest rate futures are derivative contracts which have an interest bearing GOI security as the underlying instrument.
- The buyer of an Interest Rate Futures contract agrees to take delivery of the underlying bonds when the contract expires, and the contract seller agrees to deliver the debt instrument.
- Most contracts are not settled by delivery, but instead are traded out before expiration.
- The value of the contract rises and falls inversely to changes in Interest rates. For example, if Govt. bond yields rise, prices of Govt. bonds fall and hence Futures contracts on Govt. bonds also fall in price. Converse also holds true.

FEATURES OF STANDARDIZED INTEREST RATE FUTURES CONTRACT

i. The contract shall be on 10-year notional coupon bearing Government of India security.

ii. The notional coupon shall be 7% per annum with semi-annual compounding.

iii. The contract shall be settled by physical delivery of deliverable grade securities using the electronic book entry system of the existing Depositories, namely, National Securities Depositories Ltd. and Central Depository Services (India) Ltd. and Public Debt Office of the Reserve Bank.

iv. Interest Rate Futures contracts on instruments shall be traded on the Currency Derivative Segment of a recognized Stock Exchange.

Individuals or firms can buy or sell interest rate futures by placing order with the trading members of the exchange.

Thus the IRF contract is on a notional security and not actual security because a security conforming to this description may not exit. The seller will fulfill his obligation by delivering one of the deliverable grade securities approved by the exchange. The security exchanged will be an existing security. It may carry a coupon higher or lower than the 7 percent required under the futures contract. Suitable adjustments in final payment made by the buyer will ensure that he actually gets the coupon rate of 7 percent compounded half yearly.

TYPES OF INTEREST RATE FUTURES:

Interest rate futures in the US markets are traded on the CME (Chicago Mercantile Exchange). Below is the list of short term interest rate futures contracts traded on US and foreign interest rates.

1) Three Month Eurodollars

Eurodollars refer to US dollars that are currently being held on deposit in foreign commercial banking institutions. The ability for banks to be able to have access to fund US dollar loans to foreign purchasers of US goods without the currency exchange rate risks makes the Eurodollar futures very attractive for hedging purposes. For this reason, the Eurodollar futures market has exploded in the last 20 years and has become the most highly traded futures contracts out there.

CME's Eurodollar contract reflects pricing at 3 month LIBOR on a $1 million offshore deposit.

2) One Month Libor:

One month LIBOR contract is very similar to the Eurodollar contract; however, it represents a 1 month LIBOR on a $3 million deposit.

3) *EuroYen:*

Euroyen are similar to Eurodollars and represent Japanese Yen deposits outside of Japan.

4) *13 Week Treasury Bills:*

Treasury backed instruments are considered risk free investments as they are backed in good faith by the United States government. T-bill futures contracts are available in quarterly contracts.

5) *One Month Fed Funds:*

Federal funds represent reserves Federal Reserve member banks in excess of the reserve requirement for banks. These deposits are not interest bearing deposits and therefore banks lend these funds out to other member banks for overnight term.

6) *91-Day Cetes (Mexican Treasury Bills):*

Cetes are government issued short term paper issued in Mexican Pesos. Similar to the US Treasury market, Cetes is the basis for short term lending rates in Mexico.

7) *28-Day TIIE (Mexican Interest Rate):*

The TIIE is the benchmark inter bank interest rate that Mexican banks use to borrow or lend from the Bank of Mexico.

DURATION OF IRF:

The futures contract will have a maximum expiration cycle of 12 months. Quarterly contracts are available, expiring by the months of March, June, September and December. Thus there will be December 2009 futures, March 2010 futures and so on. A futures contract expires seven working days prior to the last business day of the expiring month. The expiry month is also known as delivery month since delivery of security for outstanding contracts are expected during this period.

DELIVERY UNDER IRF:

The obligation of the seller under the futures is to deliver one of the deliverable grade securities. The list of deliverable grade securities is specified by the exchange separately for futures of each quarter. The criteria applied for including a security in the list is that (i) the Indian government security should mature after at least 8 years, but not later than 12 years from the first day of the delivery month, and (ii) its minimum outstanding stock should be Rs. 10,000 crore. The seller can deliver the securities on any day during the delivery month. The seller should convey to the exchange his intention to deliver securities at least 2 business days prior to the actual delivery date.

9. INTEREST RATE FUTURE AT GLOBAL CONTEXT:

Most of the global markets trade futures on two underlings - one at the long end (maturity of 10 years or more) and another at the short end (maturity up to one year) of the yield curve. The futures on the long end of the yield curve are called the Long Bond Futures and futures at the short end of the yield curve are called the T-Bill Futures and Reference Rate Futures. Some markets do trade futures on underlying with multiple maturities say of 2 years and 5 years as well, but volumes in these products speak for their poor receptivity by market participants. In other words, most of the volumes in the global markets are concentrated on derivatives with one underlying at the long end and one underlying at the short end of the yield curve.

