Interest Rate Futures
Pricing, Hedging, Trading
Analysis and Applications

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Agenda

1. Financial Instruments
2. Pricing Methodology
3. Hedging Illustrations
4. Trading Strategies
5. Analysis Studies
6. Application Examples
7. Process Efficiency
8. Conclusion

Appendix
1.1 The Short Term Interest Rate (STIR) futures Market

A financial contract where settlement of a transaction happens at a future date while all other financial aspects of the transaction is fixed today.

1. Anonymous Trading, exchange, price-time priority.
2. Equivalent to standardised Forward Rate Agreement (FRA) contract
3. Standardised notional principal amounts, maturity dates and underlying interest rates,
4. STIR futures are deemed to be Credit Risk Free as each contract is guaranteed by exchange:
   to achieve this, when entering into a contract, each party must place an initial margin with the exchange (sufficient to cover an extreme movement in the market) plus variation margin because each contract is valued and settled daily.

For example

Maturity : 3 to 6 month contracts.
The Underlying : 3 month BIBOR and 6 month THBFIX interest rates
Mode of Settlement : Cash settlement
1.2 The STIR futures Market

For Cash Settlement Case,

The buyer of a STIR futures contract has a long position. If the position is held until the Settlement date, then he/she will be received or asked to pay the relevant difference for Cash Settlement.

The seller of a STIR futures contract has a short position. If the position is held until the Settlement date, then he/she will be asked to pay or received the relevant difference for Cash Settlement.

1.3.1 Time Frames (USD STIR futures or ED futures)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
<td>Dec</td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
<td>Apr</td>
<td>May</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
</tr>
</tbody>
</table>

15 Dec to 15 Mar

15 Jun to 15 Sep

21 Sep to 21 Dec

year 2011
1.3.2 Time Frames (USD STIR futures or ED futures)

<table>
<thead>
<tr>
<th>Expiry</th>
<th>From</th>
<th>To</th>
<th>Last</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>F2</td>
<td>19-Mar-12</td>
<td>19-Mar-12</td>
</tr>
<tr>
<td>Feb</td>
<td>G2</td>
<td>21-Mar-12</td>
<td>21-Mar-12</td>
</tr>
<tr>
<td>Mar</td>
<td>H2</td>
<td>27-Jun-12</td>
<td>27-Jun-12</td>
</tr>
<tr>
<td>Apr</td>
<td>K2</td>
<td>99.9500</td>
<td>99.9500</td>
</tr>
<tr>
<td>May</td>
<td>L2</td>
<td>02-Dec-12</td>
<td>02-Dec-12</td>
</tr>
<tr>
<td>Jun</td>
<td>M2</td>
<td>05-Dec-12</td>
<td>05-Dec-12</td>
</tr>
<tr>
<td>Jul</td>
<td>N2</td>
<td>08-Dec-12</td>
<td>08-Dec-12</td>
</tr>
<tr>
<td>Aug</td>
<td>Q2</td>
<td>10-Dec-12</td>
<td>10-Dec-12</td>
</tr>
<tr>
<td>Sep</td>
<td>U2</td>
<td>13-Dec-12</td>
<td>13-Dec-12</td>
</tr>
<tr>
<td>Oct</td>
<td>V2</td>
<td>16-Dec-12</td>
<td>16-Dec-12</td>
</tr>
<tr>
<td>Nov</td>
<td>X2</td>
<td>19-Dec-12</td>
<td>19-Dec-12</td>
</tr>
<tr>
<td>Dec</td>
<td>Z2</td>
<td>22-Dec-12</td>
<td>22-Dec-12</td>
</tr>
</tbody>
</table>

1.3.3 Term Structure (USD STIR futures or ED futures)

Price as the Reciprocal of forward interest rates.
Pricing Methodology

2.1 Birdeye View on Trading/Pricing/Hedging Planes

- Linearly Implied Rate and Spot Interest Rates converge
- Cash Settlement date
- 90 day Time frame
- $ 100 for Pricing Purpose
2.2.1 Zero Coupon Bond vs STIR futures

Zero Coupon Bond.

\[ P_{\text{zero coupon bond}} = \frac{100}{1 + r_{90,365}^{90/365}} \]

STIR futures as forward starting Zero Coupon Bond.

