Wall Street

**Order Types**

* Iceberg Order - A large single order that has been divided into smaller lots, usually by the use of an automated program, for the purpose of hiding the actual order quantity.
* Fill and Store (FAS)
* Fill or Kill (FAK)
* Market Order
* Limit Order

**Treasury Yield Curve**

**US Treasury**

* T-Bill: 4 weeks, 3 months, 6 months and 1 year. T-Bills are sold at a discount rate.

1. Face value: $100
2. Quoted as discount rate = [(Face Value - Price) / (Face Value)] / (days to maturity/360)
3. How to calculate yield?

* CMB: Cash Management Bills. They are irregular in amount, term (often less than 21 days), and day of the week for auction, issuance and maturity. It is also sold at a discount.
* Note/Bond

1. 2, 3, 5, 7, 10 and 30 (bond) years. The interest is paid every 6 months until maturity.
2. Quoted in 32nd. 95-071 is 95 + 7/32 + (⅛)\*(1/32). The last digit is ⅛ of 1/32 or 1/256
   1. 95-07+ is 95 + 7/32 + 1/64
   2. 95-071 is 95 + 7/32 + 1/256
   3. How to convert decimal to 256th or 256th to decimal

* TIP: Treasury Inflation-Protected Securities
* Benchmarks: on-the-run of 2, 5, 7(?), 10 and 30 year.
* The **dirty price** of a bond is the sum of a bond’s **clean price** and the accrued interest since the previous coupon date. The clean price is simple the present value of a bond’s future cash flows. Bond prices are usually quoted “clean”, and then settled “dirty”.
* Bond Present Value PV = C/(1+r) + C/(1+r)^2 + C/(1+r)^3 + + (C+R)/(1+r)^n
* Daily Treasury Yield Curve Rates

<https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2010>

* WI (When Issue)
  + Announcement Day Auction Day Issue Day (excluded)
  + Before auction day and on auction day uses yield – since we don’t know rate yet. After the auction, we will have the rate and then we can calculate the price and trade on the price.
  + After auction day, uses price.
  + TradeWeb uses cusip + "\_WI" as symbol for a WI security.
  + BBG uses BBG 9999 Code from Announcement Day to Auction Day (Included). After Auction Day it uses real cusip as symbol.
* Auction Process

**Fed Fund Rate**

In the United States, federal funds are overnight borrowings by banks to maintain their bank reserves at the Federal Reserve. Banks keep reserves at Federal Reserve Banks to meet their reserve requirements and to clear financial transactions. Transactions in the federal funds market enable depository institutions with reserve balances in excess of reserve requirements to lend reserves to institutions with reserve deficiencies. These loans are usually made for one day only, that is, "overnight". The interest rate at which these deals are done is called the federal funds rate.

**LIBOR**

London Interbank Offered Rate Index is an average of the interest rates that major international banks charge each other to borrow US dollars in the London money market. It is commonly quoted for one-month, three-month six-month and one-year periods. It is commonly used in capital markets but it is also used as an index for adjustable rate mortgage.

**FRN**

Also known as a “floater”. A bond or other debt whose coupon rate changes with market conditions (short-term interest rates)

**AGCY**

**Corp**

**Muni Bonds**

* Default risk
* The interest received from Muni bonds is often exempt from federal income tax and may exempt from state tax too.
* When comparing Muni bonds yield to Corp bonds or other taxable bonds, we have consider the tax exemptions

**Derivatives**

* A contract between two or more parties whose value is based on an agreed-upon underlying financial asset or set of assets.
* Common underlying instruments: bonds, commodities, currencies, interest rates, market indexes and stocks
* Common derivates: Future contracts, forward contracts, options, swaps and warrants
* Trading purpose: speculating and hedging
* Hedging: transferring risk of underlying security between contract parties.