In global markets, underlying for the long bond futures is a notional coupon bearing bond. These contracts are generally physically settled but some markets do have cash settled products. For instance, Singapore trades 5 years gilt futures, which are cash settled. Chicago Board of Trade (CBOT) also trades futures on the 10 year Municipal Bond Index, which is also a cash settled product. Methodology of the physically settled

Products are beyond the scope of this work. The simple thing to understand here is that there are concepts like basket of deliverable bonds, conversion factors, cheapest to deliver bond, delivery month etc. Price quote for long bond futures is the clean price of the notional bond, across the markets.

On the short end of the yield curve, global markets have two kinds of products – T-Bill futures and reference rate futures. T–Bill futures are essentially the futures on the notional T- Bills, which are physically settled. But, reference rate futures are the futures on reference rates like London Inter-bank Offer Rates (LIBOR) and are cash settled. Over a period of time, these reference rate futures have rendered the T-Bill futures out of fashion. Possible reasons for this phenomenon are that they are easy to comprehend, have very wide participation from across the globe and are cash settled. The success of reference rate futures may be measured by the volumes they command in the international markets. Indeed, all major markets across the globe trade them. For instance, Japan trades futures on the Japan inter-bank offer rates (JIBOR), Singapore trades futures on Singapore inter-bank offer rates (SIBOR), Hong Kong trades futures on Hong Kong inter-bank offer rates (HIBOR).

10. STRUCTURE OF THE PRODUCT AT THE INDIAN CONTEXT

Products proposed to be launched in the Indian Market are futures on long bond (10 year notional G-secs) and T-bills (91 days notional). This is in line with the international practice on the interest rate derivatives. Reference rate short end products i.e. the futures on Mumbai Inter-bank Offer Rate (MIBOR), Mumbai Implicit Forward Offer Rate (MIFOR) etc. Are proposed to be launched after certain legal issues related to these products are resolved. Issues like the coupon of the underlying notional long bond and the maturity of the futures contract (subject to it being maximum of one year) are left to the exchanges to decide upon.

Both these products Long bond futures and T-Bill futures are proposed to be settled in cash based on the Zero Coupon Yield Curve (ZCYC). The final settlement value of these futures contract would be the present value of all future cash flows from the underlying discounted at the zero coupon rates for the corresponding maturities taken from the ZCYC. This methodology would also be used to price the product theoretically for the Marking to Market (MTM) purpose, in case futures do not see any trade during the last half an hour of trading. The ZCYC is proposed to be derived from the actual traded prices of the Government Securities each day, reported on the Wholesale Debt Market (WDM) of the Exchange or the price data collected from the Negotiated Dealing System (NDS).

TABLE 2:INTEREST RATE FUTURES AT NSE:

Particulars	Description
Symbol	10YGS7
Market Type	N
Instrument Type	FUTIRD
Underlying	10 Year Notional Coupon-bearing Government of India (GOI) security
Notional Coupon	7% with semi-annual Compounding
Tick size	0.25 paisa or INR 0.0025
Trading Hours	9:00 am to 5:00 pm (Monday to Friday)
Contract Size	INR 2 lakhs
Quotation .	Similar to quoted price of GOI securities up to four decimals with 30/360 day count convention
Tenor	Maximum Maturity: 12 months
Contract Cycle	Four Fixed quarterly contracts for entire year ending March, June, September & December. To start with NSE has introduced two quarterly contracts
Daily Settlement Price	Volume Weighted average price of the contract during the time period specified by the Exchange. If not traded in specified timings then the theoretical price of the contract as determined by the exchange will be the daily settlement price
Settlement Mechanism	• Daily Settlement - Marked to market daily • Final Settlement - Physical settlement on delivery day in the delivery month i.e. last working day of the month
Deliverable Grade Securities	• GOI Securities maturing at least 8 years but not more than 10.5 years from first day of the delivery month with a minimum total outstanding of Rs 10,000 crores. The list of the deliverable grade securities will be informed by the exchange from time to time. • Further any new security which meets the eligibility criteria as mentioned above shall be added to the list of deliverable grade securities. However, additions, if any, shall be made not later than 10 business days before the first business day of the delivery month
Conversion Factor	The conversion factor would equate the deliverable security (per rupee of principal), to yield 7% with semiannual compounding.
Invoice Price	Futures settlement price times conversion factor plus accrued Interest
Last Trading Day	Two business day proceeding the last business day of the delivery month.
Delivery Day	Last business day of the delivery month.
Initial Margin	SPAN ® Based Margin subject to minimum 2.33% on first day and 1.6% subsequently.
Extreme loss Margin	0.3% of the value of the gross open positions of the futures contracts

NEED FOR INTEREST RATE FUTURES:

Interest rate risk affects not only the financial sector, but also the corporate and household sectors. As observed in the Report on Interest Rate Futures, banks, insurance companies, primary dealers and provident funds bear a major portion of the interest rate risk on account of their exposure to government securities. As such these entities need a credible institutional hedging mechanism. Today, with a large stock of household financial savings on the assets side and an increasing quantum of housing loans on the liabilities side, interest rate risk is becoming increasingly important for the household sector as well. Moreover, because of the Fisher effect, interest rate products are the primary instruments available to hedge inflation risk which is typically the single most important macroeconomic risk faced by the household sector 3 . In this context, therefore, it is important that the financial system provides the household sector greater access to interest rate risk management tools through Exchange-Traded interest rate derivatives.