\[ P_{\text{STIR futures}} = \frac{100}{1 + f_{30,120}^{365/120}} \]

2.2.2 Suggested Pricing via Zero Coupon Rates

For example, 90 d BIBOR futures,

\[ P_{90 \text{d BIBOR futures}} = \frac{100 * \left[ 1 + r_{30,365}^{30/365} \right]^{30/120}}{\left[ 1 + r_{120,365}^{120/365} \right]^{120/365}} \]

\[ = \frac{100}{\left[ 1 + f_{30,120}^{365/120} \right]^{365/365}} \]
2.3 Suggested Pricing via Deposit Rates

For example, 90 d BIBOR futures,

\[
P_{90 \text{ d BIBOR futures}} = \frac{100 \times \left[ 1 + \left( \frac{30}{365} \right) \text{depo \ 30 d} \right]}{\left[ 1 + \left( \frac{120}{365} \right) \text{depo \ 120 d} \right]} = \frac{100}{\left[ 1 + \left( \frac{90}{365} \right) \text{FRA} \right]}
\]

Day Count Fraction is not "power of" but multiply beside depo rates

Hedging Illustrations
3.1 Transactions Involving Hedging

<table>
<thead>
<tr>
<th>Expected Transaction in Cash Market</th>
<th>In STIR futures market (now)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrow short-term funds</td>
<td>Sell or short 3m BIBOR or 6m THBFIX futures</td>
</tr>
<tr>
<td></td>
<td>(known as short hedging, to protect against an increase in interest rates)</td>
</tr>
<tr>
<td>Lend short-term funds</td>
<td>Buy or long 3m BIBOR or 6m THBFIX futures</td>
</tr>
<tr>
<td></td>
<td>(known as long hedging, to protect against a decline in interest rates)</td>
</tr>
</tbody>
</table>

3.2.1 To compensate for rise in cost of borrowing

STIR futures contract can be used to hedge interest rate risk.

Suppose that 7 months from today, we plan to borrow THB 10 million for 90 days, and that our borrowing rate is the same as BIBOR.

3 month BIBOR futures price for 7 months from today is $96,000;
=> 90-day rate of ($100 - $96) * (90/365) * (1/100) = 0.980%

Now, suppose that 7 months hence, 3 month BIBOR fixing is 5.000%,
=> 3 month BIBOR futures of $95,000 = $100 – annualised yield of 5.000%
(linear)

The linearly implied 90-day rates is (5%)* (90/365) = 1.230%
Our extra borrowing expense over 90 days on THB 10 million will therefore be (1.230 - 0.980)% or 0.250% or THB 25,000.
3.2.2 To compensate for rise in cost of borrowing

Extra borrowing expense is offset by gains on, short 3-month BIBOR futures contract.

The 3-month BIBOR futures price has gone down, giving us a gain of THB \( 250 \times 100 \times (\$96 - 95) = \text{THB 25,000} \).

Since, from THB \((125/0.005) \times 0.01 = \text{THB 250 per basis point or bp} \).

Short position in the 3-month BIBOR futures contract compensates us for the increase in our borrowing cost.

\[
\text{Gain of THB 25,000}
\]

In the same way, a long position can be used to lock in a lending rate. Note: Exchange and Clearing Fee are not included in the calculation.

3.2.3 If 3m BIBOR starts to rise ... 3m BIBOR futures price will fall
3.2.4 If 3m BIBOR indeed rises ... 3m BIBOR futures price falls

![Graph showing the price movement over time for 3m BIBOR futures.]

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Mar Contract

Initial Trade: open to sell at $96.000

After 7 months: 3-month BIBOR indeed rises (or naturally expiry) close to buy at $95.000

Profits

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3.3.1 A possible way to price a Forward Rate Agreement (FRA)

FRA may be created by spot money market transaction, using 2 deposit rates.

Future value of $1,

\[ [1 + \left( \frac{164}{365} \right) \text{dep}_1 \text{64d}] = [1 + \left( \frac{73}{365} \right) \text{dep}_73 \text{d}] [1 + \left( \frac{91}{365} \right) FRA_{3 \times 6}] \]

\[ FRA_{3 \times 6} = \left[ \frac{365}{91} \right] \left[ \left[ 1 + \left( \frac{164}{365} \right) \text{dep}_1 \text{64d} \right] - 1 \right] \]

---
3.3.2 To price or hedge a *Forward Rate Agreement (FRA)*

However, *FRAs* are off-balance sheet whereas cash trades are on–balance sheet, which is not a good mix.