**Future**

* A future is an agreement to buy or sell goods, currency or securities on an agreed future date and for a price fixed in advance.
* Using Bond Future to hedge Bond price change. If a trader holds a bond and his bond yield may go up (bond price may go down). Its future price should also go down. He can sell the bond future; he locks in the future value of his bond holding, thus reducing the risk of his bond holding.
* 4 main elements in a future contract: asset class (which underlying instrument), quantity, contract expiration date and price
* Future contracts are standardized, so they can be traded on exchanges such as CME
* Delivery date (Final settlement date)?
* Future price?
* Settlement price?
* ZTM9, ZFM9, ZNM9, TNM9, ZBM9, UBM9

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Interest Rates Futures** | | | | | |
| **Sym/CME Ticker** | **Futures Contract** | **Exchanges** | **Futures Delivery Months** | **Min. Tick** | **Unit Move** |
| ED | Eurodollars | CME | H, M, U, Z | 0.005 | 2500 |
| MB | Municipal Bonds | CME | H, M, U, Z | 1/32 | 1000 |
| TU/ZT | 2-Year T-Notes | CME | H, M, U, Z | 1/128 | 1000 |
| FV/ZF | 5-Year T-Notes | CME | H, M, U, Z | 1/64 | 1000 |
| TY/ZN | 10-Year Note | CME | H, M, U, Z | 1/64 \* 1000 = $15.625 | 1000 |
| /TN | Utra 10 | CME | H, M, U, Z |  |  |
| US/ZB | 30-Year T-Notes | CME | H, M, U, Z | 1/32 | 1000 |
| WN/UB | Ultra T-Bond Future(25 years to 30 years) | CME |  |  |  |

**FRA**

* Forward rate agreement (FRA) is a forward contract in which one party pays a fixed interested, and receives a floating interest rate equal to a reference rate (the underlying rate). The payments are calculated over a notional amount over a certain period, and netted; i.e. only the differential is paid. It is paid on the effective date. The reference rate is fixed zero, one or two days before the termination date, dependent on the market convention for the particular currency. FRA are over-the counter derivatives. A swap is a combination FRAs.

**Repo**

* Repurchase agreement allows a borrower to use a financial security as collateral for a cash loan at a fixed rate of interest. In a Repo, the borrower agrees to sell immediately a security to a lender and also agree to buy the same security from the lender at a fixed price at some later date.
* **Haircuts** are the repo market’s way of imposing a margin on the collateral sellers. The buyer will pay the seller less money than market value of the collateral. The difference is called haircut. A haircut, in the financial industry, is a percentage discount that's applied informally to the market value of a stock or the face value of a bond in an attempt to account for the risk of loss that the investment poses.

So, for example, a stock with a market value of $30 may get a haircut of 20%, to $24, when an analyst or money manager tries to anticipate what is likely to happen to the price.

Similarly, when a broker-dealer calculates its net capital to meet the 15:1 ratio of debt to liquid capital permissible under Securities and Exchange Commission (SEC) rules, it typically gives volatile securities in its portfolio a haircut to reduce the potential for being in violation.

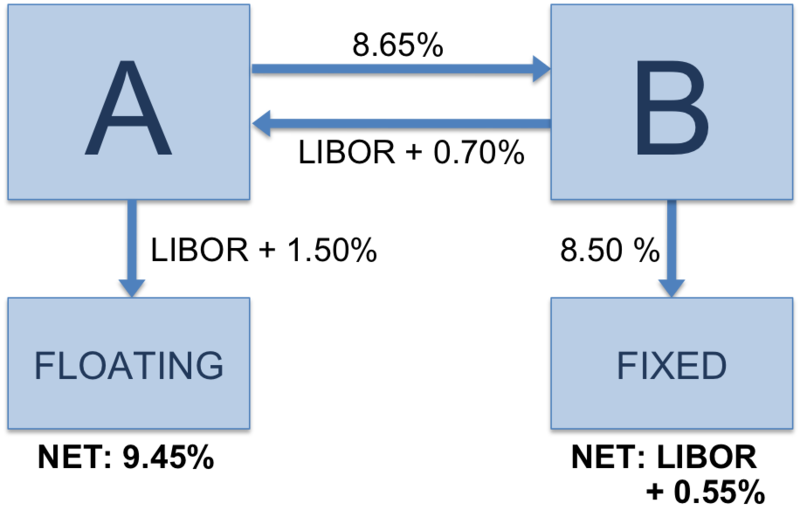
The only securities that consistently escape a haircut are US government bonds because they are considered free of default risk.

