Equities Business Overview

PRESENTATION TO
HYPERLEDGER CAPITAL MARKETS SIG
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Presented by:
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1. Holistic View of Capital Markets
2. What are equities
3. Equities Trade Lifecycle
4. Current Equities Trading and Settlement Process
5. Challenges in Capital Markets
6. Key problems to solve
7. Blockchain Potential Benefits
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A capital market is a financial market in which long-term debt or equity-backed securities are bought and sold. Capital market refers to a broad spectrum of tradeable assets that includes the stock market as well as other venues for trading different financial products. The stock market allows investors and banking institutions to trade stocks, either publicly or privately. Stocks are financial instruments that represent partial ownership of a company. These documents are used extensively by companies as a means of raising capital. Within the stock market itself are primary and secondary markets that trade among banks underwriting stock and public investors trading stock, respectively.

Investment Banks are intermediaries between the providers of funding (investors—both debt and equities investors) and the users of funding (corporates, financial institutions, hedge funds, supranational, municipals and governments). When talking about investment banking, it is important to know the difference between the buy-side and the sell-side. These two sides make up the full picture, the ins and outs of the financial market, and both are indispensable to each other:

- **Sell-Side** – is the side of the financial market, which deals with the creation/issue, promotion, and selling of traded securities to the public.
- **Buy-Side** – is the other side of the financial market that buys and invests large portions of securities for the purpose of money or fund management. The Buy Side refers to those firms that purchase securities and includes investment managers, pension funds, and hedge funds.

Investments banks also tend to be heavily involved in advising corporate clients on their activities, particularly in merger and acquisitions (M&A).

The Sales & Trading Division of the Investment Bank connects buyers and sellers of stocks, bonds, commodities and other assets. Salespeople and traders sit on a trading floor. The trading floor is split out by asset class. Any large investment bank has following roles:

**Front office Sales & Trading:**
1. Sales Traders – Client orders and contract management
2. Traders – Pricing, Trade executions and Trade Entry
3. Structuring – Complex Strategies and Product Types
4. Research - analyze market data and trade ideas.
5. Quant/Strat - backtest trade ideas, build pricers, maintain electronic trading or algorithmic trading platforms.

**Middle office:**
1. Risk management - credit, margin, and market risk
2. Trade Governance - validation, enrichment and novation
3. Product controls-performance, advising, MI,P&L Attribution
4. GRC - legal, compliance and regulatory reporting.
5. Treasury Management - capital, funding and liquidity risk.

**Back office:**
1. IT and Trade support
2. Trade confirmations/allocations
3. Collateral Management
4. Accounting Settlements –delivery, receipt, payment
5. Reconciliations
6. Custodian – safekeeping of investors’ securities
7. Clearing
**Holistic view of Capital Markets (cont.)**

**Products in Sales & Trading** - Markets products are broadly classified as

- **Equities**
  - Refers to trading stock. More specifically, equities are split up between:
    - Cash equities: Trading ordinary shares of stock
    - Equity derivatives: Trading derivatives of equities (stock options) and equity indices – ETF

- **Fixed Income** - Refers to bonds, and are often further split up in the following way:
  - Bond: Government/Treasury, Municipals: Tax-exempt bonds (State, Municipality, Non-Profit), EM Bonds, Supranational agencies etc.
  - Rates: Macro-economic focused Interest Rate Derivatives. Focused on the yield curve, inflation..
  - Credit: Corporate Bonds (High Grade, High Yield, Loans), Credit Derivatives – CDS, CDO, iTraxx etc.
  - Securitized Products: Mortgage Backed Securities, Asset Backed Securities

- **Currencies** - Also referred to as FX - and Commodities rounds out FICC.

**Types of trading**

- **Flow Trading** - Trader acts as principal, market making directly and not through exchange. The client decides if they want to buy or sell, and the trader sets the price and takes the other side, charging a bid-offer spread on the transaction. Used for Fixed Income and most equity derivatives.