If a liquid interest rate (or deposit) futures market exists, then this is much more likely to be used to price and hedge *FRAs*.

The current quotes for the *3-month BIBOR futures* contract are:

<table>
<thead>
<tr>
<th>Maturity Date</th>
<th>Futures Price</th>
<th>Linearly Implied Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar Contract</td>
<td>16 Mar 2011</td>
<td>$97.800</td>
</tr>
<tr>
<td>Jun Contract</td>
<td>15 Jun 2011</td>
<td>$97.500</td>
</tr>
</tbody>
</table>

Given these rates, we wish to price the *FRA* by estimating the fair 3 month rate out of 6 *Apr 2011*, this is usually done by simple linear interpolation between the neighbouring linearly implied rates from *STIR futures*.

3.3.3 To price or hedge a *Forward Rate Agreement (FRA)*

Since
6 *Apr 2011* – 16 *Mar 2011* = 21 days
&
15 *Jun 2011* – 6 *Apr 2011* = 70 days

Linear interpolation gives:
(70/91)*2.200% + (21/91)*2.500% = 2.269%

The reflects the contribution of each futures contact, Mar provides 77% & Jun provides 23% to the price estimates of the 3x6 FRA.

If the bank has sold *THB* 100 million of a 3x6 FRA, therefore, to partial hedge: 8 of Mar contracts
2 of Jun contracts.

The profit gained via *3-month BIBOR futures* via variation margin should offset some of the loss on the 3x6 FRA.
3.3.4 Case study on a Parallel Shift

Consider first of all a 10bp parallel shift in the 3 month forward rate curve.

The bank would pay
\[ 100 \text{ million } \times 10bp \times (91/365) \]
\[ = \text{THB 24,931 extra on the 3x6 FRA} \]

& would receive 10 contracts \( \times 10bp \times 250 \)
\[ = \text{THB 25,000 from the 3-month BIBOR futures.} \]
(ignoring trading cost)

So the hedge is fairly effective, given the slight day count mismatch.

In theory, the size of the futures hedge could have been adjusted slightly, but this is obviously impractical.

3.3.5 Case study on a Rotational Shift

Consider a rotational shift, pivoting around 1 Apr 2011.

This results in the following shifts:

- 8 of Mar contract -6.8 bp \( \text{THB} \) value\(-13,600\)
- 2 of Jun contract +32.4 bp \( \text{value} \) +16,200
- 3x6 FRA contract +2 bp \( \text{value} \) \(-4,986\)
- Net Effect \( \text{value} \) \(-2,386\)

The hedge appears to be quite effective against both parallel and rotational shifts. However, if the rates move to increase their curvature, for example, both futures rates decrease but the FRA rate remains constant, then the hedge will fail.
3.3.6 Further Considerations

As time passes, the hedge needs to be re-balanced as the proportions of the 2 contracts change.

Eventually, the Mar contract will expire leaving the 3x6 FRA hedge only with the Jun contract. This exposes the bank to rotational risk for the reminder of the contract.

This may be reduced by selling a small amount of Sep contracts, but this is unlikely to be effective given the short time to the FRA fixing. By this, we mean that the correlation between the remainder of the FRA contract and the Sep contract is likely to be quite small, and hence a large degree of curve risk has been introduced.

The time of greatest risk therefore when hedging a FRA with futures is when one of the bracketing contracts has matured.

3.4.1 THB IRS with 6m THBFIX interest rates as floating index

THB IRS structure

<table>
<thead>
<tr>
<th>Fixed-rate payments (pay 1% semi-annually)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swap Desk of a Bank</td>
</tr>
<tr>
<td>Float-rate payments (receive 6M THBFIX i/r)</td>
</tr>
</tbody>
</table>

THB IRS structure

<table>
<thead>
<tr>
<th>Fund Management Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swap Desk of a Bank</td>
</tr>
</tbody>
</table>
3.4.2 Hedge THB IRS with 6m THBFIX interest rate futures

THB IRS structure

Fund Management Company

- Fixed-rate payments (pay 1% semi-annually)
- Float-rate payments (receive 6M THBFIX i/r)

