

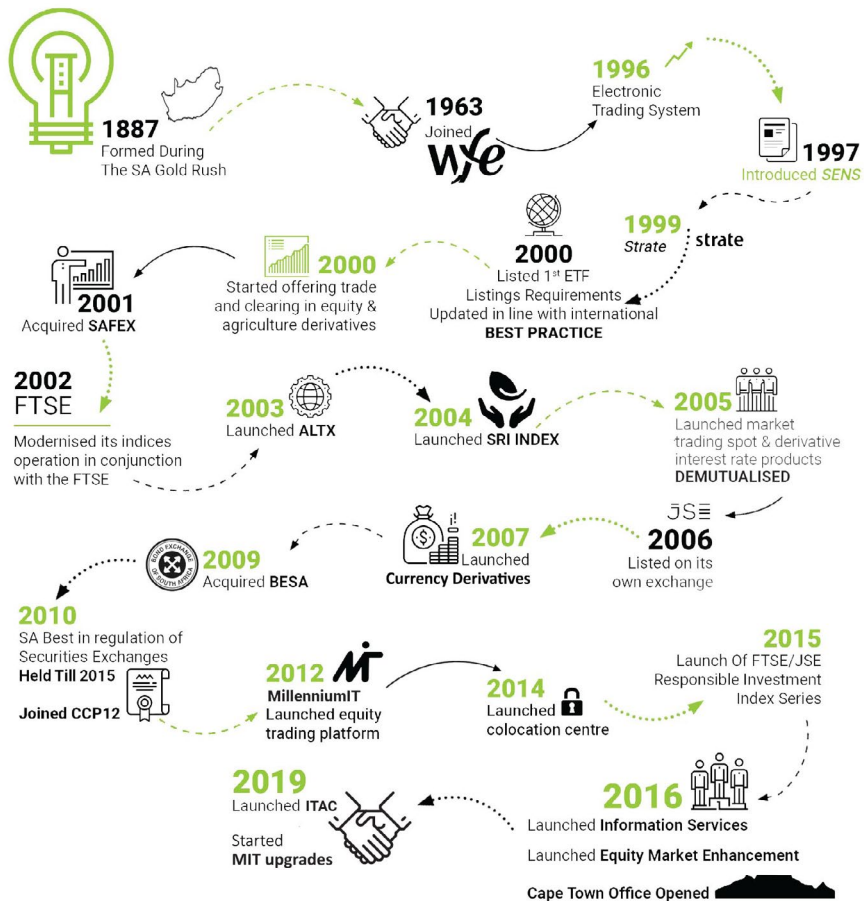


## **JIBAR vs FRAs**

A Comparison of  
JIBAR Futures  
& Forward Rate  
Agreements

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# Introduction

Historically, hedging short-term interest rate movements has taken place via over-the-counter (OTC) style Forward Rate Agreements (FRA's). However, exchange-traded and listed futures contracts can also be used to hedge these risks via 3-month JIBAR futures contracts. Both the JIBAR futures and the FRA's are instruments that reference the 3-month JIBAR rate at a future point in time. They are similar in many respects but there are a few key differences investors should bear in mind when trading these instruments, particularly when trading one contract against the other. The aim of this document is to explain these differences and to illustrate the effect they may have.

## Key features of Forward Rate Agreements (FRA's)

A FRA is an over-the-counter (OTC) contract to fix a certain interest rate (on either borrowing or lending) for some future period of time (called the forward period). In South Africa the assumption underlying the contract is that borrowing or lending is benchmarked against the JIBAR rate, and the forward period is usually three months.

An investor buying a FRA agrees to pay a fixed rate in exchange for 3-month JIBAR, and is said to be taking a long position in the FRA (or buying a FRA which is equivalent to borrowing at the fixed rate). The value of a FRA at inception is zero; which means that the fixed rate (agreed upon at inception of the transaction is equal to the market expectation of the 3-month JIBAR rate at the beginning of the forward period.

FRA Position Summary	
Buy FRA	Pay fixed rate / Receive floating rate
Sell FRA	Receive fixed rate / Pay floating rate

FRA's are net settled at the beginning of the forward period  $T_1$ . The net cash-flow that would be expected at the end of the forward period  $T_2$  is discounted to the beginning of the forward period by the 3-month JIBAR rate observed at the beginning of the forward period.

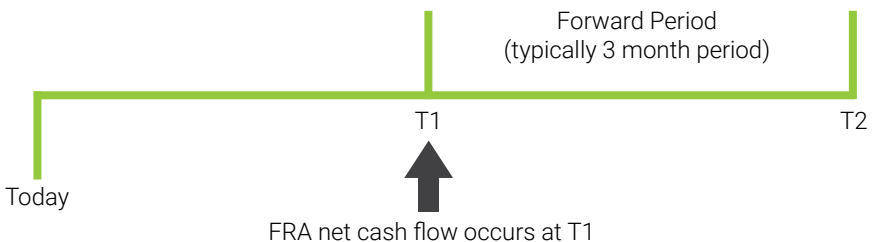


Figure 1: Diagrammatic Representation for a Forward Rate Agreement

An investor taking a long FRA position intends to profit from the 3-month JIBAR rate at the beginning of the forward period being higher than expected. Conversely an investor taking a short FRA position intends to profit from the 3-month JIBAR rate at the beginning of the forward period being lower than expected.

## Key features of JIBAR Futures

A JIBAR futures contract is an exchange-traded contract with a contract value at expiry of 100 minus the 3-month JIBAR rate at the expiry date  $T_1$ . (Note that while the value is calculated as described above, the JIBAR futures contract is traded on its yield).