- **Agency Trading** - IB sends client order to exchange on behalf of clients. Action on behalf of clients. Investment bank takes no risk in agency trades, traders earn only a small commission when they act as agent. Mostly Stocks (cash equities), futures and certain derivatives.

- **Prop Trading** - Proprietary trading refers to banks invests firm money for direct market gain, rather than earning commission dollars by trading on behalf of clients. Banks take direct risk with their own capital.

- **Electronic Trading** – also called platform or algorithmic trading, is all about removing human touch points from the trading process. e.g. ATS, ECN, DMA, Dark Pool, Single Dealer, Exchanges(RM), Broker venues, etc.

- **Interdealer Brokers (IDB) or Voice Brokers** - With no central exchange for some OTC and wholesale secondary markets, financial institutions need to find a way to find information, liquidity and anonymity for their trading activities. IDB has specialist, up to the minute market knowledge, they can offer colour to the dealer at any time. IDB provide anonymity to client traders. IDB broker provides potential buyers and sellers a MTF/OTF venue with the necessary information they need to execute their trades.

**Today, most traders are Flow Traders, with Prop Trading being regulated out and many Agency Trading roles being replaced by Electronic Trading. Only Algo and Hedge funds run prop trading desks.**
Equities or commonly known as stocks are instruments that signify an ownership position in a corporation, and represents a claim on its proportional share in the corporation’s assets and profits. Ownership in the company is determined by the number of shares a person owns divided by the total number of shares outstanding.

**Types of Cash Products**

**Common stocks**
- Also called “Ordinary Shares”
- Still represents ownership in a corporation
- Exercise control by election a board of directors and voting on corporate policy
- Last priority in liquidation

**Preferred stocks**
- Class of ownership in corporation that has a higher claim on the assets and earning than common stock
- Do not have voting rights
- Higher priority in liquidation than common stocks

**American Depositary Receipt**
- ADR are negotiable certificate issued by a US bank representing a specific number of shares of a foreign stock traded on a US stock exchange.
- ADRs make it easier for Americans to invest in foreign companies, due to dollar denominated price, lower transaction cost and timely dividend distributions

**Global Depository Receipt**
- Specific number of share certificate held in the bank of one country of a stock traded on another country exchange
- Also called European Depository Receipt

**Types of Derivative Products**

**Index**
- Indexes are a portfolio of securities representing a particular markets or a portion of it
- Each index has its own calculations methodology and is usually expressed in terms of a change from a base value
- The percentage change is more important than the actual change in value

**ETF**
- Is a security that tracks an index, a commodity or basket of assets like an index fund but trades like a stock on an exchange

*Disclaimer: From the purpose of this presentation, we will simplify and assume that the ETF(s) concerned are booked as stock*

**Futures & Forwards**
- Futures and Forwards obligate the holder to buy the said contract in a future date.
- Futures contract are standardized instruments that trade on an exchange, have proper secondary and are guaranteed against credit default by means of a daily settling of gains and losses.
- Forwards are OTC products

**Futures Margin (daily netting)**
- In trading futures, margins are required, which acts like a performance bond or down payment. The original deposit is called initial margin and lowest amount the account can reach before it gets pulled is called maintenance margin.

**Options**
- An Option is a contract that gives one party (the option holder) the right, but not the obligation, to perform a specified transaction with another party (the option writer) according to specified terms.
- Special instrument that covers the right, but not the obligation to engage in a future transaction on some underlying security, or in a future contract.

**Parties in Option**
1. Option Buyer: Enjoy the right to exercise and the right not to exercise the options; pays the option premium
2. Option Seller (Writer): Has the obligation to deal at the contracted strike price if the buyer will not exercise the option; receive the premium.

**Types of Options**
1. Call Option
2. Put Option

**Types of Option based on Exercise date**
1. American - exercisable at any time during the option period.
2. European - exercisable only at expiry date.
3. Bermudan - exercisable at pre-defined dates within the option period.