11. A REVIEW OF INTEREST RATE FUTURES IN INDIA:

In the wake of deregulation of interest rates as part of financial sector reforms and the resultant volatility in interest rates, a need was felt to introduce hedging instruments to manage interest rate risk. Accordingly, in 1999, the Reserve Bank of India took the initiative to introduce Over-the-Counter (OTC) interest rate derivatives, such as Interest Rate Swaps (IRS) and Forward Rate Agreements (FRA). In November 2002, a Working Group under the Chairmanship of Shri Jaspal Bindra was constituted by RBI to review the progress and map further developments in regard to Interest Rate Derivatives (IRD) in India. On the recommendation of the High Level Committee on Capital Markets (HLCC), the Bindra Group also examined the issues relating to Exchange Traded Interest Rate Derivatives (ETIRD).

In its report (January 2003), the Bindra Group discussed the need for ETIRD to create hedging avenues for the entities that provide OTC derivative products and listed anonymous trading, lower intermediation costs, full transparency and better risk management as the other positive features of ETIRD. It also discussed limitations of the

OTC derivative markets viz., information asymmetries and lack of transparency, concentration of OTC derivative activities in major institutions, etc. The Bindra Group favored a phased introduction of products but suggested three bond future contracts that were based on indices of liquid Gov securities at the short, the middle and the long end of the term structure. The Bindra Group also considered various contracts for the money market segment of the interest rates

and came to a conclusion that a futures contract based on the overnight MIBOR would be a good option.

The Security and Exchange Board of India's (SEBI) Group on Secondary Market Risk Management also considered introduction of ETIRD in its consultative document prepared in March 2003. Concurring with the recommendations of the Bindra Group, the SEBI Group considered various options in regard to launching IRF and recommended a cash-settled futures contract, with maturities not exceeding one year, on a 10-year notional zero-coupon bond. It is pertinent to mention that the Group recognized the advantages of physical settlement over cash settlement. However, it recommended that 'the ten year bond futures should initially be launched with cash settlement' because of possibility of squeeze caused by low outstanding stock of Gov securities, lack of easy access to Gov security markets for some participants (particularly households) and absence of short selling.

Accordingly, in June 2003 IRF was launched with the following three types of contracts for maturities up to 1 year on the NSE.

- Futures on 10-year notional Gov security with 6% coupon rate
- Futures on 10-year notional zero-coupon Gov security
- Futures on 91-day Treasury bill

While the product design issues were primarily handled by the exchanges and their regulators, RBI permitted the Scheduled Commercial Banks (SCBs) excluding RRBs & LABs, Primary Dealers (PDs) and specified All India Financial Institutions (AIFIs) to participate in IRF only for managing interest rate risk in the Held for Trading (HFT) & Available for Sale (AFS) categories of their investment portfolio. Recognizing the need for liquidity in the IRF market, RBI allowed PDs to hold trading positions in IRF subject, of course, to prudential regulations. However, banks continued to be barred from holding trading positions in IRF. It may be mentioned that there were no regulatory restrictions on banks' taking trading positions in IRS. Thus SCBs, PDs and AIFIs could undertake IRS both for the purpose of hedging underlying exposure as well as for market making with the caveat that they should place appropriate prudential caps on their swap positions as part of overall risk management.

In terms of RBI's circular, SCBs, PDs and AIFIs could either seek direct membership of the Futures and Options (F&O) segment of the stock exchanges for the limited purpose of undertaking proprietary transactions, or could transact through approved F & O members of the exchanges.

As far as the accounting norms were concerned, pending finalization of specific accounting standards by the Institute of Chartered Accountants of India (ICAI), it was decided to apply the provisions of the Institute's Guidance Note on Accounting for Equity Index Futures, mutatis-mutandis, to IRF as an interim measure. The salient features of the recommended accounting norms were as under:

Since transactions by banks were essentially for the purpose of hedging, the accounting was anchored on the effectiveness of the hedge.

Where the hedge was appropriately defined and was 'highly effective' offsetting was permitted between the hedging instruments and hedged portfolio. Thereafter, while net residual loss had to be provided for, net residual gains if any, were to be ignored for the purpose of Profit & Loss Account.

If the hedge was not found to be 'highly effective', the position was to be treated as a trading position, till the hedge effectiveness was restored and accounted for with daily MTM discipline, but with asymmetric reckoning of losses and gains; while the losses were to be reckoned, gains were to be ignored.

In the case of trading positions of PDs, they were required to follow MTM discipline with symmetric reckoning of losses and gains in the P&L Account.