Swap Desk of Bank

- Shorting a series of 6M THBFIX i/r futures

Company’s View

- Fixed-rate payments
  (pay 1% semi-annually)
- Float-rate payments
  (receive 6M THBFIX i/r)

Gain to Company

Gain to Swap Desk of Bank

3.5 Curves Discrepancy : Convexity on Term Structure

<table>
<thead>
<tr>
<th>USD</th>
<th>Trade Date: 27 Nov 2010</th>
<th>Value Date: 30 Nov 2010</th>
</tr>
</thead>
</table>

**Calculation Parameters**

- **Asset Type:** Futures
- **Filter:** All Contracts
- **Source:** ED

**Linear Implied Yield from STIR futures**

FRA curve from cubic spine interpolated spot deposit rate curves

narrower

wider

Maturity or Expiry Date

Mar Contract | Jun Contract | Sep Contract | Dec Contract
3.6 An example of Risk Management System: Reuters’ K+ Futures Maturities

Trading Strategies
4.1 Three month BIBOR daily time series

Historical data may be used to build model for simulation purpose (Econometrics, Monte Carlo Simulation etc.)

4.2 Six month THBFIX interest rates daily time series

\[
\left\{ \left[1+(FWD/SPOT)\right]\times\left[1+(SIB0R/DAYS/360)\right]-1 \right\} \times 365/DAYS \times 100
\]

(Subprime Crisis with spot FX complication)
4.3.1 Trade based on Interest Rates View (e.g. rising)

- BIBOR term structure on Nov 2010
- BIBOR term structure on Aug 2010 (3 month ago)
- BIBOR term structure on May 2010 (6 month ago)
- BIBOR term structure on Nov 2009 (1 year ago)

Parallel shift being observed (may be due to more Economic Activities)

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4.3.2 Trade based on Interest Rates View (e.g. rising)

- Linear Price Yield Relationship
- Linearly Implied Yield curve

Profit

- Price $:
  - $95.95
  - $96.000
  - $96.00
- Linearly Implied Yield %:
  - 4%
  - 4.05%

Trading Plane

- Open to sell $96.000
- Close to buy $95.95
- Mar Contract
- 3 day later
- Linearly Implied Yield curve (T + 3 days)

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THOMSON REUTERS
4.3.3 Interest Rates indeed rises ... 3m BIBOR futures price falls

Mar Contract

Initial Trade: open to sell at $96.000

After 3 days : close to buy at $95.950

Profits

4.3.4 How about THBFIX interest rates term structure ?

Inverted at this end

Flattening after 3m tenor
4.4.1 Riding the Yield Curve (Roll-down)

As long as the forward interest rates curve remains upward sloping ... this is a possible strategy.

4.4.2 Riding the Yield Curve (Roll-down)

Jun Contract
Initial Trade: open to buy at $98.200

After 14 days: close to sell at $98.250

Profits
4.5.1 Calendar Spread Trading with STIR futures

Traders, who anticipate potential changes in the relative value of two different contracts, may employ a speculative trading strategy known as Calendar Spread Trading.

<table>
<thead>
<tr>
<th>Linearly Implied Yield %</th>
<th>Term or Tenor or maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.000%</td>
<td>Linearly Implied Yield curve</td>
</tr>
<tr>
<td>4.250%</td>
<td>Linearly Implied Yield curve (T + 5 days)</td>
</tr>
</tbody>
</table>

Price $ $96.000 $95.700 $95.900 $95.750

Trading Plane

Open to sell $96.000
Open to buy $95.700
Close to buy $95.900
Sell $95.750

4.5.2 Calendar Spread Trading with STIR futures

<table>
<thead>
<tr>
<th>Price $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open to sell at $96.000 for Mar Contract</td>
</tr>
<tr>
<td>Close to buy at $95.950</td>
</tr>
<tr>
<td>Close to sell at $95.750</td>
</tr>
<tr>
<td>Open to buy at $95.700 for Jun Contract</td>
</tr>
</tbody>
</table>

Mar Contract
Initial Trade: open to sell at $96.000
After 5 days: close to buy at $95.900
Profits

Jun Contract
Initial Trade: open to buy at $95.700
After 5 days: close to sell at $95.750
Profits
4.6.1 3m BIBOR and 6m THBFIX interest rates correlation analysis

Suggestion: “Basis Trade”
During positive correlation, borrow low & lend high, unwind when correlation starts to drop towards zero.

