CANADIAN BANKER'S ACCEPTANCE FUTURES

ROLE OF BAX™ FUTURES IN THE CANADIAN MARKET AND MARKET RISK CONSIDERATIONS

FOR PRESENTATION AT THE INTERNATIONAL CONFERENCE ON FINANCIAL REGULATION & SYSTEMIC RISK

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HISTORICAL DEVELOPMENT

BAX™ futures was introduced 1988 by the Montreal Exchange (M-X)

Designed for Arbitrage:

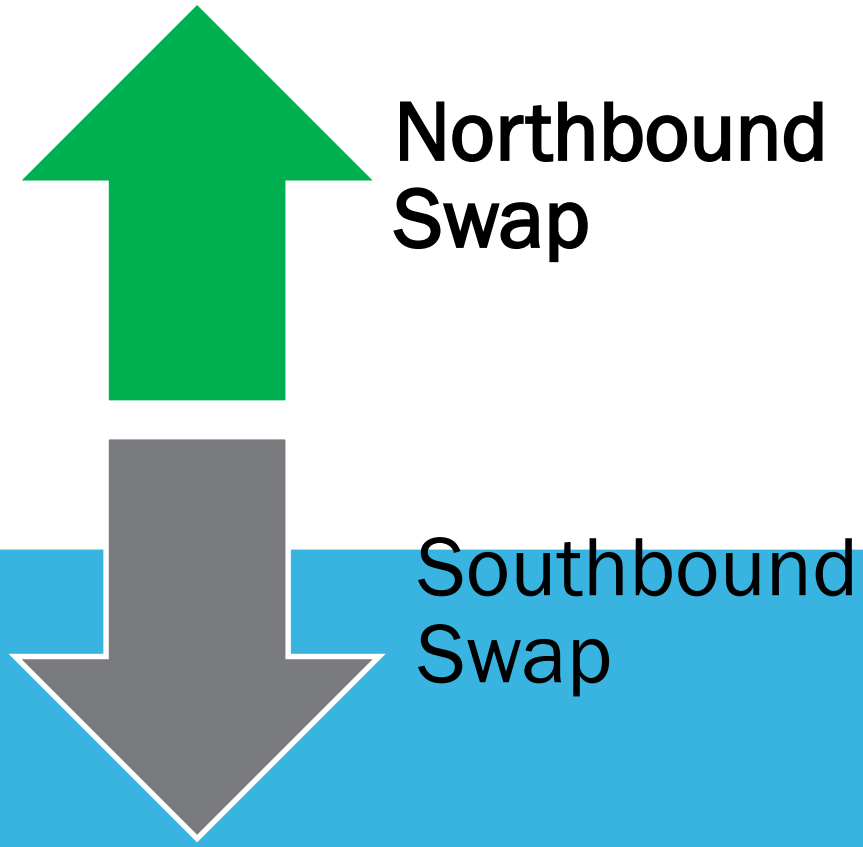
with Eurodollar Futures

" BAX ™ seems to respond

To new information more rapidly

Than do markets for traditional

Instruments:"



Source: The market for futures contracts on Canadian bankers' acceptance, Bank of Canada Review, Autumn 1996

USERS OF CAD/USD FX OTC DERIVATIVES

US Dollar Sellers: Resource Industry, example, the Canadian oil Industry out of Alberta

US Dollar Buyers: Automobile Industry, importers of automobile parts.

FOREIGN EXCHANGE TURNOVER IN CANADA CANADIAN DOLLAR AGAINST U.S. DOLLAR

Monthly volume of transactions priced and executed by traders in Canada as at Oct-2012.

FX Swaps: $429 Billion.

Currency Swaps: $31 Billion

Source: CFEC (The Canadian Foreign Exchange Committee) Releases Results of October 2012 Foreign Exchange Volume Survey. Table 3

INTEREST RATE SWAP MARKET

BAX™ is the floating leg of a Canadian Dollar Interest Rate

swap, or of a Canadian Dollar cross currency swap.

OTC single-currency Canadian Dollar Interest Rate Derivatives

totaled a notional of $7.5Tr (out of a total of $490Tr world-wide).