On the other hand, the accounting norms for the IRS were simply predicated on fair value accounting without any explicit dichotomy between recognition of loss and gain. The general principles followed were as follows:

Transactions for hedging and market making purposes were to be recorded separately.

Transactions for market making purposes should be MTM, at least at fortnightly intervals, with changes recorded in the income statement.

Transactions for hedging purposes were required to be accounted for on accrual basis.

While Rupee IRS, introduced in India in July 1999, have come a long way in terms of volumes and depth, the IRF, ab initio, failed to attract a critical mass of participants and transactions, with no trading at all thereafter. Since both the products belong to the same class of derivatives and offer similar hedging benefits, the reason for success of one and failure of the other can perhaps be traced to product design and market microstructure. Two reasons widely attributed for the tepid response to IRF are:

1. The use of a ZCYC for determining the settlement and daily MTM price, as anecdotal feedback from market participants seemed to indicate, resulted in large errors between zero coupon yields and underlying bond yields leading to large basis risk between the IRF and the underlying. Put another way, it meant that the linear regression for the best fit resulted in statistically significant number of outliers.

2. The prohibition on banks taking trading positions in the IRF contracts deprived the market of an active set of participants who could have provided the much needed liquidity in its early stages.

In late 2003, an attempt to improve the product design was made by SEBI in consultation with RBI and the Fixed Income Money Market and Derivative Association of India (FIMMDA). Accordingly, in January 2004, SEBI dispensed with the ZCYC and permitted introduction of IRF contracts based on a basket of Gov securities incorporating the following important features:

- The IRF contract was to continue to be cash-settled.
- The IRF contract on a 10-year coupon bearing notional bond was to be priced on the basis of the average 'Yield to Maturity' (YTM) of a basket comprising at least three most liquid bonds with maturity between 9 and 11 years.
- The price of the futures contract was to be quoted and traded as 100 minus the YTM of the basket.
- In the event that bonds comprising the basket become illiquid during the life of the contract, reconstitution of the basket shall be attempted, failing which the YTM of the basket shall be

determined from the YTMs of the remaining bonds. In case 2 out of the 3 bonds comprising the basket become illiquid, polled yields shall be used.

However, the exchanges are yet to introduce the revised product.

In December 2003, an internal working group of the RBI headed by Shri. G Padmanabhan, then CGM, Internal Debt Management Department (IDMD), evaluated the regulatory regime for IRD, both OTC as well as exchange-traded, with a view to recommending steps for rationalization of the existing regulations. Starting with the premise that the regulatory regime in respect of both products which belong to the same family of derivatives should be symmetrical, the working group recommended removing anomalies in the regulatory, accounting and reporting frameworks for the OTC derivatives (IRS / FRA) and IRF. Among the principal recommendations were allowing banks to act as market makers by taking trading positions in IRF and convergence of accounting treatment in respect of both the products.

12. DIRECTIONS GIVEN BY RBI TO PARTICIPATE IN INTEREST RATE FUTURES:

The Reserve Bank of India having considered it necessary in public interest and to regulate the financial system of the country to its advantage, in exercise of the powers conferred by section 45W of the Reserve Bank of India Act, 1934 and of all the powers enabling it in this behalf, hereby gives the following directions to all the persons dealing in **Interest Rate Futures**.

1. Short title and commencement of the directions

These directions may be called the Interest Rate Futures (Reserve Bank) Directions, 2009 and they shall come into force with immediate effect.

2. Definitions

(i) Interest Rate Futures means a standardised interest rate derivative contract traded on a recognized stock exchange to buy or sell a notional security or any other interest bearing instrument or an index of such instruments or interest rates at a specified future date, at a price determined at the time of the contract.

(ii) Interest Rate Futures market means the market in which Interest Rate Futures are traded.

(iii) The words and expressions used but not defined in these directions shall have the meaning assigned to them in the Reserve Bank of India Act, 1934.

3. Permitted instruments

(i) Interest Rate Futures are permitted on 10-year notional coupon bearing Government of India security or any other product, as may be approved by the Reserve Bank from time to time.

(ii) Persons resident in India may purchase or sell Interest Rate Futures referred to in sub-paragraph (i) to hedge an exposure to interest rate risk or otherwise. Foreign Institutional Investors, registered with Securities and Exchange Board of India, may purchase or sell Interest Rate Futures referred to in sub-paragraph (i) subject to the condition that the total gross long (bought) position in cash and Interest Rate Futures markets taken together does not exceed their individual permissible limit for investment in government securities and the total gross short (sold) position, for the purpose of hedging only, does not exceed their long position in the government securities and in Interest Rate Futures at any point in time.

(iii) Notwithstanding anything contained in sub-paragraph (i), no scheduled bank or such other agency falling under the regulatory purview of the Reserve Bank under the Reserve Bank of India Act, 1934, the Banking Regulation Act, 1949 or any other Act or instrument having the force of law shall participate in the Interest Rate Futures market without the permission from the respective regulatory Department of the Reserve Bank.