90 day time frame

4.6.2 Suggestion: “Basis Trades” during known In-Sync period

Suggestion: “Basis Trade”
For normally upward sloping yield curves, during positive correlation, borrow low & lend high, unwind when correlation starts to drop towards zero.
4.7 Closely monitor Surprises or Disappointment over Economics Indicators

4.8 News that moves Financial Markets
Analysis Studies

5.1.1 The Success Story of Australia (Futures) Exchanges
### 5.1.2 A Comparison

<table>
<thead>
<tr>
<th>Futures Type</th>
<th>Futures Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>STIR futures</td>
<td>90d Bank Bill futures</td>
</tr>
<tr>
<td></td>
<td>Bond futures (yield based)</td>
</tr>
<tr>
<td></td>
<td>3y Gov Bond futures</td>
</tr>
<tr>
<td></td>
<td>10y Gov Bond futures</td>
</tr>
<tr>
<td>Bond futures</td>
<td>3m BIBOR futures</td>
</tr>
<tr>
<td></td>
<td>6m THBFIX interest rate futures</td>
</tr>
</tbody>
</table>

Successful, mainly because, the futures are embraced by the domestic markets. The futures are used actively as hedging tools by Aussie Corporations.

### 5.2.1 Which operation is preferred by your Central Bank?

**More or Less FX operations?**

If More FX operation, apart from FX trading, you may want to consider FX-linked interest rates:

- 6 month THBFIX interest rate futures

**Less or More Interest Rates operation?**

If More Interest Rates operation, both 3-month BIBOR futures and 6-month THBFIX interest rate futures (related to THB IRS) activities will likely be more too.
5.2.2 **ESTIMATES OF DAILY ASIA CENTRAL BANK FX INTERVENTION**

<table>
<thead>
<tr>
<th>DATE</th>
<th>BOK</th>
<th>BNM</th>
<th>BI</th>
<th>BOT</th>
<th>BSP</th>
<th>CEC</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Oct</td>
<td>500</td>
<td>100</td>
<td></td>
<td>500</td>
<td>300</td>
<td>3,450</td>
<td></td>
</tr>
<tr>
<td>4 Oct</td>
<td>1,500</td>
<td>600</td>
<td>100</td>
<td>500</td>
<td>450</td>
<td>500</td>
<td>3,450</td>
</tr>
<tr>
<td>1 Oct</td>
<td>3,000</td>
<td>900</td>
<td>850</td>
<td>1,350</td>
<td>600</td>
<td>500</td>
<td>6,350</td>
</tr>
<tr>
<td>30 Sept</td>
<td>900</td>
<td>700</td>
<td>700</td>
<td>150</td>
<td>150</td>
<td>200</td>
<td>2,800</td>
</tr>
<tr>
<td>29 Sept</td>
<td>2,200</td>
<td>900</td>
<td>800</td>
<td>300</td>
<td>1,100</td>
<td>500</td>
<td>5,800</td>
</tr>
<tr>
<td>28 Sept</td>
<td>500</td>
<td>50</td>
<td>200</td>
<td>150</td>
<td>50</td>
<td>300</td>
<td>1,250</td>
</tr>
<tr>
<td>27 Sept</td>
<td>900</td>
<td>800</td>
<td>300</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>2,500</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9,500</td>
<td>3,950</td>
<td>2,950</td>
<td>1,600</td>
<td>2,600</td>
<td>2,600</td>
<td>23,200</td>
</tr>
</tbody>
</table>

Estimated daily totals in millions of dollars

Central banks:
- BOK – South Korea
- BNM – Malaysia
- BI – Indonesia
- BOT – Thailand
- BSP – Philippines
- CEC – Taiwan

Source: IFR Markets

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5.3.1 **How does your STIR behaves?**

**THBFIX interest rates term structure**

- Rate will rise, open to sell 6m THBFIX i/r futures
- Rate will fall, open to buy 6m THBFIX i/r futures

How True?

*Is the probability distribution of interest rate Normal?*

That is, most of time (68%) stays between the distance of 1 standard deviation from the average interest rates (time series)
5.3.2 How does your STIR behaves?