**Eurodollar Future**

* Eurodollar **-** are time deposits denominated in U.S. dollars at banks outside the United States, and thus are not under the jurisdiction of the Federal Reserve. Consequently, such deposits are subject to much less regulation than similar deposits within the U.S., allowing for higher margins.
* Eurodollar futures contract
  + Size has a principal value of $1,000,000 with a three-month maturity.
  + Tick reflects the dollar value of a 1/100 of one percent change in a $1 million, 90-day deposit, determined by the following equation: $1,000,000 notional value x 0.0001 x 90/360 = $25. Trading can also occur in minimum ticks of 0.0025, or ¼ ticks, representing $6.25 per contract and in 0.005, or ½ ticks, representing $12.560 per contract.
  + Quote: 100 - three-month LIBOR. For example, current 3 months LIBOR is 4.99%, Eurodollar quoting price is 100 - 5 = 95.01

**IRS**

Interest Rate Swap. Fixed rate to floating rate swap. Floating rate to fixed rate swap.

* Purpose: used to hedge the exposure to interest-rate fluctuations
* Risk: interest rate risk. Credit risk of possible default by the other party.
* 

A is currently paying floating (LIBOR + 1.5%), but want to pay fixed. B is paying a fixed (8.50%) but want to pay a floating. By entering into an interest rate swap, then net result is that each party can swap their existing obligation for their desired obligation. A is going to pay a fixed of 9.45% in net and B is going to pay a floating LIBOR + 0.55% in net.

A: (LIBOR + 1.50%) + 8.65% - (LIBOR + 0.70%) = 9.45%

B: 8.50% + (LIBOR + 0.70%) – 8.65% = LIBOR + 0.55%

8.65% is called swap rate.

What is the interest rate swap? How do you trade? Why do people trade IRS? What are the parameters on an IRS trade? What is the Broken Date?, What is Unwinded? What does happen if one part of the IRS contract breaks the contract?

Swap definition

* Two parties agree to exchange cash flows on a regular future dates where the two payment legs are calculated on a different basis.
* it is traded as an over-the-counter contract
* **Key transaction -specific variables** that affect swap valuation include notional amount, trade date, start of effective date, maturity date, fixed rate, floating rate index (LIBOR), first floating rate.

**Type of Swaps**

* Basis Swap - Float-Float Swap
* Spread Switch - two Swap Spreads switch
* Rate Switch (Curve Switch) - 3Y vs 4Y
* IMM
* Swap Spread (Swap vs TRSY or Swap Spread vs TRSY) - Swap vs on the run treasures
* Intermediate Spread - Swap vs off the run treasures. The yield of the off the run treasures is weighted based on On-the-Run treasury yields.

iSwap products:

* *USD Outright OIS*

Overnight Indexed Swap (OIS) is a fixed/floating interest rate swap with the floating leg computed using a published overnight rate index, in the case of USD, the Fed Funds Effective Rate. Two parties agree to exchange at maturity the difference between interest accrued at the fixed rate and interest accrued at the compounded floating rate on the agreed notional amount of the swap. Net payment is made two business days after maturity.

The basis convention is ACT/360.

* *Spreads*
* *Butterflies*
* *Spread-Over*

**Credit Default Swap**

A credit default swap (CDS) is a financial [derivative](https://www.investopedia.com/terms/d/derivative.asp) or contract that allows an investor to "swap" or offset his or her [credit risk](https://www.investopedia.com/terms/c/creditrisk.asp) with that of another investor. For example, if a lender is worried that a borrower is going to [default](https://www.investopedia.com/terms/d/default2.asp) on a loan, the lender could use a CDS to offset or swap that risk. To swap the risk of default, the lender buys a CDS from another investor who agrees to reimburse the lender in the case the borrower defaults. Most CDS will require an ongoing [premium](https://www.investopedia.com/terms/p/premium.asp) payment to maintain the contract, which is like an insurance policy.