Explanation: - The expression 'Person resident in India' shall have the meaning assigned to it in sub-section (v) of section 2 of the Foreign Exchange Management Act, 1999.

(iv) Agencies falling under the regulatory purview of any other regulator established by law shall not participate in Interest Rate Futures market except with the permission of their respective regulators and participation of such agencies as members or clients shall be in accordance with the guidelines issued by the regulator concerned .

4. Features of Interest Rate Futures

Standardized Interest Rate Futures contract shall have the following features:

a. The contract shall be on 10-year notional coupon bearing Government of India security.

b. The notional coupon shall be 7% per annum with semi-annual compounding.

c. The contract shall be settled by physical delivery of deliverable grade securities using the electronic book entry system of the existing Depositories, namely, National Securities Depositories Ltd. and Central Depository Services (India) Ltd. and Public Debt Office of the Reserve Bank.

d. Deliverable grade securities shall comprise GoI securities maturing at least 7.5 years but not more than 15 years from the first day of the delivery month with a minimum total outstanding stock of Rs 10,000 crore.

5. Position limits

i. The position limits for various classes of participants in the Interest Rate Futures market shall be subject to the guidelines issued by the Securities and Exchange Board of India.

ii. All regulated entities shall operate within the prudential limits set by the regulator concerned.

6. Risk Management measures

The trading of Interest Rate Futures contracts referred to in sub-paragraph (i) of paragraph 3 shall be subject to maintaining initial, extreme loss and calendar spread margins and the Clearing Corporations / Clearing Houses of the exchanges should ensure maintenance of such margins by the participants on the basis of the guidelines issued by the Securities and Exchange Board of India from time to time.

7. Surveillance and disclosures

The surveillance and disclosures of transactions in the Interest Rate Futures market shall be carried out in accordance with the guidelines issued by the Securities and Exchange Board of India.

8. Powers of Reserve Bank

The Reserve Bank may from time to time modify the eligibility criteria for the participants, modify participant-wise position limits, prescribe margins and / or impose specific margins for identified participants, fix or modify any other prudential limits, or take such other actions as deemed necessary in public interest, in the interest of financial stability and orderly development and maintenance of interest rate market in India.

13. IMPORTANT PARTICIPANTS OF INTEREST RATE FUTURES:

Some of the important participants who participate in trading interest rate futures are as fallows:

1. Banks and Primary dealers
2. Mutual Funds
3. Insurance Companies
4. Corporate House
5. Brokers, Institution investors and Retail investors

HEDING INTEREST RATE RISK

Interest rate futures are good hedging assets for two reasons. First, the transaction costs of buying and selling them are relatively low. Second, interest rate futures prices are closely related to the prices of many fixed income assets when interest rates change.

The transaction costs of establishing a futures position are low because nothing is really being bought or sold-the contract is just an agreement to make a trade at a future date. When a position is established, the only outlays are broker fees and commissions and an initial margin deposit with the broker. The fees paid to brokers and traders are quite small. For example, the cost of establishing and settling a position in a CBT Treasury bond futures contract, which is based on $100,000 face value of bonds, is about $41. The initial margin is also very small-the margin on a CBT Treasury bond futures used for hedging purposes is $2,000-and the margin generally earns a market rate of interest.

Interest rate futures hedge the interest rate risk of many fixed income assets successfully because interest rate futures prices are closely related to the prices of many fixed income assets. The prices are closely related because interest rate futures prices are sensitive to changes in interest rates just like fixed income asset prices. The price of any futures contract-whether it is an interest rate, exchange rate, commodity, or any other type of futures contract-is always very closely related to the price of the underlying asset.16 Since interest rate futures are based on fixed income assets and the prices of these assets move in the opposite direction of interest rates, interest rate futures prices move in the opposite direction of interest rates.

Like any other hedging asset, though, the extent to which a given interest rate futures contract will provide an effective hedge for a fixed income asset depends on how closely the futures price is related to the price of the asset being hedged. Chart 4, for example, shows that the prices of a 30-year Treasury bond and the CBT Treasury bond futures are nearly identical. The small differences that do exist are shown at the bottom of the chart. Because of this close relationship, Treasury bond futures should be very effective at hedging Treasury bonds against interest rate volatility.

In contrast, the price of the CBT Treasury bond futures is not as closely related to the price of a 30-year corporate bond as to the price of the 30-year Treasury bond (Chart 5). The difference between the corporate bond price and the futures price is clearly more variable than the difference between the Treasury bond price and the futures price.

The prices of corporate bonds and Treasury bond futures are less closely related because corporate bond prices can change for a variety of reasons other than changes in the general level of interest rates. For example, the price of a corporate bond would fall if the issuer's credit rating fell or if adverse general economic conditions led investors to believe the chances of default were more likely. The price of a corporate bond could also fall if a large investor decided to sell his share of an issue. Since these factors would not affect the price of a Treasury bond, a Treasury bond futures contract would not hedge an investor against these price changes. As a result, Treasury bond futures should be a less effective hedge for a corporate bond than for a Treasury bond.

