JOHANNESBURG STOCK EXCHANGE

YieldX

Bond Futures

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Bond Futures

A bond future is a contractual obligation for the contract holder to purchase or sell a bond on a specified date at a predetermined price. Bond futures are traded on YieldX, the Johannesburg Stock Exchange's interest rate market and the prices and dates are determined at the time the future is purchased.

The predetermined price is derived as follows:

- It is determined by supply and demand in the same way as a spot price
- The **buyer (long position)** of a bond future is obligated to **purchase** the underlying bond at the agreed price, on expiry of the future
- The **seller (short position)** of a bond future is obligated to **deliver** the underlying bond at the agreed price, on expiry of the future

Bond futures are traded for hedging, speculative, gearing and arbitraging purposes. The holders of the bond futures need not physically deliver /settle if they close the position (contract) prior to the predetermined delivery date.

Bond futures offer the opportunity to gain similar exposure to interest rates as spot bonds but at a fraction of the cost. There is no payment of the principal or holding of the physical bond, unless the future is held to expiry.

How do Bond Futures work?

YieldX's futures on bonds are conventional, fully margined, physically settled, futures contracts defined on R 100,000 nominal of each of the exchange's spot bonds.

The near, middle, far and special contracts are listed at any time. Longer dated contracts may be listed from time to time if there is demand.

The contracts trade on yield to maturity for settlement on their delivery dates. They are physically settled on the t+3 date of their expiry date. The settlement price is found from their closing yield to maturity, using the standard bond pricing formula.

There is a daily explicit mark-to-market to the value determined from the bond pricing formula at the day's mark-to-market yield to maturity.

Bond Futures contracts offered

YieldX offers bond futures contracts on the underlying bonds

R153, R157, R186, R201, R203, R204, R206, R208, R209

Expiry months and dates

Midday on the first business Thursday of February, May, August and November.

Minimum contract size

1 contract = R100 000 nominal of the underlying bond.

How are Bond Futures quoted on YieldX

YieldX quotes all bond futures in the same way as the underlying spot bond market, namely on a yield-to-maturity (YTM) basis. The price is determined from the yield using the standard bond pricing formula.

Settlement

The bond futures contracts on YieldX are physically settled. This means that physical delivery of the bond will take place. Delivery takes place on a t + 3 cycle.

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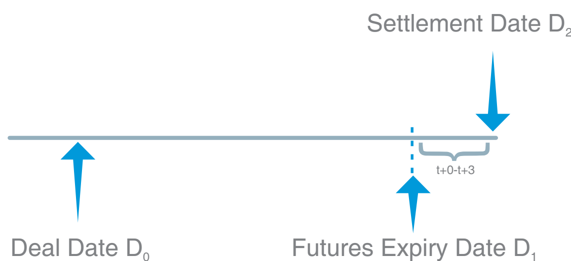
Important dates

- On the **Deal Date (D_0)**, a futures contract is entered into, in terms of which a specific bond will be traded at a set future date, at a price which is set today (the all-in price).
- On the Futures Expiry **Date (D_1)**, the underlying bond is traded for settlement 3 days later (t+3).
- Delivery of the bond takes place on the Settlement **Date (D_2)**, after which ordinary bond cash-flows are transferred.



Expiry prices

The prices at which the bond future contracts expire are provided by BESA. They determine this through an auction held at 12 o'clock on the expiry date.

Margining

The JSE's clearing house SAFCOM becomes the counterparty to each trade once each transaction has been matched and confirmed. The clearing house therefore ensures that settlement takes place on each trade. To protect itself from non-performance, SAFCOM employs a process known as margining. This mechanism entails initial margin and variation margin.

Deals in bond futures, in common with all YieldX's standardised derivative instruments are risk managed and margined, whether transacted on-screen as central order book trades, or dealt off-screen as report-only trades. Report-only derivative trades must be within clearing member limits to qualify for the risk position and the participants must remain within their overall clearing limits. All components of risk positions are guaranteed for settlement. Deals outside of risk positions are not guaranteed.

Initial margin

Positions in bond futures are margined to mitigate risk. The margin applied is a measure of the risk of a participant's futures' position on YieldX. This risk measure is obtained by analysing the effect of possible yield curve changes on the position's cashflows, and hence on its value. Margin is due to cover the largest negative value that the position is likely to encounter. This is known as **Initial Margin** collected on the morning after the trade date (t+1).