Source: BIS Dec 2012. Table 21B

INTEREST RATE DERIVATIVES

BIS SEMIANNUAL OTC SURVEY (G10 COUNTRIES PLUS SWITZERLAND, AUSTRALIA AND SPAIN) (DEC 2012). NOTIONALS IN U.S. DOLLARS

Forward Rate Agreements:	$71 Tr
Swaps:	$370Tr
Options:	$48Tr
Total:	$489Tr

Source: BIS Dec 2012 Table 21A

INTEREST RATE CONTRACTS CANADIAN BANKS

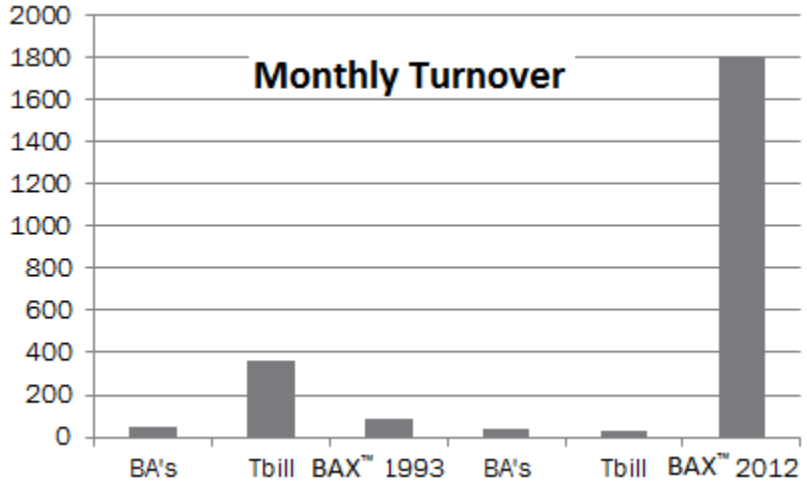
NOTIONAL ($ BILLIONS) 2011

Bank	Trading Derivatives	Asset Liability Management	Total
BMO	2,691	74	2,765
BNS	1,788	114	1,902
CIBC	928	310	1,238
NBC	398	30	428
RBC	5,605	172	5,777
TD	1,924	387	2,311
Total	13,334	1,087	14,421

Source: PricewaterhouseCoopers LLP, Canadian Banks 2012, Perspectives on the Canadian banking industry

CANADIAN DOLLAR BAX™ FUTURES

BAX™ futures have seen a dramatic growth since 1994 due to non-residence participation as well as increased use By banks as hedging instruments.



In early 1993, BAX ™ turnover was $60B and the Treasury bill market was the largest and most liquid sector of the Canadian money market at $360B. Banker's Acceptances monthly turnover was $50B.*

Currently, the size of the treasury bill market is $28B, Banker's Acceptances $35B, and BAX™, $1.8 trillion (Average Monthly Turnovers Jan 2012 to Sep 2012**)

Sources: Bank of Canada Review, Autumn 1996*, Bank of Canada Review, Tables F11 & F15, Feb 2013**.

BAX™ FUTURES CONTRACT SPECS

Notional: CAD $1,000,000

Contract Months: 12 Quarterly contract months.

Price Quote: 100 – Price = Interest Rate

$25 per .01 price movement.

E.g. Purchase at 98, settle at 99:

(99 – 98) x $25 /.01 = $2,500 equivalent to

1,000,000 x 1% /4

Cash settled at the 3 month CDOR rate on Reuters at 10:00 am Last Trading Day

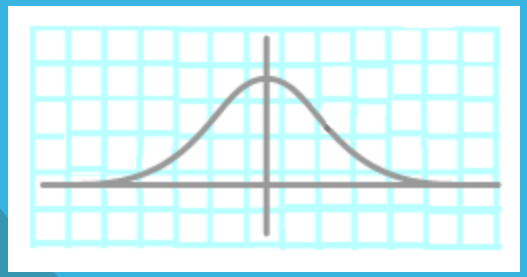
Source: Montreal Exchange, M-X

HVAR AS A RISK MEASURE

Bank's method to measure market risk based on historical data

Traditional Clearing House method to measure market risk based on 3 standard deviations of the underlying price.