**Warrant**
- A derivative security that gives the holders the right to purchase securities, usually equity from issuer at a specific price within a time frame

**Others**
- Synthetic equities, convertibles bonds, Sec lending, Exotics, Strategies etc.
Equities Trade Lifecycle

Issues
- Rising cost pressures from manual processes and legacy technology infrastructure, multiple intermediaries, unnecessary data reconciliations, and complex layer of handoffs within the ecosystem.
- Increased regulatory pressures, including the use of more central counterparties for clearing and settlement, reporting requirements, and higher capital buffer requirements.
- The proliferation of data available across multiple platforms but few programs in place to harness its potential and use its knowledge to better serve clients.

Opportunity
1. Industry standards to facilitate the adoption and migration to sustainable digitization
2. Technology to support new digital business models and processes.
3. Common domain model (CDM) - CDM is meant to be technology agnostic yet at the same time can be leveraged with emerging technologies, such as smart contracts and distributed ledger technologies (DLTs).
4. With the advent of blockchain and smart contracts, the inefficiencies and costs in derivatives trading due to multiple handoffs and complex processes were supposed to decrease.
Equities Trade Lifecycle

Trade Life Cycle – equities secondary market – Pre-trade, Order placement, Order Management (High touch vs Low Touch), Order execution (Exchange x OTC), Confirmation, Reconciliation, Allocation

Fig 2: Degrees of commoditisation across equities trade management functions

- FIX Connectivity
- Pre-trade Analytics
  - Programme Trading
  - Position-keeping
  - P&L Reporting
- EMS
  - Smart-order Router
  - Algorithmic Trading
  - Dark Pool/Crossing Network
  - Market Connectivity
- OMS
  - Market Data
  - Reference Data
  - Audit/Compliance Data

End to end Reconciliation: Trade / Position / Nostro Reconciliation

Source: Finasolve Next Generation Intelligence
Equities Trade Lifecycle

![Diagram of Equities Trade Lifecycle]

**TP1** Reference data and trade processing systems must be configured for T+2 as standard settlement
Equities Trade Lifecycle

Exhibit 45: Simplified illustration of how US cash equities trade today

- **Execution**
  - Buy Side: Stock Order
  - Broker Dealer: Order Management and Routing
  - Exchange: Order Execution
  - DTCC: Trade Details / Confirm
  - Custodian: Trade Details / Confirm

- **Clearing**
  - Buy Side: Allocation / Affirmation
  - Broker Dealer: Allocation / Affirmation
  - Exchange: Trade Details / Confirm
  - DTCC: Trade Details / Confirm
  - Custodian: Trade Details / Confirm

- **Settlement**
  - Buy Side: Approves / Oversees Cash Settlement
  - Broker Dealer: Approves / Oversees Cash Settlement
  - Exchange: Trade Details / Confirm
  - DTCC: Trade Details / Confirm
  - Custodian: Trade Details / Confirm

Source: DTCC, Goldman Sachs Global Investment Research.
Equities Trade Lifecycle

Source: https://www.slideshare.net/aiQUANT/fix-protocol-overview-1697394
Equities Trade Lifecycle

Source: https://www.b2bits.com/about/success-stories/smart-order-router-system-for-dash-financial

Source: https://www.slideshare.net/aiQUANT/fix-protocol-overview-1697394
Equities Trade Lifecycle
The distribution of liquidity in the US market

Current Equities Clearing and Settlement

Securities Clearing and Settlement

- Clearing Participant (Brokers)
  - 1. Trade (T)
  - 2. Notified Trade (T)
  - 3. Net Batch Instructions (T+1)
  - 4. Batch Instructions (non-novated)
  - 6. Confirmation of DvP Transfer (T+3)
- Clearing Service
  - 3. Net Batch Instructions (T+1)
  - 4. Batch Instructions (non-novated)
  - 6. Confirmation of DvP Transfer (T+3)
- Settlement Participant (Custodians)
  - 5. Instructions to effect transfer of funds (T-3)
  - 7. End of Day Reporting (T-3)