For example, more Resistance on interest rates rising and less Resistance on interest rates falling. Rate will fall more often, more people will open to buy 6m THBFIX futures => Skewed Market.

5.4 Economic Situation affects Supply & Demand of STIR futures

Open Interests for STIR futures
Notional amount for FRA

Ease of Hedging and Speculation over OTC products

Higher level of awareness and sensitivity but likely to decay with time.

Usual level of activities
Less and Delayed due to Negotiation and Subjected to Credit Limits Approval etc

OTC : Over The Counter financial product, for example, Forward Rate Agreement (FRA)
6.1 Use STIR futures to construct a Cost-of-Funding Curve

A Zero Coupon Curve could be interpreted as a Cost-of-funding Curve.

Zero Coupon Curve is an interest rate proxy because it
1. provides a continuous interest rates from T/N (Tom./Next) to, say 30 years.
2. is usually constructed using real time tradable liquid financial instruments.
3. is coupon-free, unburdened by frequency payments of coupons (e.g. quarterly, semi-annual payment frequency).

... ...
6.2 Zero-coupon Curve (Cost-of-Funding Curve) as Basic Engine

- Asset Swap
- Bond Calculator
- Swap Pricer (IRS, CRS, CMS etc)
- Forward Rate Agreement (FRA)
- ZC Builder
- Caps, Floors & Collar
- Swaption
- Currency Option

6.3 Thomson Reuters’ default THB Zero-coupon Curve

Convexity unadjusted Interbank-rate-derived Zero-coupon Curve
6.4.1 Construct a Zero-coupon Curve from most liquid instruments

Factors to consider if you would like to construct it yourself:
1. Liquidity (ease of hedging)
2. Real-time (e.g. Deposits, Libor Fixings, STIR futures, IRS etc)

6.4.2 Construction of your own Zero-coupon Curve with Reuters’ functions
6.5 Structured Products from STIR futures

3m BIBOR futures
or
6m THBFIX futures

+ Deposits or

+ Others

Par Swap

or

Synthetic Floating Rate Notes, FRN

or

Interest Rate Linked Structure Products

Process Efficiency
7.1 Evolution Stages

**New to the STIR futures Markets**
- Pricing Methodology
- Hedging Approach
- Trading Strategies
- etc

**Next Stage**
- Documented Process
- Cost Effective
- Time Efficiency
- Intelligence built-in (example: Algo Trading)
- etc

7.2 Thomson Reuters AUTEX Network

Thomson Reuters Autex network

is one of the world’s largest networks that support trading of multiple markets and asset classes.

The network provides you

the connectivity to your global and regional brokers.

Being a member of the network

will allow you to access the broadest pool of liquidity and to trade with the largest community in the world.
7.3 RTEx – Reuters Trading for Exchanges

For those without a Seat in Exchanges to trade Interest Rate Futures, they can do trading via RTEx Broker.

7.4 Trading out of 3000Xtra or Eikon (Market Data Terminal)
7.5 RTEx Trading Ticket

An example of Algo Trading is trading based on optimising VWAP (Volume Weighted Average Price, low on Buy & high on Sell).

Order Book reflects Market Depth (in this example, presented in ladder format).

Blotter: A record of trades and the details of the trades made over a period of time.

8. Conclusion

By presenting

1. financial instruments (example: 3m BIBOR & 6m THBFIX futures)
2. method to price (example: time value of money)
3. hedging examples (example: protect against rise of interest rates)
4. trading strategies (example: Calendar Spread Trading)
5. Economic analysis and understanding Central Bank policy
6. cost-of-funding curve construction (example: Zero-coupon curve)
7. process efficiency for trades effectiveness and deals management

We attempt to help you understand the Risk and Rewards embedded-in and appreciate the Hedging and Speculation aspects of the 3m BIBOR and 6m THBFIX interest rate futures.
Any Questions?

Christmas Gifts for you

THE DAY AHEAD
REUTERS NEWS

MONDAY'S KEY ECONOMICS EVENTS

<table>
<thead>
<tr>
<th>EVENT</th>
<th>ET/GMT</th>
<th>REUTERS POLL</th>
<th>PRIOR</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago Midwest Ocr</td>
<td>1200/1700</td>
<td>--</td>
<td>80.2</td>
<td>Federal Reserve Bank of Chicago</td>
</tr>
</tbody>
</table>

RECAP: FRIDAY'S MARKETS

Materials sector shares led stocks lower on euro-debt woes while safe-haven buying boosted bonds and the dollar. Oil edged up in choppy trading of light, post-holiday volumes while gold fell.