Margin deposited at the JSE earns market related interest. Margin is returned via the clearing member to the trading participant when the position is closed out or when the contract expires. Interest on margin is returned at the end of the month.

Variation margin

Bond futures are marked-to-market on a daily basis and the profit/loss that results from this is known as **Variation Margin**. This means that profits and losses are realised and paid over in cash each day.

Daily settlement on futures has a small effect on the performance of a hedge because the payoff from the futures contract is realised daily throughout the life of the hedge rather than all at the end.

E.g. Investor is long one AUG08 R157 future contracts (nominal R100,000)

On Monday, contract valued at 9.071% (price = 128.2806)

> Value of position = 100 000 * 128.2806/100 = R1 282 80.58

On Tuesday, contract valued at 9.081% (price = 128.2216)

> Value of position = 100 000 * 128.2216/100 = R1 282 21.61

MTM LOSS = R128 221.61 R 128 280.58= R 589.70

> The investor therefore makes a cash payment of R58.97

This MTM loss is known as variation margin.

Contracts are automatically closed out on expiry

All contracts that have not been closed out or rolled over before expiry will go through the expiration process. All contracts held on expiry will automatically be closed out by the Exchange. If the investor is long a bond future and holds it till expiry he will receive the physical bond and the counterparty who is short will need to deliver the bond.

How to close a trade position

Bond Future contracts are closed out by entering an equal but opposite transaction. For example, if an investor had entered a long bond future contract, the investor would close out the trade by selling the contract, i.e. by entering into a short bond future. The Exchange charges trading fees for all contracts that are closed out.

How to roll over a trade position

All investors who wish to hold their positions beyond the expiry date will be required to roll their positions over into the next expiry date. In other words all investors holding a May contract will need to roll their positions into the August contract. Investors will need to close out their positions (as explained) and subsequently enter into the next contract expiry. In other words, if an investor was long a May contract, the investor would have to short the May contract and subsequently enter into a long August contract. The benefit to the investor is that the same exposure is maintained.

Market participants

There are four categories of participants in the currency derivatives market:

- Hedgers
- Arbitrageurs
- Investors
- Speculators

Hedgers use bond futures to protect an existing portfolio against adverse interest rate movements. Hedgers therefore seek to reduce risk. Hedgers have a real interest in the underlying spot bonds and use futures as a way of preserving their value.

Arbitrageurs profit from price differentials of similar products in different markets e.g. price differentials between the spot bonds and the futures

Investors use bond futures to enhance the long-term performance of a portfolio of assets.

Speculators use bond futures in the hopes of making profit on short-term movements in prices. Speculators therefore seeks to enhance risk with the aim of making a profit. Speculators have no interest in the underlying spot bond market other than taking a view on the future direction of the bond's price.

Advantages of trading futures

Short sell: Investors can short sell an asset they do not physically own at the time.

Low transaction costs: R0.75 per R100 000 nominal

Credit risk: Very little if any credit risk as trades are guaranteed by the clearing member.

Liquidity: More liquid than the physical spot bond market which will lead to finer pricing and enhanced price discovery.

Example of cash flows on a long Bond Futures position

The table below highlights the daily cash flows that will be debited or credited to the investors trading account during the period 28/03/2008 to 08/04/2008.

	2008/03/28 Trade day open position	2008/03/31	2008/04/01	2008/04/02	2008/04/03	2008/04/04	2008/04/07	2008/04/08
R157 bond futures trade price	127.02000							
Consideration	R127,020.00							
Initial margin	(R1,546.00)							
MTM price	127.94498	127.85687	128.2393	129.00891	129.36626	129.42595	129.54545	129.48568
Consideration	R127,944.98	R127,856.87	R128,239.30	R129,008.91	R129,366.26	R129,425.95	R129,545.45	R129,485.68
Profit/(Loss) for the day {Variation margin}	**R924.98**	**(R81.10)**	**R382.43**	**R769.61**	**R357.35**	**R59.69**	**R119.50**	**(R59.77)**
Cash Flow for the day	**(R621.02)**							

28/03/2008: The investor decides to enter into a long R157 bond future expiring in May 2008 at a price of 127.02000.

At the end of the day the mark-to-market is determined to be 127.94498. His profit will thus be: (127.94498/100 * 100, 000) – (127.02000/100 * 100,000) = R 924.98.

However, the investor is also required to pay initial margin which is determined on the day to be R1,546. The total cash flow for the day is thus (R1,546) + R924.98 = (R621.02) which the investor needs to pay. It is important to note that initial margin will be returned to him when the position is closed out or else when the contract expires.

