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Business transformation for derivatives users and intermediaries using IT systems

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1 Introduction of derivatives in India

The Indian equities market is one of the most automated markets in the world, thanks to the introduction of screen–based trading, dematerialised settlement and electronic banking in the mid-nineties. All these changes have meant dramatic changes in the IT systems at the offices of equity market intermediaries. Then followed even more changes: Derivatives trading and the shift of settlement models from account period to $T + 5$. This further shortening of the settlement cycle to $T + 3$ resulted in the need for the capital market intermediaries to make changes to their IT infrastructure and resources in order to minimise costs and maximise profits.

With the introduction of futures in the year 2000, and with the options segment following at its heels, derivatives trading in India has grown in leaps and bounds, achieving volumes equalling that of the equities segment in a very short span of time. It has shown astounding growth despite fears that capital markets intermediaries would not be prepared for this giant leap

both in terms of IT as well as knowledge of derivatives strategies available in the global markets.

The ease of automation of Indian securities markets so far is primarily because the Exchanges, at the center, have kept the level of understanding and expertise required at the level of other intermediaries to the minimum. The complexity has been kept at the center, while the intermediaries at the periphery have not been expected to contribute much to automation in any significant way.

This notion has been taken to extreme in the case of derivatives where the margins for each client are being calculated at the Exchange clearing houses and then sent to the brokers for collection from their clients. This means that a broker would typically not require any software system of his own to do trading, clearing, margin calculation, settlement etc. Most of his automation needs have been taken care of by the Exchanges themselves in the equities and derivatives markets.

While these steps have ensured that the introduction of derivatives trading has been smooth, there are issues with the current enterprise IT of the intermediaries which needs to be be addressed before derivatives trading in India would be able to reach its peak volumes.

2 Change in role of intermediaries

The need for change in the IT infrastructure owing to the entry of derivatives trading is less from the point of view of automating just the trading operations but more from the fact that the role of the intermediaries has to evolve in order for them to differentiate themselves in their segment. In order to attract investors to play in the relatively more complex arena of derivatives, the broker would have to shake off his current mantle of being a mere gatekeeper to the Exchanges and assume a more active role in order to provide value added services.

It has been observed internationally that a large portion of retail investment is now shifting to mutual funds and separately managed portfolio management services. Individual investors investing in mutual funds have gone up from 62 million in 1996 to 93 million in 2001. Globally, brokerage firms are focusing on becoming full service brokerages in order to attract investments from large institutions and high networth investors. Discount brokers such as Charles Schwab are adopting the Internet based brokerage

model in order to keep transaction costs low. The number of online brokers in the US has moved up from 12 in 1995 to 60 in 2002.[1]

Full service brokerage firms cater to the mutual funds, FIIs and the high networth individuals – a high value, less number of transactions business which requires the firm to establish various specialized service desks such as a research desk to cater to the fund management departments of their clients. The discount brokerage firms would continue to exist catering to the distributed retail segment. Globally, they have been replaced or are in the process of replacing their business model with online brokerage in order to lower transaction costs. In contrast in India, bandwidth constraints and the opportunity of reaching out to retail investors in the rural areas, ensure that discount brokerages will still have an important role to play.

In whichever manner the brokerage firms wish to model themselves, the push for cost cutting, ensuring customer satisfaction and the need to comply with industry regulations for shorter settlement periods mean a change in their IT infrastructure.

3 Derivatives trading

There are two ways in which the intermediaries can increase their profits: (a) Increase trading volumes, and (b) Reduce transaction costs. Increase in trading volumes is closely related to the transaction costs and is dependent on the awareness level of the investors.

Derivatives trading is far more complex than trading in spot. Users need to keep track of expiry dates of contracts, the initial margin, daily margins and to track whether there are better opportunities in the market so that they can unwind their open positions prior to the expiry date. The intermediaries need to be aware of complex derivative strategies to help investors detect and implement hedging, speculative and arbitrage opportunities. Keeping track of complex derivatives positions in the market in real time requires a different set of tools and alert mechanisms than currently used.

Many brokers made a foray into derivatives trading by entering into manual methodologies for arbitrage between cash and derivatives market, emulating their spot market deals between NSE and BSE. The success of their methodology thus far can be attributed to the fact that not many bro-

[1] Source: Barron's.

kers have yet jumped on to this bandwagon. Their current IT infrastructure does not allow them to do this in a more efficient way.

In summary, in order to cope with the changes in settlement cycle and introduction of derivatives products:

- Intermediaries need to change their role from mere gatekeepers to an advisory role to investors
- Users require sophisticated decision support and analytic tools in order to take up opportunities both in arbitrage and speculation
- In order to execute the opportunities in different market segments, there has to be a far more efficient order routing systems and risk management with guaranteed and secure delivery of information between the entities.
- In order to lower transaction costs, intermediaries have to use technology that works much faster, requiring fewer manual processes.