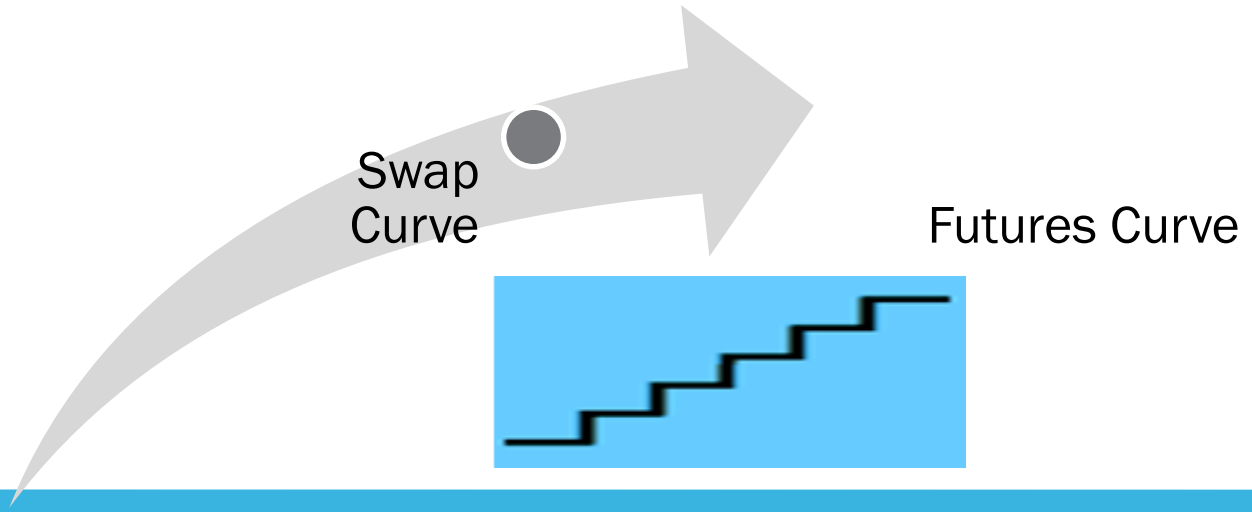
Portfolio Margining adopted by Clearing Houses for OTC products such as Interest Rate Swaps and their hedges (CME)



FUTURES CURVE COMPARED TO OTC CURVES

Interest rates used to value OTC instruments are usually represented as a continuous curve,

Futures curves, however are stepwise, with the contract price fixed between last trading days.



CONTRACT ROLLS

A series of a futures contract is always changing. For example, a 2013 June BAX™ contract will expire on June 17th, 2013. On June 16th, tenor is 1 day.

The replacement quarterly contract is 2013 September BAX™, expiring, Sep 16th, 2013

On June 18th, the tenor is 92 days.

This makes it difficult to compare tenors for HVaR purposes.

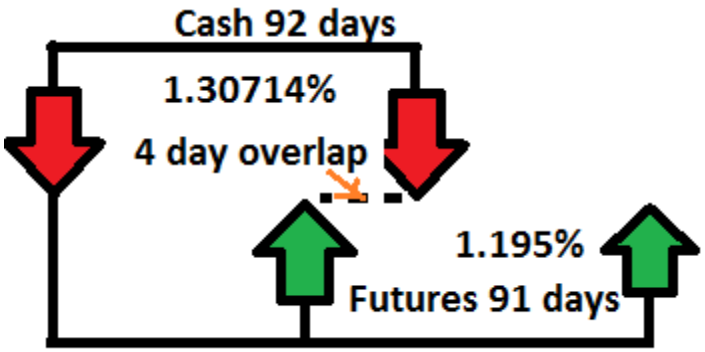
CALIBRATING THE CASH (CDOR) AND BAX™ FUTURES CONTRACTS

Convert both the Cash and the BAX™ futures to forward factors, using appropriate day/count conventions.

Obtain the annualized daily log of the factors

Accommodate overlaps and gaps such that the discount factors will result in the Cash Rates and the BAX™ futures prices.