* **the reference asset, corp bond, maturity of the swap, premium payment, default payment( the payment the protection seller needs to pay buyer when the default occurs)**
* **CDX** – Credit Default Swap Index
* **CDS** – Credit Default Swap
* **iTraxx** (Thomson Reuters Eikon Code “ITRAXX”, Bloomberg code “ITRX”) is the brand name for the family of credit default swap index products covering regions of Europe, Australia, Japan and non-Japan Asia.
* <http://www.goldmansachs.com/media-relations/in-the-news/archive/state-of-the-market-cds-101.pdf>

**Options**

**Call option** – the buyer of the option has the right, but not the obligation to buy an agreed quantity of an underlying instrument from the seller at a certain time for a certain price (strike price)

**Put option** – the buyer of the option has the right, but not the obligation to sell an agreed quantity of an underlying instrument from the seller at a certain time for a certain price (strike price)

**Option Greeks**

Delta - Delta is the change in the option price for a small change in the price of the underlying security, assuming all other inputs to the model are hold constant.

Gamma - Gamma (cobvexity) measures the rate of the change of Delta. Gamma is a measure of the curvature in the relationship between the value of the option and the price of the underlying.

Theta - Theta measures the rate of decay in the time of an option.

Vega - Vega measures the sensitivity of the option value to the volatility of the underlying.

RHO(p) - Rho measures the change in an option’s price for a given chage in the cost of funding.

European Option

American Option

Asian Option ~ is an option where the payoff is not determined by the underlying price at maturity but by the average underlying price over some pre-set period of time. For example an Asian call option might pay MAX(DAILY\_AVERAGE\_OVER\_LAST\_THREE\_MONTHS(S) - K, 0). Asian options were originated in Asian markets to prevent option traders from attempting to manipulate the price of the underlying on the exercise date.

Put-call parity relationship

Same underlying instrument, same expire date

At any time in the option life

P + S = C + K\*B(T)

P: the value of the put

C: the value of the call

S: the value of the underlying instrument

What is a bond, a stock option?

MBS TBA

Quote: price

Difference between forward and future contract?

Future contract is a contract to buy or sell a certain underlying instrument at a certain date in the future, at a specified price. Both parties of a future contract must fulfill the contract on the settlement date.

The whole call / put / long / short / american / european / asian / reverse / delta / gamma / greek stuff... Finally: what is a power reverse dual currency note? Huh? A what?

**MBS (Mortgage Backed Security)**

Risk

* Default (credit) risk, interest rate exposure and early redemption (prepayment).
* In general, when interest rate goes down, prepayment goes up. Since interest rate risk and prepayment risk is linked, it makes to values MBS more difficult.

**Pass-throughs or Participation Certificates (PCs)**

As the name suggests, the issuer or servicer of pass-through securities collects the monthly payments from the homeowners whose loans are in a given pool and “passes through” the cash flow to investors in monthly payments which represent both interest and repayment of principal. Most pass-through mortgage securities are issued and/or guaranteed by Ginnie Mae, Fannie Mae or Freddie Mac and carry an implied AAA credit rating. The remainders are privately issued and generally rated AAA or AA. The payments of principal and interest on pass-throughs are considered secure; however, the cash flow on these investments may vary from month to month, depending on the actual prepayment rate of the underlying mortgage loans. At issuance, the stated maturity of pass-through securities is generally 30 years, although an increasing number may have 15-, seven- or five-year stated maturities.