29/03/2008: The closing price is determined to be 127.85687 for 29/03/2008.

The Profit/(Loss) for the day is determined to be:

= (127.85687/100 * 100,000) – (127.94498/100 * 100,000)

= (R81.10) which the investor will need to pay to the exchange and is known as variation margin

Variation margin is calculated daily from the Mark-to-Market (Closing Prices) as above and results in an actual cash flow to/from the investor until the position is closed out or the contract expires.

Pricing

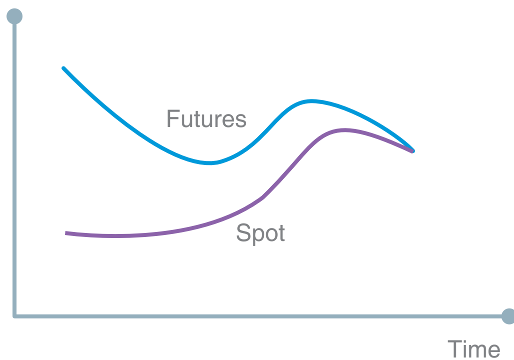
Bond futures prices are quoted in terms of yield to maturity (YTM) for settlement on the delivery date of the underlying bond. Using standard bond pricing techniques, this yield is converted to the All-In-Price (AIP) which is the price that will be paid for the bond on futures-expiry.

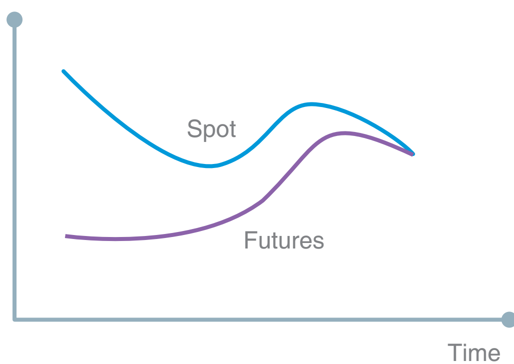
The futures price of a bond is the bond's current spot price plus the cost of carry necessary to hold the bond to the future delivery date. Cost of carry is the interest on funds borrowed to purchase the bond and hold it until expiry and delivery.

Futures Price = Spot Price + Cost of Carry – Income from the Coupons

Spot-Futures price convergence

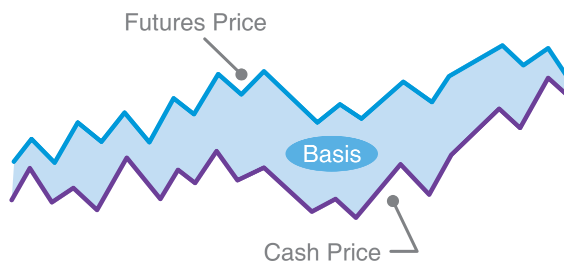
As the delivery approaches, **the futures/forward price will eventually converge to the spot price** of the underlying asset. If this was not the case there would be clear arbitrage opportunities.





Basis

The difference between a security's cash/spot and futures prices is known as the **"cash-futures basis"**. The Basis reflects a number of factors, collectively called "Carry Costs" (e.g. interest differential). The Basis narrows as the bond futures contract nears expiry. This is known as basis convergence.



While futures trading can eliminate price level risk, it cannot eliminate the risk that the basis will change unfavourably and unpredictably during the lifetime of the hedge. The cash-futures basis is subject to many influences, like general market factors and interest rates. In certain financial markets, basis reflects the difference between long-term and short-term interest rates.

The basis is used to determine:

- The best time to buy or sell
- When to use the futures market to hedge a purchase or sale
- The futures month in which to place a hedge
- When to accept an offer or bid

Gearing

Futures settle in arrears and thus investors only need to **post initial margin upfront** (the margin is calculated as the largest possible loss in one day on a position & is payable as a good faith deposit). Investors can thus take on larger positions than otherwise possible in the physical spot market. Investors can thus short sell an asset they do not physically own at the time.

The ability to take on larger positions will encourage both long-term buyers and those with a short-term view to participate in the market, where as in the cash market those with a short-term view will not want to participate as they will have to hold the physical bond.

Short hedge

A short hedge involves a short (sell) position in a futures contract. It is appropriate when the hedger already owns the underlying asset and expects to sell it at some time in the future. This strategy can also be used when the bond is not owned right now but will be owned at some time in the future.