EXAMPLE



92 day Cash Rate: .0130714

91 day Forward Rate (Day 88 to Day 179)

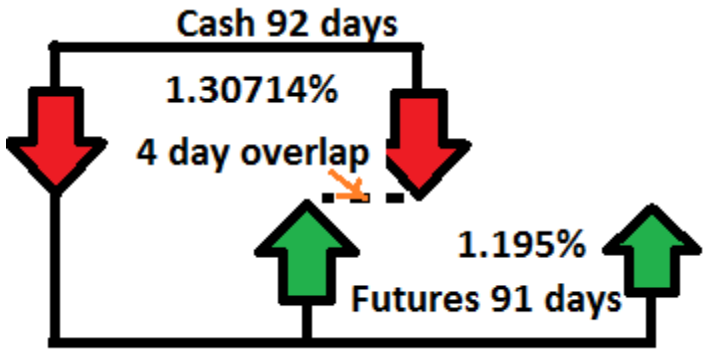
Which starts from the Last Trading Day of the BAX™ contract to the 3 month forward Banker's Acceptance Rate.

e.g. BAX™U12, starts Sep 17, 2012, ends on the 3 month CDOR (Canadian Libor) forward, Dec 17, 2012.

BAX™ Futures Price: 98.805

- Implied Rate = 100 – 98.805 = 1.195%

CONVERT TO DAILY IFR

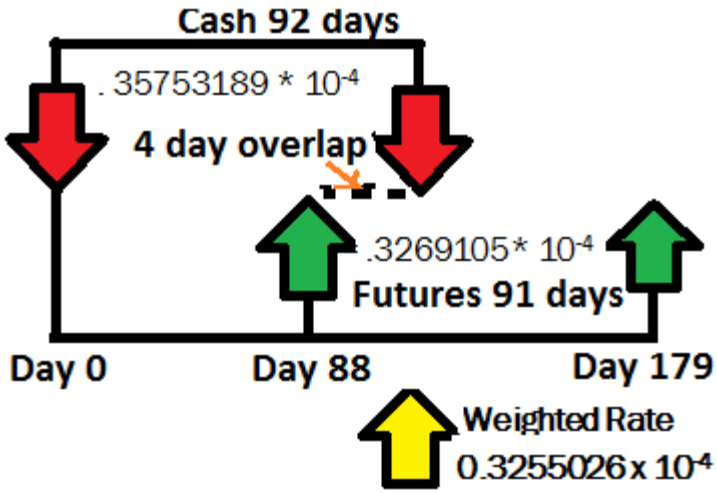


- Cash Daily IFR : Ln (1 + .0130714 * 92/365)/92 = . 35753189 * 10^{-4}

- BAX™ Futures Daily IFR : Ln(1 + .01195 * 91/365)/91 = .3269105* 10^{-4}

IFR =Instantaneous Forward Rate

MIND THE GAP (AND OVERLAPS)



Cash Rate covers 92 days

The futures rate will use 4 days of the daily IFR's for the Cash plus 87 days of the IFR's from the futures.

Ie. $4 \times .35753189 \times 10^{-4} + 87 * \text{Weighted Rate} = 91 * .3269105^* \times 10^{-4}$

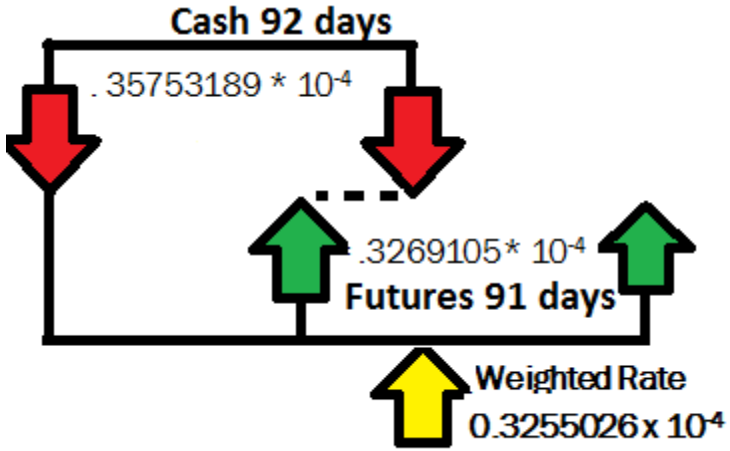
Weighted Rate $= 0.3255026 \times 10^{-4}$

The Weighted Rate is the IFR rate for the period t=88 to t=179.