Most pass-throughs are backed by fixed-rate mortgage loans; however, adjustable-rate mortgage loans (ARMs) are also pooled to create the securities. Most ARMs have caps and floors limiting the extent of interest-rate changes, and these option-like characteristics require that pass-throughs backed by ARMs have higher yields than pure floating-rate debt securities. The market for ARMS is largely an institutional market.

**CMOs or REMICs**

The CMO is a multiclass bond backed by a pool of mortgage pass-throughs or mortgage loans. CMOs may be collateralized by (i) Ginnie Mae, Fannie Mae or Freddie Mac pass-throughs; (ii) unsecuritized mortgage loans insured by the Federal Housing Administration or guaranteed by the Department of Veterans’ Affairs; (iii) unsecuritized conventional mortgages; or (iv) any combination thereof. In structuring a CMO, an issuer distributes cash flow from the underlying collateral over a series of classes (called tranches) which constitute the bond issue. Each CMO is a set of two or more tranches, each having average lives and cash-flow patterns designed to meet specific investment objectives. The average life expectancies of the different tranches in a four-part deal, for example, might be two, five, seven and 20 years. Some CMOs issued have had more than 50 tranches.

As the payments on the underlying mortgage loans are collected, typically the CMO issuer first pays the coupon rate of interest to the bondholders in each tranche. All scheduled and unscheduled principal payments generated by the collateral, as loans are repaid or prepaid, go first to investors in the first tranches. Investors in later tranches do not start receiving principal payments until the prior tranches are paid off. This basic type of CMO is known as a sequential pay or plain vanilla CMO. Any collateral remaining after the final tranche has been paid is known as a residual. The residual in a REMIC may be traded as a stand-alone security.

Sometimes CMOs are structured so that the prepayment and/or market risks are transferred from one tranche to another. Prepayment stability is improved in some tranches because other tranches absorb more of the risk of prepayment variability. Therefore, it is important to know the characteristics of other tranches in the offering before selecting a tranche as an investment. Some of the more common tranche types are described below.

The final tranche of a CMO often takes the form of a Z-bond, also known as an accrual bond or accretion bond. Holders of these securities receive no cash until the earlier tranches are paid in full. During the period that the other tranches are outstanding, the periodic interest accruals are added to the initial face amount of the bond but are not paid to investors. When the prior tranches are retired, the Z-bond receives coupon payments on its higher principal balance, plus any principal prepayments from the underlying mortgage loans. The existence of a Z-bond tranche helps stabilize the cash-flow patterns in the other tranches. In a changing interest rate environment, however, the value of the Z-bond itself tends to be more volatile.

As the CMO has evolved, some modifications in the classes of bonds have become more prevalent. The planned amortization class (PAC) and targeted amortization class (TAC), for example, were designed to reduce investors’ prepayment risk by establishing a sinking-fund structure. PAC and TAC bonds assure to varying degrees that their investors will receive payments over a predetermined time period under various prepayment scenarios. Although PAC and TAC bonds are similar, PAC bonds tend to provide more stable cash flow under a greater number of prepayment scenarios than TAC bonds.

The existence of a PAC or TAC tranche can create higher levels of risk for other tranches in the CMO because the stability of the PAC or TAC tranche is achieved by creating at least one other tranche—known as a companion bond or a support or non-PAC bond—which absorbs the variability of collateral principal cash flows. Because companion bonds have a high degree of average life variability, they generally pay a higher yield. Companion bonds are not always labeled as such, however. Moreover, a TAC bond can have some of the prepayment variability of a companion bond if there is also a PAC bond in the issue.

Floating-rate CMO tranches (“floaters”) pay a variable rate of interest which is usually tied to the London Interbank Offered Rate (LIBOR). Institutional investors with short-term liabilities, such as commercial banks, often find floating-rate CMOs to be attractive investments. “Superfloaters” (which float a certain percentage above LIBOR) and “inverse floaters” (which float inversely to LIBOR) are further variations of the floater structure with highly variable cash flows. These securities are used by sophisticated institutional investors to hedge interest rate risk in their portfolios and to invest on the basis of their interest rate outlook.