Source: ASX
Challenges in Capital Markets

- Challenges in Capital Markets – Transparency (e.g. reporting, execution indicators), operations efficiency (e.g. reconciliation), risk management (…), liquidity, AML, surveillance (record keeping, trade reconstruction)
- Common domain model (CDM) - Common standards for data formats, reference data, transactional data, and business processes. CDM is meant to be technology agnostic yet at the same time can be leveraged with emerging technologies, such as smart contracts and distributed ledger technologies (DLTs).

1. A consistent model that defines all lifecycle events and processes for traded products can position firms to achieve simplification and scale in post-trade while preserving freedom of technology choices and interoperability between technology solutions.

2. With the advent of blockchain and smart contracts, the inefficiencies and costs in derivatives trading due to multiple handoffs and complex processes were supposed to decrease. However, before banks and industry participants can rely on any distributed ledger as the new holy grail or “single source of truth,” better standardization is required. Most participants today use a complex set of processes, data structures, and reporting formats to track trade lifecycles in order to satisfy internal and external regulatory and compliance norms. Thus, without a common language or format, it may not make sense to adopt a common ledger.

3. The market ecosystem faces challenges from a sub-scale post-trade infrastructure marred by inadequate risk controls. Traditional cost-saving opportunities have already been fully explored, and new solutions don’t effectively address the end-to-end process. Current pain points will likely magnify over time, increasing stress on operational processes and risk management, as well as leading to the need to retrofit innovative financial technology solutions with inherent workarounds. A standard blueprint for the entire post-trade can significantly reduce inefficiencies. However, real digital transformation is only possible through common underlying standards.
Key problems to solve

Operational simplification:
Reduces manual efforts to create transparency and reconcile and resolve customer struggle.

Regulatory efficiency improvement:
Enables real-time monitoring. Our central data store solution will help clients with regulator reporting and assisted reporting.

Fraud minimisation:
With the help of blockchain, machine learning and artificial intelligence, banks and financial institutions can monitor fraud and financial crime.

Counterparty risk reduction:
Agreements can be codified and executed in a shared, immutable environment.

Clearing and settlement time:
Our Smart Contract technology reduces some 3rd party transaction verification/validation and accelerates settlement.

Liquidity and capital improvement:
Can reduce locked-in capital and provides increased transparency.
Blockchain Potential Benefits

**Pre-trade**
- Transparency and verification of holdings
- Reduced credit exposures
- Mutualisation of static data
- Simpler KYC/KYCC\(^1\) via look through to holdings

**Trade**
- Secure, real-time transaction matching, and immediate irrevocable settlement
- Automatic DVP on a cash ledger
- Automatic reporting & more transparent supervision for market authorities
- Higher AML\(^2\) standards

**Post-trade**
- No central clearing for real-time cash transactions
- Reduced margin/collateral requirements
- Faster novation and efficient post-trade processing
- Fungible use of assets on blockchains as collateral
- Auto-execution of smart contracts

**Custody & securities servicing**
- Primary issuance directly onto a blockchain
- Automation and de-duplication of servicing processes
- Richer central datasets with flat accounting hierarchies
- Common reference data
- Fund subscriptions/redemptions processed automatically on the blockchain
- Simplification of fund servicing, accounting, allocations and administration
Blockchain Potential Benefits

CURRENT CLEARING & SETTLEMENT PROCESS VS. CLEARING & SETTLEMENT PROCESS WITH BLOCKCHAIN

For stocks, this process typically takes 3 days

This process happens in real-time and would be monitored by custodians and central depositories
Blockcchain benefits for Equities Clearing and Settlement

Sources: European Central Bank, World Economic Forum, Richard Gendal Brown (R3), Moody’s Investors Service
Equities Clearing and Settlement