CHART 5

Treasury bond futures price and corporate bond price

Note: Corporate bond is an A-rated 9½ percent 30-year bond of a U.S. industrial firm. The futures price is th of the nearest Chicago Board of Trade Treasury bond future with at least one month until expiration.

Source: Data Resources Inc.

14. HEDGING INTEREST RATE RISK WITH INTEREST RATE FUTURES

Investors can hedge interest rate risk by selling or buying interest rate futures. Whether an investor sells or buys futures depends on how changes in interest rates affect the value of his portfolio.

In general, an investor who suffers losses on his investment portfolio when interest rates rise hedges interest rate risk by selling interest rate futures. When interest rates rise, interest

rate futures prices fall. If an investor loses money on his portfolio when interest rates rise, then, he needs to make a profit from falling futures prices. That is, he needs the gain on his futures contract to offset the loss on his original investment portfolio. Since sellers of futures make a profit when futures prices fall, the investor would hedge by selling futures. Similarly, when interest rates fall, the losses on the futures offset the profits on the original investment portfolio.

Conversely, an investor who suffers losses on his portfolio when interest rates fall hedges by buying interest rate futures. When interest rates fall, interest rate futures prices rise. If an investor loses money on his portfolio when interest rates fall, he needs to make a profit from rising futures prices. Since buyers of futures make a profit when futures prices rise, the investor would hedge by buying futures. Similarly, when interest rates rise, the losses on the futures offset the profits on the portfolio.

Hedging a Treasury bond portfolio

Treasury bond prices fall when interest rates rise, so an investor in Treasury bonds would hedge his portfolio against changes in interest rates by selling interest rate futures. In this way, a gain or loss on the Treasury bonds would be offset by a loss or gain on the futures contracts.

An example of the reduction in price volatility that can be achieved by hedging is shown in Chart 6. This chart shows the price of a portfolio of unhedged Treasury bonds and the price of a hedged portfolio. The unhedged portfolio contains 30-year and 10-year U.S. Treasury bonds. The bonds are hedged using the CBT Treasury bond futures. The value of the hedged portfolio of bonds is clearly less variable than the value of the unhedged portfolio. The volatility of the price of the hedged portfolio, measured by the standard deviation of the change in price, is 60 percent lower than the volatility of the price of the unhedged portfolio.

CHART 6

Hedging treasury bonds

Note: The bond portfolio is an equally weighted portfolio of the 30-year U.S. Treasury bond that matures in November 2007 and the 10-year U.S. Treasury bond that matures in May 1989. The hedged price is the price of the minimum risk hedged portfolio of bonds using the nearest futures contract with at least one month until expiration.

Source: Data Resources Inc.

Hedging a corporate bond

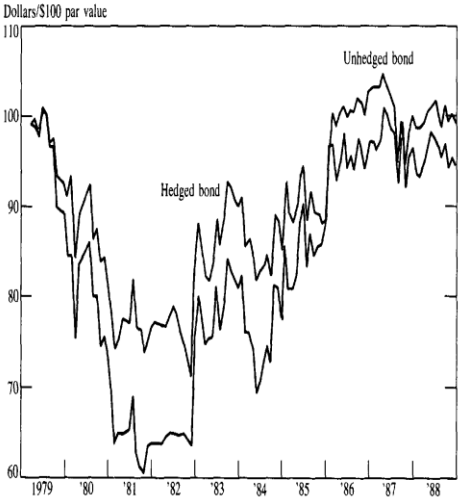
An investor in corporate bonds would hedge his portfolio against changes in interest rates by selling interest rate futures because corporate bond prices fall when interest rates rise. Corporate bond futures do not exist, so the investor would use Treasury bond futures as a hedge. Treasury bond futures should be a less effective hedge for corporate bonds than for Treasury bonds, however, because Treasury bond futures prices are not as closely related to corporate bond prices as to Treasury bond prices.

An example of the reduction in the price volatility of a corporate bond that can be achieved by hedging is shown in Chart 7. This chart shows the prices of an A-rated 9-1/2 percent 30-year bond of a U.S. industrial company and the value of the hedged bond.

The value of the hedged bond is still quite variable, but less variable than the unhedged portfolio. The standard deviation of the change in the value of the hedged bond is 8 percent lower than that of the unhedged portfolio. As expected, Treasury bond futures are a less effective hedge for corporate bonds than for Treasury bonds.

CHART 7

Hedging corporate bonds



Note: Corporate bond is an A-rated 9½ percent 30-year bond of a U.S. industrial firm. The hedged price is the price of the minimum risk hedged bond using the nearest futures contract with at least one month until expiration.

Source: Data Resources Inc.

Depository institutions

Depository institutions, such as banks and S&Ls, would hedge net worth against changes in interest rates by selling interest rate futures because their net worth generally falls when interest rates rise.