4 Issues with the current IT infrastructure

The piecemeal approach taken by most intermediaries in setting up their IT infrastructure, not anticipating the future growth in volumes and types of instruments traded has resulted in some common flaws in the following areas:

- **Front office**

  The area that primarily covers analytics and order execution faces the following set of issues that need to be solved:

  - *Lack of a single interface for both segments*

    The Exchanges provide two separate terminals for trading in spot and derivatives. The lack of integrated terminals makes it inefficient to execute trading opportunities simultaneously. This has been rectified to some extent by the use of CTCL order routing systems which have integrated front-ends but have not yet been integrated on the Exchange terminals.

  - *Lack of decision support tools*

    The lack of decision support and analytics software to automate the discovery of opportunities for arbitrage, speculation and hedging is a deterrent to efficient trading.

For example, arbitrage in the Indian spot markets was uncomplicated till date. The broker would employ a pair of human arbitragers manning two different Exchange terminals, probably on a profit sharing basis. As soon as the price differential is spotted across these exchanges, the arbitragers will place orders on both exchanges. Many brokers specializing in arbitrage activities would employ 50 to 100 pairs of such arbitragers during the boom time of 1999-2000. Each pair would do more than 1500-2500 trades in 5 hours of trading in each exchange on a good day. Each pair would concentrate only on few securities. With the advent of derivatives, owing to the complexity, it becomes cumbersome to follow the same methodology since the number of "watched" contracts are limited and the resources utilised are extensive.

With the introduction of five or more derivatives per underlying, and with more and more underlying securities being introduced, this manual methodology has become cumbersome. It is way more efficient for a machine to compute and detect opportunities based on pre-defined rules and parameters.

- *Current systems do not monitor client positions accurately*

  Treatment of options for the exercise, allocation of exercise of options to specific clients etc. have also ensured that the back office and risk management systems at the broker end have to change substantially when the derivatives volumes at brokerage house starts going up.

- **Risk management**

  Middle office functions of the risk management, management of post-trade customer interaction etc. has been a neglected area in the Indian equities market. Risk management on aggregate basis as well as on individual client basis was not done actively.

  Investment activities are becoming more global in nature. The trade operations are yet unsophisticated. The complexity of doing cross border trades, particularly the risks and cost of transactions need to be examined so that processes can be set in place.

  - *Requirement for user defined margins per client*

    Clearing houses calculate SPAN based margins at client level and provide the details to the brokers. However, for his own

safety, the broker might like to collect additional margins as an extra cushion in the times of stress. For the purpose, the broker staff would need to understand how the portfolio based margining model such as SPAN work. To be able to cope with these new complexities, the brokers will have to start thinking of creating new systems for dealing in the new paradigm.

– *Infrequent batch processed calculation of client risk*

  For the majority of installations, the risk management is done in batch processing. The current software that calculates margins for the clients on derivatives trade, SPAN, is calculated twice a day and is not real-time.

– *Inefficient fund transfer mechanism*

  Owing to the shortening of settlement cycles and the daily margin calculation requirement in the area of derivatives, the inefficiency of funds transfer acts as a stumbling block. Clients who have electronic banking facilities transfer the funds via a web interface of the bank. In certain rural areas, owing to poor bandwidth, funds transfer is a constraint.

– *Lack of real-time client portfolio management systems*

  Monitoring of the complex positions taken while trading in derivatives gets to be very difficult in the current systems. A few back office systems like "Pradnya" have a real-time connectivity to the exchange order routing system and other vendor order routing systems to identify changes in portfolio and outstanding positions at the customer level. The method in which the exchange's order routing system keeps the real-time outstanding positions is fraught with risk since it doesn't take in to account intra-day banking and depository transactions.

– *Lack of a comprehensive collateral check software*

  There are very few systems today that offer an overall collateral check mechanism for clients which check the various collateral presented by clients such as cash, securities, bonds etc. Intermediaries settle for the compliance checks provided by the exchange but do not improve upon them.

- **Back office**

  Back Office systems allow the brokers to conduct their day to day interaction with the investors. Contract Note preparation, tracking of client pay-in and pay-out, accounts for the broking house and each client, tracking of creditors and debtors are some of the functions which these systems provide for. Regulatory compliance is also one of the areas, these systems are expected to cover. In addition, the settlements with each exchanges are also expected to be handled using these systems.

  The issues in the current system are:

  - *Excessive time and resource is spent in the back offices owing to manual processes and documentation*

    To meet the regulatory requirements of generation of contract notes and other documentation, firms invest in large numbers of staff to handle the back office processes. This is one of the areas affected the most by the shortening of the settlement cycles and the most error prone.