Clearly the value of a JIBAR futures contract decreases as the expected 3-month JIBAR rate at futures expiry increases. Thus an investor taking a long JIBAR futures position looks to profit from the 3-month JIBAR rate at expiry being lower than expected. Conversely, an investor taking a short JIBAR futures position looks to profit from the 3-month JIBAR rate at expiry being higher than expected.

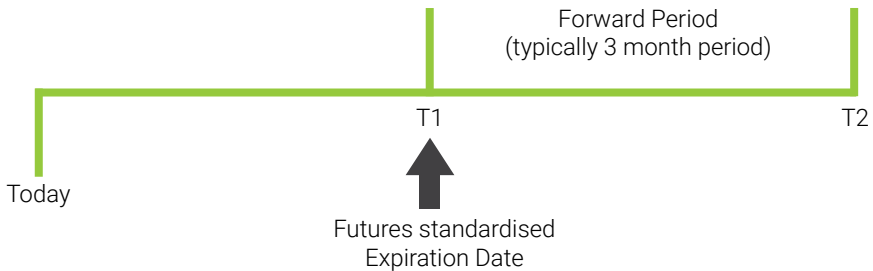


Figure 2: Diagrammatic Representation for a Future

## Summary of market rate movements

The following diagram illustrates the effect of increasing and decreasing interest rates on the value of both JIBAR futures and FRA's:

If Interest Rates Move	JIBAR Futures Values Move	FRA Values Move
↑	↓	↑
↓	↑	↓

Figure 3: Effect of Rate Changes of FRA and Futures Values

The table on the previous page illustrates that;

1. If your interest rate view required you to be a buyer of FRAs, you would be a seller of futures and vice versa.
2. If you need to hedge a long (buy) position in FRAs you would buy the equivalent JIBAR future and vice versa.

## The Convexity Bias

The quoted yields of FRAs and JIBAR futures for the same interest rate period will be slightly different. This arises from the fact that while the benchmark 3-month JIBAR rate determines the expiry value of both instruments, the valuation of the instruments during their life differs marginally as determined by the mathematics of the instruments.

A FRA is a convex instrument, i.e. changes in its MTM value are sensitive to the term structure of interest rates. Conversely a JIBAR future is linear, i.e. the change in the MTM value of the Future is only dependant on the 3-month forward rate referenced by the contract.

Convexity refers to the fact that the change in price for a decline in interest rates is larger than the change in price for a corresponding rise in interest rates.

Hence a short (sell) FRA position (receive fixed/pay floating) is hedged by a short (sell) JIBAR futures position. This portfolio is net positive convexity (arising from positive convexity of the FRA and no convexity for the JIBAR future). This neutral portfolio with positive convexity is equivalent to owning a free Option and since, theoretically, this should not be possible in an arbitrage-free world, the "cost" or value of this Option is represented through the JIBAR future yield being higher than the forward rate implied by the equivalent FRA. This is termed the "convexity bias". The size of this bias differs according to the time to expiration, in a similar way to the value of an Option increasing as the time to expiry of the Option increases.

As the FRA and the equivalent JIBAR future move towards the expiry date of the future, the JIBAR future yield will drift towards the yield of the FRA, and at expiry both products will be set to the same value of JIBAR. A short (sell) JIBAR futures position loses value as interest rates decrease (relative to the FRA) and this loss is analogous to the loss experienced due to the time decay on the value of an Option.

The Convexity Bias indicates that the rates implied by the futures should be higher than those of the equivalent forward rates implied by the FRAs.

Consider the following example as explanation:

### Example 1

Consider an investor taking a short position (receive fixed) in a FRA trading at 4%, with 3-month forward period starting at  $T_1$  on a principal amount of ZAR 1m. At inception, the value of the FRA is zero. This implies that the three month forward rate from time  $T_1$ , as observed today is 4%.

The investor effectively has a contract that receives an amount of  $(4\% \text{ minus } R_M)$  at time  $T_2$ , where  $R_M$  is the realized 3-month JIBAR rate at time  $T_1$ . The convention in the FRA market is to present-value this payment (at  $T_2$ ) towards  $T_1$  using the standard present-value mathematics and a yield of  $R_M$ .

From the explanation above, it is known that  $R_F$  must be greater than or equal to  $R_{FRA}$ . The amount by which  $R_F$  is greater than  $R_{FRA}$  is known as the convexity bias. While the pricing difference has implications for market-makers in determining the relevant market levels, in practical terms, the adjustment is very small (close to zero) for terms up to 1 year.

A general rule of thumb for relating  $R_F$  and  $R_{FRA}$  is as given by the following formula

$$R_F = R_{FRA} + \frac{1}{2} s^2 T_1 T_2$$

Where:

- $R_F$  is the futures rate implied by the JIBAR future
- $R_{FRA}$  is the forward rate implied by the Forward Rate Agreement
- $s$  is the volatility of the forward interest rate
- $T_1$  is the time to maturity of the futures contract in years
- $T_2$  is the time to maturity of the rate underlying the futures contract in years

**In brief, the size of the convexity bias is dependent largely on the volatility of interest rates.**

## A snapshot of differences between Futures and FRAs

	JIBAR Futures	FRA's
<b>Standardisation</b>	Standardised exchange traded instruments	OTC instruments, tailored to hedge specific cash-flows at specific points in time
<b>Rates expected to move DOWN</b>	BUY Futures	SELL FRAs
<b>Rates expected to move UP</b>	SELL Futures	BUY FRAs
<b>Settlement</b>	MTM cash flows settled on a daily basis	Net settled at the beginning of the forward period
<b>Practical Assumptions</b>	Generally, for short maturities (less than 1 yr), convexity adjustment is small (<1bp)	

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