When interest rates rise, the net worth of a typical depository institution falls because the value of its assets falls by more than the value of its liabilities. For example, suppose an S&L has assets with a market value of $100 million and liabilities with a market value of $90 million, resulting in a net worth of $10 million. If interest rates rise, the value of the assets might fall by, say, $5 million to $95 million. Since the liabilities have shorter maturities, their value would fall by only, say, $4 million to $86 million, resulting in a net worth of $9 million. But interest rate futures prices also fall when interest rates rise. So if the S&L sells interest rate futures, the gain on the futures when interest rates rise would offset some of the $1 million decline in net worth due to the rise in interest rates.

Securities dealer

Securities dealers hedge interest rate risk by selling interest rate futures sometimes and buying them at other times. Securities dealers would hedge the bonds they have in inventory against changes in interest rates like any other bondholder by selling interest rate futures. On the other hand, securities dealers would hedge bonds they are committed to deliver at a future date for a predetermined price against changes in interest rates by buying interest rate futures.

To understand when securities dealers would buy futures, consider the following example. Suppose a securities dealer has agreed to deliver $10 million face value of Treasury bonds for $90.00 per $100 face value of bonds in two months, and the current price of the bonds is $89.50 per $100. If the dealer had the bonds in inventory or the funds to buy them, he would make a profit of $0.50 per $100, or $50,000. If not, though, he faces the risk that interest rates will fall and bond prices will rise. For example, if interest rates fall and bond prices rise $0.25, he would have to pay $89.75 per $100 for the bonds, and the profit on the commitment would fall 50 percent to $25,000. However, if interest rates fall, the futures price should rise. Since a person who buys a futures contract makes a profit when its price rises, the profit on the futures should offset much of the decrease in the profit on the commitment when interest rates fall.

Mortgage banks

Because the value of mortgage commitments falls when interest rates rise, mortgage bankers would hedge mortgage commitments against changes in interest rates by selling interest rate futures. For example, suppose a mortgage banker commits to a 10 percent interest rate on a $100,000 mortgage. If the mortgage closes in two months and interest rates do not change, the mortgage banker could sell the mortgage for $100,000. However, if interest rates rise, the value of the mortgage will fall. If, for example, the mortgage value falls to $98,000, the value of the mortgage commitment would fall $2,000. But since interest rates rose, interest rate futures prices would have fallen. Therefore, if the mortgage banker sells interest rate futures, the profit on the futures he sold would offset the loss on the mortgage commitment when interest rates rise.

Life insurance companies

Life insurance companies would hedge GIC commitments against changes in interest rates by buying interest rate futures. For example, suppose a life insurance company commits to a 10 percent interest rate on a GIC but will not receive the funds for two months. In addition, suppose the life insurance company expects to invest the funds in an 11 percent corporate bond. If interest rates do not change in the two-month period, the life insurance company would earn a spread of one percentage point. But if interest rates fall and the corporate bond rate falls to, say, 10.5 percent, the spread earned on the GIC would fall 50 percent to 0.5 percentage points. When interest rates fall, though, interest rate futures prices rise. Therefore, by buying futures, life insurance companies can offset declines in the spread on GIC commitments when interest rates fall.

THE RISK OF HEDGING WITH INTERST RATE FUTURES:

Although hedging with interest rate futures allows investors to reduce interest rate risk, it generally cannot completely eliminate risk. All hedges generally contain some residual, or basis, risk. Moreover, hedging also introduces some new risks. Some of those risks are credit risk, marking to market risk, and managerial risk.

Basis risk

The risk that remains after an investor hedges his portfolio is called basis risk. An investor who hedges his portfolio with interest rate futures bears basis risk because, when interest rates change, the change in the price of the futures contract does not perfectly offset the change in the price of the asset being hedged. Fixed income asset prices can change for reasons other than changes in interest rates. As a result, the basis risk in a hedge will be relatively high when factors other than interest rates are an important source of the changes in the price of the asset being hedged.

For example, an asset's price will fall if the issuer's credit rating falls or if the asset is relatively illiquid and a large amount is sold. Since these factors would not affect the prices of interest rate futures, such as Treasury bond futures, interest rate futures cannot offset price changes caused by such factors. In fact, that is why Treasury bond futures proved to be a less effective hedging instrument for the corporate bond than for the Treasury bond portfolio in the examples used in the preceding section.

Credit risk

The credit risk in an interest rate futures hedge is not that the opposite party in the futures contract will default, but that the opposite party in the asset being hedged will default. Individuals do not have to be concerned about the opposite party defaulting on a futures contract because every futures exchange has a clearing organization that is a party to every futures contract in order to guarantee the integrity of the contract.26 That is, the clearing house is the seller in every contract bought and the buyer in every contract sold. But the risk remains that an investor will end up with an unhedged open futures position if there is a default on the asset being hedged.

For example, suppose an investor in corporate bonds hedges his portfolio against changes in interest rates by selling interest rate futures. If interest rates fall, the prices of the bond and futures will rise. Since futures were sold, the investor would suffer losses on the futures, but those losses would be offset by the gains on the bonds. If the bond issuer defaults, though, the investor would have the losses on his futures position but no gains to offset the losses.