  - *Lack of a centralised database between branches of member firms*

    Most brokers treat their branches as clients and settle with them on net basis for all practical purposes. This means that the trade details of the clients are available at the Exchange and also at the Broker Head Office. However, the settlement details are not available with the Head Office most of the time. The client related settlement details are transferred to the Head Office on a periodic basis by most branches or sub-brokers.

    This results in the head office not having an immediate visibility of the risk taken by the individual clients based on his open position or payment history of the final clients. The framework is prone to frauds by internal employees conniving with clients. The lack of appropriate technology solutions and network facilities combined with high cost of the connectivity prohibited brokers form centralizing their back office processing.

  - *Unnecessary replication of data*

    In various sections, owing to the lack of centralization of data, data is replicated such as broker-dealer confirmations,

customer information replication in different departments etc. Multiple entry points introduce more chances of errors.

- *Inadequate customer profiling*

  The capital markets intermediaries each maintain a separate customer database capturing various information of investors. Consolidation of investor information would ensure that better customer service and correct exposure limits can be provided per investor.

- **Non standard messaging interfaces between intermediaries**

  There are no common messaging standards used between banks, the exchanges, the depositories and the member firms. This results in extended delays while trying to establish data communication channels between them.

- **Inability to handle spikes in trading volumes**

  The trading volumes are increasing in the derivatives segment. The IT and resource utilization in the user organisation needs to be planned such that it is scalable and can handle unexpected increases in the volumes.

5 Rethinking Enterprise IT to handle derivatives

The increasing trade volumes are pushing existing trading systems and processes to full capacity and increasing settlement risk. This compounded with the increase of crossborder trading opportunities and desire to lower transaction costs has prompted *Straight Through Processing* (STP) to be proposed as a important part of the solution to scale up processes.

STP has been defined by the TowerGroup as *a trade environment in which a trade goes through its entire lifecycle without any manual handling, duplicate or redundant processing*.

STP, in itself makes an interesting topic for discussion which can be covered separately. Some of the benefits envisioned post STP are:

- Automation of processes with little or no manual intervention
- Guaranteed and secure delivery of information
- Less replication of data thus lower transaction costs
- Usage of globally accepted message standards

- Connectivity
- Multiple technology integration
- High latency batch processing
- Lower risk exposure
- Data aggregation and distribution
- Scalability
- Ease in process audits

Factors which will determine the pace of adoption of STP

1. Deployment of a *real-time funds transfer system* (RTGS). RTGS is estimated to launch in June 2003.
2. Selection and enforcement of an internationally accepted messaging standard between the intermediaries like ISO 15022 which will allow the financial entities to share information effectively.
3. Cooperation in establishing real time information transfer between the custodians, exchange and the member firms.

5.1 Implementation paths under Indian conditions

While the benefits of STP can be enormous, most securities firms are bogged down with the amount of changes that need to be made. The fine lines between the roles of the front, middle and back office are disappearing. Since STP touches all parts of the trading process, it requires systems integration and faster communication in its own firm as well as the other entities in the industry to use a common standard.

Implementation of STP is a process which will require a large amount of cooperation between the entities involved. Approvals and decisions of the regulators could take some amount of time. There are luckily a combination of products and services that are available in the markets today to start the process with. Products available in the Indian markets possess a combination of features belonging to the three categories:

- **Front office**
  - *Market watch and Order management*

    There are several CTCL software solutions with integrated equity and derivatives segment order routing available in India. Vendors like *NSE.IT* and *Financial Technologies* have developed front office software which have integrated cash and

derivatives screens. The Exchanges have asked for a mandatory set of features that the front office software have to possess; these features are tested and approved by the Exchanges before the vendors can offer their products in the market. Thus a number of solutions are already available in this area.

The software selected should be capable of executing the orders instantaneously with minimum lag. If arbitrage opportunities are to be executed, it is important that all legs of the execution should go through without delay and confirmations to the trades should be available.

It should additionally support facilities to monitor whether one leg of the transaction has not yet gone through and re-calculate the opportunity to see whether it is worthwhile to execute the second leg of transaction. If not, it should ask whether the user wishes to unwind the originally placed order.