- Permission-based / Closed Network of Participants that act as miners
- Clearing ecosystem members themselves act as participants (miners)
- Some of them are entitled to execute Smart Contracts
- Some of them are entitled to carry out transactions and maintain Ledgers (blockchain)
AML, FinCrime, Surveillance & Regulatory Compliance

Next generation compliance solutions can be designed to protect financial institutions from financial and reputational harm. We can provide tailored our solution to fit to your specific needs. We offer fully integrated, customisable AML and trade surveillance solution based on next generation AI machine learning algorithms.

AML SOLUTIONS:
- CLIENT ONBOARDING
- CUSTOMER DUE DILIGENCE (CDD)
- KNOW YOUR CUSTOMER (KYC)
- SANCTIONS AND PEP SCREENING
- TRANSACTION FILTERING
- REGULATORY REPORTING
- ALERT CASE MANAGEMENT
- AI/ML BASED FRAUD DETECTION AND PREVENTIONS

TRADE SURVEILLANCE:
- ENSURE THE FIRM IDENTIFY POTENTIAL MARKETS VIOLATIONS SUCH AS INSIDER TRADING OR ROUGE TRADING
- MONITORS USING RELATIONSHIP GRAPH
- AI/ML CLUSTERING AND SCORING ALGORITHM TO VERIFY ABNORMAL ACTIVITIES
- FULLY TRANSPARENT CASE MANAGEMENT
- AI/ML BASED ALERT SCENARIOS

Mifid II: what you need to know

- To make European markets safer, more transparent and more efficient
- To restore investor confidence following the financial crisis
- To move a significant part of over-the-counter trading on to regulated trading venues
- Equities markets, fixed income, commodities, currencies, futures, exchange-traded products and retail derivatives such as contracts-for-difference

- Everyone - banks, fund managers, exchanges, trading venues, high-frequency traders, brokers, pension funds and retail investors
- More pricing transparency for off-exchange markets
- Volume caps for equity ‘dark pools’
- Splitting payments for analyst research and trading commission
- Tougher standards for investment products

Investment Firm/Trade Booking Source System
- Order data
- Price information
- Lifecycle events

Reconciliation System
- Data Sources: (D1) Trade Booking System, (D2) Reporting System, (D3) Product/LEI, (D4) ARM, APAs, CTPs, (D5) NCA/ESMA

Data Normalization: Create RAW Data

Data Sources: No. Break Feed, Dispute Feed, MI Reports

Matching & Recon: Find Discrepancies, Create Dispute, Potential Match

The MiFID II Circle of Truth
Source: Aite Group

CFT research
Blockchain Potential Benefits

**HOW BLOCKCHAIN WORKS IN KYC/AML COMPLIANCE**

**Step 1**
- FI #1: Client creates a profile on the KYC/AML DLT system.

**Step 2**
- FI #1 verifies that the KYC data on the client profile is valid.

**Step 3**
- FI #1 transfers digital copies of the KYC data to client profile.

**Valid**
- Client can now make a transaction with FI #1.

**FI #2**
- FI #2 skips these steps.

**Client decides to change their KYC documents**

1. Client uploads to FI #1
2. Now, FI #1 validates it and broadcast change to FI #2

FI (Financial Institution)
An initial public offering (IPO) seems to be the de facto goal of many startup companies. Founders, investors, and public observers often wonder, “When will this company IPO?”, “What will this company’s stock price be when they eventually IPO?”, and “Why hasn’t this company completed an IPO yet?” You may have been asked some of these questions about your own company. While an IPO is a worthy objective with many potential benefits, there are also many risks and disadvantages associated with going public, and thus, an IPO may not be suitable for every company.