**Strips**

Stripped mortgage securities, first introduced in 1986, are created by segregating the cash flows from the underlying mortgage loans or mortgage securities to create two or more new securities, each with a specified percentage of the underlying security’s principal payments, interest payments or a combination of the two. For example, the cash flow on an 8 percent pass-through security might be redistributed to create one new security with a 10 percent coupon and another security with a 6 percent coupon.

Securities may be partially stripped so that each investor class receives some interest and some principal. When securities are completely stripped, all the interest is distributed to one type of security, known as interest-only (IO), and all the principal distributed to another, known as principal-only (PO). These securities may be custom-made to suit individual portfolio needs, depending on which portion of the cash flow the investor wants. Strips, IOs and POs can be created in a pass-through structure or as tranches of a CMO.

The market values of IOs and POs are very sensitive to fluctuations in prepayment rates and interest rates, making them more volatile than standard pass-throughs. As with most fixed-income securities, POs, for example, increase (or decrease) in value as interest rates decline (or rise). For this reason, the investors in these securities are primarily institutional.

Price behavior also depends on whether the mortgage collateral was purchased at a premium or a discount to its par value. Prepayments on discount coupon POs generally are much lower than prepayments on premium coupon POs.

On the other hand, IOs increase (or decrease) in value as interest rates rise (or decline). Since prepayment rates generally decrease as interest rates rise, investors in IOs are likely to receive interest payments over a longer time period, thus increasing the value of their investment. However, in a low-interest-rate, high-prepayment environment, the market value of an IO may decline considerably, and an investor may not recoup his or her initial investment. IOs can function as portfolio hedging vehicles, because prepayments cause the value of an IO strip to move in the opposite direction from many other mortgage and fixed-income securities.

**Callable Pass-throughs**

One of the newest developments in the MBS market is the Callable Pass-through. A Callable Pass-through is created by splitting a pass-through into two classes: a “Callable Class” and a “Call Class.” The Callable Class receives all of the principal and interest from the underlying collateral. The Call Class receives no principal or interest. The holder of the Call Class has a right to call the underlying pass-through at a stated price (usually par plus accrued interest) from the Callable Class holders after a specified period of time has passed from issuance of the two classes.

The Callable Class holder is still long a bond and short a call option, as is any MBS investor. But rather than just being short a series of call options to a number of underlying borrowers who may or may not exercise their option, the holder is also short one call option to one other investor. This other investor, given his/her economic incentive, will call the underlying pass-through from the Callable Class holder in a much more efficient manner than the mortgage borrower will. Thus, the Callable Class holder will have reduced performance relative to pass-through holders if rates fall. For the more limited upside performance potential, the investor is usually paid more in yield.

**Callable Pass-throughs in CMOs**

Callable Pass-throughs can be used as collateral to back CMOs or REMICs. Investors need to pay attention to this, as a call of the underlying Callable Pass-throughs would result in a call of all the outstanding tranches in a deal. This can be particularly important to holders of long-term classes.

**CMBS**

Commercial mortgage-backed securities. CMBS issues are usually structured as multiple tranches, similar to CMOs, rather than typical residential “pass-throughs.”

**RMBS**

Residential mortgage-backed securities.

CDO

MBS/TBA ~ Mortgage-backed security to-be-announced. The actual MBS to be delivered will be designed at settlement date.

**Factor**

A decimal value reflecting the proportion of the outstanding principal balance of a mortgage security, which changes over time, in relation to its original principal value. The Bond Buyer publishes the “Monthly Factor Report,” which contains a list of factors for Ginnie Mae, Fannie Mae and Freddie Mac securities.

**WAM (Weighted-average maturity)**

The weighted-average maturity (WAM) of an MBS is the average of the maturities of the mortgages in the pool, weighted by their balance at the issue of the MBS.