WHAT TO WATCH IN THE WEEK AHEAD

- With the arrest of an executive from an "expert network" firm this week, expect more movement on insider trading investigations that have recently shaken Wall Street. A judge's ruling on Wednesday that wiretaps can be used as evidence in the Galileo case strengthened the hand of the FBI and prosecutors in pursuing cases against others. Sources have already told Reuters

Drop me an email (vincent.chia@thomsonreuters.com) for soft copy or to request for free subscription of:

1. "Reuters Insider" (web-based News in Video Format for Internet Explorer, iPhone/iPad, Blackberry
2. "The Day Ahead"
3. "Insider Debt"
4. "The Morning Benchmark"
Finance Minister Korn Chatikavanij says Thailand may implement more capital controls to combat excessive inflows, as tensions sparked by easy U.S. monetary policy intensify.
Construction of Interbank-rate-derived Zero-coupon Curve (< 1 year)

From Money Market, \( deposit_{ON} = deposit_{TN} = 3.3\% \), \( deposit_{SW} = 3.42\% \) (ask)

For Spot-week (SW)’s “ask” using the Time Value of Money:

\[
(1 + s_{SW}) = \left[ 1 + \frac{1}{360} (deposit_{ON} \% ) \right] \left[ 1 + \frac{1}{360} (deposit_{SW} \% ) \right] 1 + \frac{7}{360} (deposit_{TN} \% )
\]

\[
\Rightarrow (1 + s_{SW}) = \left[ 1 + \frac{1}{360} (3.3\%) \right] \left[ 1 + \frac{1}{360} (3.42\%) \right] 1 + \frac{7}{360} (3.42\%)
\]

\[
\Rightarrow s_{SW} = 3.499\%
\]

Construction of Interbank-rate-derived Zero-coupon Curve (1 ~ 2 years)

From Money Market, \( deposit_{ON} = deposit_{TN} = 3.3\% \), \( deposit_{9m} = 4.09\% \) (ask)

Eurodollar futures mid price = \( ED_{9m \text{ to 1y (mid)}} = USD \ 95.6 \) using Time Value of Money:

\[
(1 + s_{9m}) = \left[ 1 + \frac{1}{360} (deposit_{ON} \% ) \right] \left[ 1 + \frac{1}{360} (deposit_{9m} \% ) \right] 1 + \frac{274}{360} (deposit_{9m} \% )
\]

\[
(1 + s_{9m}) = \left[ 1 + \frac{1}{360} (3.3\%) \right] \left[ 1 + \frac{1}{360} (4.09\%) \right] 1 + \frac{274}{360} \left( 4.09\% \right)
\]

\[
\Rightarrow s_{9m} = 4.256\%
\]

\[
(0 \leftarrow \text{convex1y}_{\text{up}} < \text{convex366d}_{\text{IT}})
\]
Construction of Interbank-rate-derived Zero-coupon Curve (> 2 years)

Given fixed rate for mid IRS$_{3\text{ year}}$ (mid) = 4.49% or $4.49$ for notional of $100$

Behave like a 3 year par Bond,

\[
\begin{align*}
\$100 &= \frac{\$4.49}{(1 + 4.256\%)} + \frac{\$4.49}{(1 + 4.468\%)} + \frac{\$(4.49 + 100)}{(1 + r_{3\text{ year}})^3} \\
\Rightarrow s_{3\text{ year}} &= 4.494\%
\end{align*}
\]

This condition holds only if the payment schedule is the same as the LIBOR benchmark used & the swap starts on Spot Date.

Convexity Bias (adjustment) for STIR futures

The STIR futures pays us at the time we borrow, but we do pay interest until the loan matures, 90 days hence. Since we have time to earn interest on the change in the value of the contract.
Convexity Bias (adjustment) for *STIR futures*

Typically, a convexity adjustment is made to convert implied yield from *STIR futures* into forward interest rates.

For short maturities (up to one year), the linearly implied yield from *STIR futures* can be assumed to be the same as the corresponding forward interest rate.

But for longer maturities, the difference between futures and forward contracts become important when interest rates vary unpredictably.