15. CASE STUDY

CASE EXAMPLE 1: CORPORATE BORROWING

LONG-TERM DEBT FOR INFRASTRUCTURE EXPENSES

XYZ Company Limited is a well-established infrastructure development company. It has won a contract for building the sea-link between Mumbai and Navi Mumbai. The total cost of the project is approximately Rs. 4,000 Crores, 50% of which is funded using debt over a period spanning the duration of the

project – estimated to be 4 years. The loan is syndicated through 2 banks and 4 financial institutions.

In the first tranche of the entire debt structure, XYZ is planning to borrow Rs. 500 Crores, which it plans to repay in 10 years. The interest on the first tranche is payable quarterly based on a major Public Sector Bank's Prime Lending Rate (PLR) prevailing on the interest payment date. The interest payment is commencing on 1st January 2010. The loan has been sanctioned and first tranche issued on 1st October 2009, when the PLR is 11%. XYZ is exposed to risk of increase in interest rates (which increase PLR). If inflation increases, then there is likelihood that the Central Bank may increase interest rates, leading to increase in the PLR. This may lead to higher interest rate cash outflow. XYZ decides to hedge using Interest Rate Futures.

1. On 1st October 2009, the March 2010 futures contract on the 10-year Notional 7% coupon-bearing Government Security is trading at Rs. 104, effectively indicating a yield rate of 6.30%.
2. XYZ decides to hedge by taking short position in the March 2010 futures contract. The rationale for shorting the futures contract is as follows:

a. When the interest rate increases, then the yield rate for the underlying G-Sec also increases. This effectively decreases the price of the bond, leading to corresponding decrease in price of the futures contract.

b. Thus, when XYZ shorts the futures contract, it is protected against any impending increase in the interest rate.

3. The number of lots of the futures contracts should be equivalent to the debt component considered for the duration of hedge. As XYZ increases the loan exposure over the tenor of the project, it needs to increase the hedge exposure, to mitigate against interest rate risk.

16. FINDINGS:

Some of the important findings of this study are as follows:

- The transaction costs of buying and selling them are relatively low. The transaction costs of establishing a futures position are low because nothing is really being bought or sold- the contract is just an agreement to make a trade at a future date. When a position is established, the only outlays are broker fees and commissions and an initial margin deposit with the broker. The fees paid to brokers and traders are quite small
- Interest rate futures hedge the interest rate risk of many fixed income assets successfully because interest rate futures prices are closely related to the prices of many fixed income assets. The prices are closely related because interest rate futures prices are sensitive to changes in interest rates just like fixed income asset prices.
- Interest rate futures contract will provide an effective hedge for a fixed income asset as they are closely related to the future price of the underlying assets. . Because of this close relationship, Treasury bond futures should be very effective at hedging Treasury bonds against interest rate volatility.
- Investors can hedge interest rate risk by selling or buying interest rate futures. Whether an investor sells or buys futures depends on how changes in interest rates affect the value of his portfolio.
- Treasury bond prices fall when interest rates rise, so an investor in Treasury bonds would hedge his portfolio against changes in interest rates by selling interest rate futures. In this way, a gain or loss on the Treasury bonds would be offset by a loss or gain on the futures contracts.
- Depository institutions, such as banks and S&Ls, would hedge net worth against changes in interest rates by selling interest rate futures because their net worth generally falls when interest rates rise.
- Securities dealers hedge interest rate risk by selling interest rate futures sometimes and buying them at other times. Securities dealers would hedge the bonds they have in inventory against changes in interest rates like any other bondholder by selling interest rate futures.

17. CONCLUSION:

I strongly believe that sometimes precedents limit the creativity. If there is no precedent it does not mean that the idea is bad; indeed, it means the idea is different and may be revolutionary. Therefore, it would not be surprising if other markets across the globe learn something from the Indian approach to interest rate futures and start redefining their product structures.

Further, though there are apprehensions among the market participants about the structure of the products proposed, they would fade away with the passage of time once the benefits of the proposed structure take effect. We all would appreciate that the development of a new market is an evolutionary process. Issues exist but they in no way write off the value delivering capabilities of the innovative products. All issues have the solution and we have to stay focused on them. Ultimately, all in the market want to see the markets growing and maturing.

The riskiness of investments in bonds and other fixed income assets has increased in recent years because of increased interest rate volatility. The lack of traditional low-cost methods for managing this increase in interest rate risk led to the development of many new financial instruments that can be used to hedge interest rate risk. One of the most popular types of instruments is interest rate futures contracts. Interest rate futures are now trading on exchanges around the world, and they have become an important pan of virtually every portfolio manager's tool kit for managing interest rate risk.

This project showed how interest rate futures can be used to manage interest rate risk. In many cases, interest rate risk can be substantially reduced. It must be remembered, though, that hedging with interest rate futures can be complex, and investors must thoroughly examine all aspects of interest rate futures and hedging techniques before implementing a hedging strategy.

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