Suppose that:

F_1: Initial Futures Price

F_2: Final Futures Price

S_2: Final Asset Price

You hedge the future sale of an asset by entering into a short futures contract:

Price Realized $= S_2 + (F_1 - F_2) = F_1 +$ **Basis**

Long hedge

A long hedge involves taking a long futures position in a futures contract. It is appropriate when an investor knows he will have to buy a bond at some point in the future and wants to lock in a price now.

Suppose that:

F_1: Initial Futures Price

F_2: Final Futures Price

S_2: Final Asset Price

You hedge the future purchase price of the bond by entering into a long futures contract

$$\textbf{Cost of Asset} = S_2 - (F_2 - F_1) = F_1 + Basis$$

Duration management strategy

Duration is an important concept when **hedging interest rate risk.**

Futures are used to manage the duration of a portfolio in situations where active deviations from benchmark neutral positions are desired.

For example, a portfolio manager may be of the opinion that interest rates are likely to rise and thus wish to decrease the duration of his/her portfolio.

This enables the hedger to ***assess the sensitivity of the bond portfolio/futures price to small parallel shifts in the yield curve.***

Financial institutions attempt to hedge themselves against interest rate risk by ensuring that the average duration of their assets equals the average duration of their liabilities (liabilities can be regarded as short positions in bonds). This strategy is known as ***duration matching or portfolio immunisation.***

When implemented, it ensures that a small parallel shift in interest rates will have little effect on the value of the portfolio of assets and liabilities. The ***gain (loss) on the assets should offset the loss (gain) on the liabilities.***

The number of futures contracts necessary to protect the bond portfolio against small parallel shifts in the yield curve can therefore be calculated.

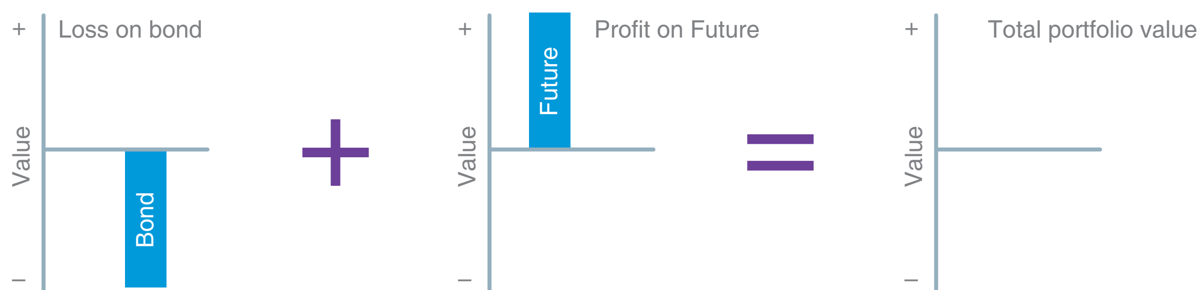
The hedge performance is liable to be poor if the duration of the bond underlying the futures contract differs markedly from the duration of the asset being hedged.

Hedging positions in a bond portfolio

An investor with a portfolio of **long bond positions** may need to protect the portfolio against anticipated increasing interest rates.

Sell bond futures – thus if rates increase, decline in value of bonds is offset by the increase in value of the short position.

Go long bond index futures contract of the risk faced by the investor is related to the performance of the whole bond market. The investor can neutralise this risk with a long position in a bond index futures contract.



Bond Futures specifications	
Name	Futures: Futures on bonds
Underlying bonds	Bonds listed by the Exchange (currently R153, R157, R186, R201, R203, R204, R206, R207, R208, R209)
Expiry dates and times	Midday on first business Thursday of February, May, August and November
Codes	e.g. Feb 10 R186
Listing programme	Near, middle and far contracts Specials on demand
Unit of trading and minimum allocation	1 contract = R100,000 nominal of underlying bond
Quotations	Yield to maturity (generally nacs) for settlement on the delivery date
Minimum quotation movement	$1/10^{th}$ point
Corresponding minimum value movement	$1/10^{th}$ of contract's "Rand per point" at pertaining yields range in February 2009 is ±R1,113 for the November 2009 R186
Settlement	Delivery of the physical bond
Delivery dates	t+3 of expiry date
Settlement price (for daily mark-to-market and on expiry)	All-in price calculated from the contract's closing yield to maturity for settlement on the delivery date, using the Bond Pricing Formula
Mark-to-market	Explicit daily
Margining	Bond future positions are risk managed and margined

Note: Contract specifications are subject to change from time to time.

Contact information

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