GAP: End of Interest Rate Period at T-1 < Start of next Interest Rate Period

Overlap: End of Interest Rate Period at T-1 > Start of next Interest Rate Period

GET DISCOUNT FACTORS



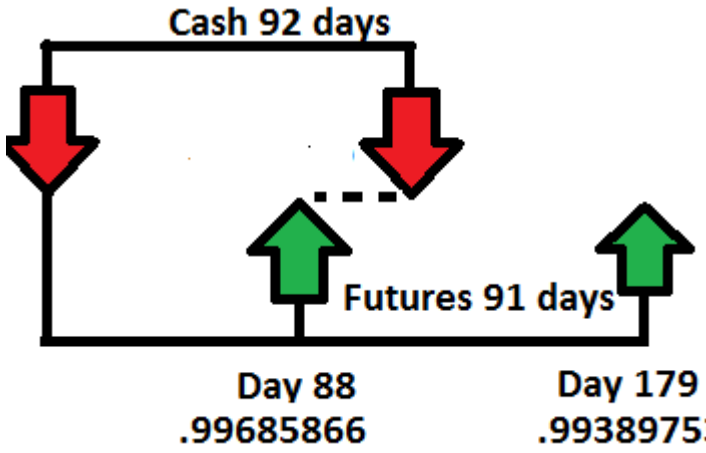
Discount Factor to day 88,

EXP (-88* 0.35753189 * 10^{-4}) = .99685866

- Discount Factor to day 179,

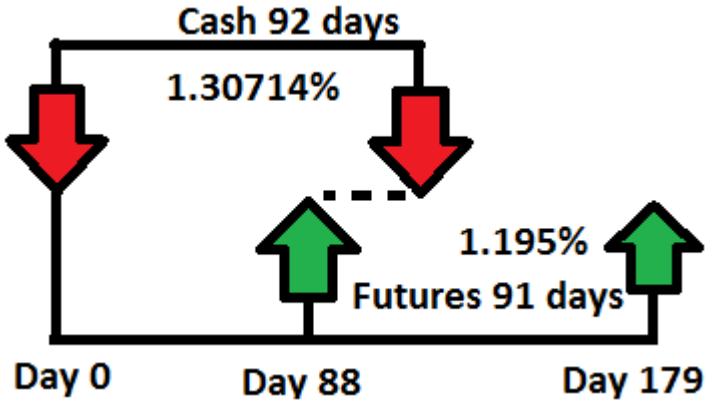
EXP (-(92* 0.35753189 * 10^{-4} + 0.3255026* 10^{-4} *87))= .99389753

CALCULATE BAX™ RATE FROM DISCOUNT FACTORS



$$\left(\frac{.99685866}{.99389753} - 1\right) * \left(\frac{365}{91}\right) = 1.195\%$$

100 – 1.195 = 98.805



COMPARISONS

LTD

6/14/2012	6/15/2012	6/18/2012	6/19/2012	6/20/2012	6/21/2012
98.695	98.705	98.697	98.81	98.775	98.805

- Last Trading Date was Jun 18th. The shift to the 3 month contract resulted in a 10 bp increase in price. On 100 BAX™ contracts, this is a $25,000 difference.

	June 18	June 19	Difference
Roll	98.697	98.81	11.3 bp
Calibrated	98.697	98.693	0.4 bp

- With calibration, the difference is reduced to 0.4 bp

BENEFITS

- Converts mix of cash and BAX™ futures curves to consistent IFR daily rate curves. The exponential of the cumulative daily rates will provide a discount factor at any point in time.
- The forward rates from the curves translate directly to futures rates for pricing.
- For HVaR testing, allows comparison of like tenors
- Other: In order to provide a comparable cash forward rate a convexity adjustment would be needed.