- Industry 5.0 has revolutionised how digital transformation can be delivered. IPO process are still very cumbersome and paper based.
- Companies incur huge transaction cost during the IPO issuance process
- Additional Regulatory Requirements And Disclosures
- Market Pressures
Blockchain Potential Benefits

- Vanguard - a synchronized database for mutual fund indexes that is constantly updated every time CRSP makes a change to the index

- **Riskless Trading** - effectively guarantees that every matched order (execution) is settled. Riskless trading is made possible through atomic settlement on the SDX system

- A ‘Smart’ Approach to Blockchain for **Collateral Management**: Bringing Banks and Blockchain Together

- Vanguard Advances Blockchain Technology Pilot To **Streamline Asset-Backed Securities Markets**

- **HQLA^x** - seamlessly execute capital-efficient securities lending transactions for enhanced balance sheet optimization and mobilize collateral across a fragmented custody ecosystem; this is done without moving the collateral from one location to another.
  - https://www.hqla-x.com/

- **Shortening settlement times** - Project Ion aims to shorten the settlement cycle for the DTCC’s core settlement systems

- **Tokenizing private securities** - Project Whitney is the edgier of the two proposals and aims to tokenize private securities and enable secondary trading. This would initially target Regulation D (SEC Exemption) equities.

Blockchain Implementations

**MARKETPLACE**
- Eurex Repo electronic trading market (new segment for HQLA\(x\) collateral swaps)
- Ability to enter specific opening/closing date & time (to the nearest minute)

**DIGITAL COLLATERAL REGISTRY**
- Enables atomic change of ownership of baskets of securities
- Delivery vs Delivery “DvD”

**TRUSTED THIRD PARTY (TTP)**
- Holds baskets of securities at multiple custodians on behalf of participants
- Management of exposure requests to triparty agent services

**CUSTODY LAYER (Triparty Agents and Custodians)**
- Safekeeping of securities in accounts opened by the TTP
- Collateral management of securities in and out of segregated TTP accounts
<table>
<thead>
<tr>
<th>Market Infrastructure</th>
<th>Asset Management</th>
<th>Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Markets</td>
<td>Fund Distribution</td>
<td>CBDC</td>
</tr>
<tr>
<td>A real-time trading and settlement platform.</td>
<td>A platform to manage the creation and distribution of funds with primary and secondary market capability.</td>
<td>A framework to enable cash-like transactions over the internet.</td>
</tr>
<tr>
<td>CSD</td>
<td>Onboarding &amp; KYC</td>
<td>Wholesale Payments</td>
</tr>
<tr>
<td>A depository system for securities, funds or other assets</td>
<td>A suite of tools to manage client on-boarding process</td>
<td>Payments infrastructure backed by a Central Bank Digital Currency.</td>
</tr>
</tbody>
</table>
POTENTIAL DIGITAL ACCELERATED SETTLEMENT SERVICE

The proposed design of a Digital Accelerated Settlement Service at DTC was inspired by key concepts from the Settlement Optimization and Accelerated Settlement initiatives but modelled around a T+0 settlement cycle.

Underpinned by DTCC’s years of settlement experience, a potential Digital Accelerated Settlement Service has the promise of offering the industry an accelerated settlement option that does not compromise on the core benefits of DTCC’s centralized netting and risk management.

- Integrated to current trade capture capabilities
- Allow Market & Member submission
- Leverages NSCC’s Risk practices
- Digitization of Securities & Cash
- Leverages Existing DTC Account System
- Auto-Optimization of DTC Inventory & FedWire Cash
- Real time Netting with flexible cut-offs
- Continuous Calculation of Net Projections
- Accessible Data Stream via Node or API
- Atomic T+0 Settlement on-chain
- End of Day & Intraday Slices with Partial
- Alternative Settlement: Integrated DTC/NSCC Settlement & Prefunding

Common Interface via Front End, Node & API abstracting between existing and new infrastructure
Backward compatibility to Settlement Web for ease of adoption
Full Synchronization between the ledgers for redundancy and resiliency
Q&A

Thanks you for your time.