**WAC (Weighted-average coupon)**

The weighted-average coupon (WAC) of an MBS is the average of the coupons of the mortgages in the pool, weighted by their original balances at the issuance of the MBS. WAM and WAC are used for describing a mortgage pass-through security, and they form the basis for the computation of cash flows from that mortgage pass-though. For example, “this is a $3 billon pass-though with 6% pass-though rate, 6.5% WAC, and 340 month WAM”.

The pass-though rate is always less than the WAC. The difference goes to servicing the mortgage loans in the pool.

**ABS** ~ Asset-backed securities

**CMO** ~ Collateralized Mortgage Obligations

**REMICS** ~ Real Estate Mortgage Investment Conduits

Treasury bond benchmarks: on-the-run of 2 Year, 5 Year, 10 year and 30 year.

What is a bond and a stock?

What is interest rate swap?

* Exchange of a fixed rate interest payment for a floating rate interest payment. It is used by hedgers to manage their fixed or floating assets and liabilities.
* Quote: Semi-annually fixed rate vs. 3-month U.S. $LIBOR

Difference between forward and future contract?

Future contract is a contract to buy or sell a certain underlying instrument at a certain date in the future, at a specified price. Both parties of a future contract must fulfill the contract on the settlement date.

The whole call / put / long / short / american / european / asian / reverse / delta / gamma / greek stuff... Finally: what is a power reverse dual currency note? Huh? A what?

**Exchange, ECN and Market**

**CME Group  - CME(Chicago Mercantile Exchange) merged with CBOT(CBOT Holding Inc)**

**Montreal Exchange**

BAX ~ Three-Month Canadian Bankers’ Acceptance Futures

OBX ~ Options on Three-Month Canadian Bankers’ Acceptance Futures

ONX ~ 30-Day Overnight Repo Rate Futures

CGZ ~ Two-Year Government of Canada Bond Futures

CGB ~ Ten-Year Government of Canada Bond Futures

LGB ~ 30-Year Government of Canada Bond Futures

OGB ~ Options on ten-Year of Canada Bond Futures

**Wall Street Terminology**

SEC ~ Securities and Exchange Commission

SIA ~ Securities Industry Association

T+1 ~ One-Day Settlement

T+3 ~ Three-Day Settlement

STP ~ Straight-Through Processing

Sun has defined STP focus areas for some of the most common customer challenges: exception management, reference data, core (batch-to-realtime) processing, trade compliance, VMU gateways, connectivity, integration, and security. ~ <http://www.sun.com/finance/stp_straight_through_processing.html>

**Protocols, Libraries and Regulations**

**SEF**

* **USI** - Unique Swap Identifier
* **LEI** - Legal Entity Identifier
* **UPI** - Unique Product Identifier
* **Bloomberg SEF CDS trade flow**

Bloomberg -> block trade with Alpha USI -> TD

Bloomberg -> ICE -> Confirm -> Bloomberg

Bloomberg -> allocations with Alpha USI and Beta USI -> TD -> eSTP -> TD-FPML

Clearing Agent – ICE

**FIX**

The Financial Information eXchange (FIX) Protocol is a "language" which defines specific kinds of electronic messages for communicating securities transactions between two parties. FIX defines only the format of the messages and the session-level interaction between two applications. FIX website <http://www.fixprotocol.org>

* Message type -  <http://www.fixprotocol.org/FIXimate3.0/en/FIX.5.0SP2/messages_sorted_by_type.html>
* Configuration - <http://www.quickfixengine.org/quickfix/doc/html/configuration.html>
* Tags - <http://www.fixprotocol.org/FIXimate3.0/en/FIX.5.0SP2/fields_sorted_by_tagnum.html>

**FAST Protocol**

FIX Adapted Streaming Protocol. It is developed for the transport of high-volume market data feeds and ultra-low latency applications. It uses significant compression. The classic FIX tag value format was considered to be too verbose and had a high processing overhead.

**RASH (RASHport)**

Routing and Special Handling. It is a protocol that allows customers of the NASDAQ to conduct business int the options market. It allows subscribers to place limit orders and receive updates on those orders with minimal latency and optimum speed.