– *Decision support and analytical tools*

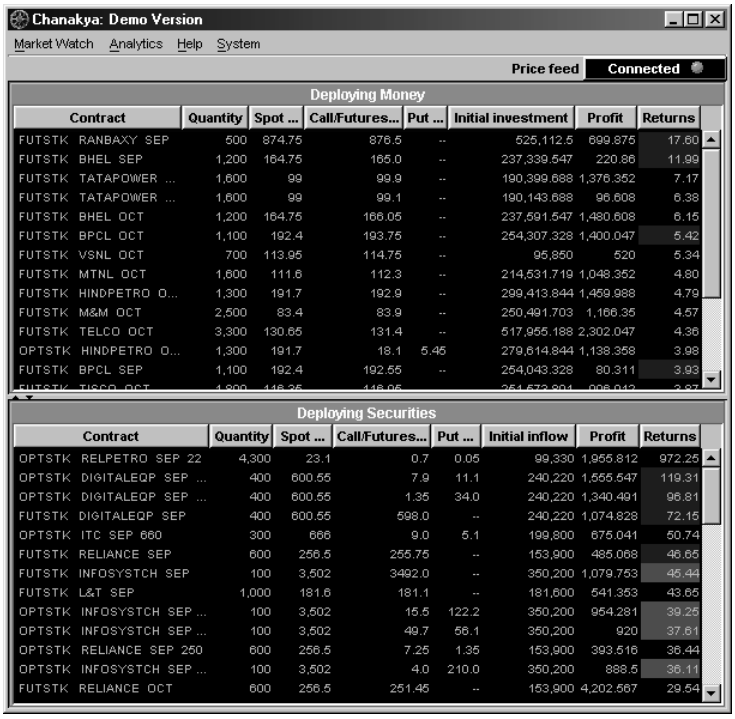
There are more than 2000 derivatives contracts being traded in the Indian markets and numerous strategies used to detect opportunities in the derivatives markets. It is most efficient to automate these calculations which are mathematical in nature and use tools that perform these calculations to scan across all 2000 contracts simultaneously. There are a few analytical software available in the Indian market like *Chanakya* and *Aegis'* derivatives tool offering different features.

We take *Chanakya* as a case study of such a decision support system.

Aimed at a growing market where the immediate need is to start making money with the least amount of complications and user inputs, *Chanakya* has the ability to watch the entire market and detect the best opportunities available in real time. The user has to define the different types of transactions costs he would incur: *Chanakya* does the rest by displaying opportunities depending on whether the user wishes to deploy money or an existing portfolio in the market.

Chanakya can be interfaced with a order routing system wherein the user can execute trades simultaneously in both seg-

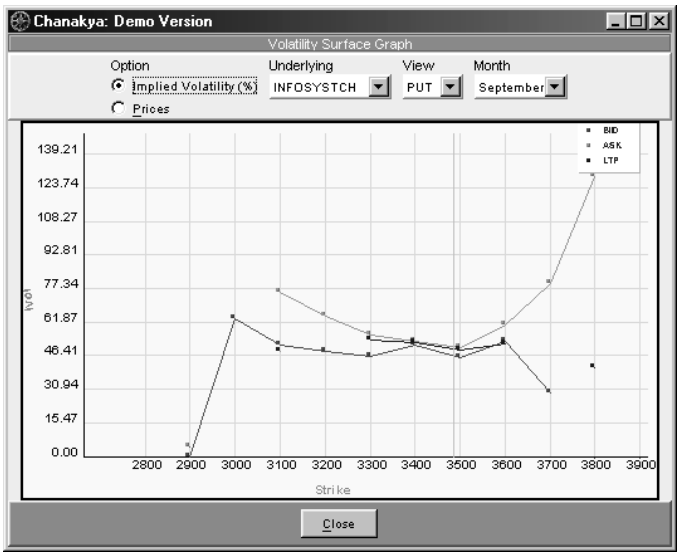
ments, at a single click. These executed positions can then be monitored, client-wise and portfolio-wise using the Portfolio analytics module. Once positions are taken, alerts can be easily set up such that the user is informed when opportunities to unwind the position to get higher rates of return are detected. Alerts can also be configured to inform the user when the portfolio performance changes due to various market movements.



Graphs of the implied volatility and prices of each contracts, updated in real-time, helps the user identify where he needs to place his trades.

For brokers, this software can be a useful tool where the portfolio of various clients can be added and monitored. Portfolio analysis comes in the form of a real–time display of :

* The profit/loss of the portfolio: A continuous mark to market value of the portfolio is calculated and the profit or loss on the portfolio is displayed in real–time.



* The greeks on the portfolio: These indicate the effect of various factors like changes in the underlying price, time, volatility and interest rate, which helps in taking decisions in modifying the user portfolio to suit the user trading beliefs, and to help the user craft new trading strategies.
* Pay-off profile of the portfolio: The payoff from the portfolio at various values of the underlying spot is displayed graphically.
* Profit v/s volatility: Since volatility becomes of great importance in a portfolio with derivatives, *Chanakya* presents a graph of how the profit of a complex portfolio of derivatives changes when the volatility of the underlying security changes.

The system also takes into account the impact costs, initial margins and keeps track of the dividends and minimum tradeable lots per security.

– *Multiple trading interfaces for clients* The brokers front end software should also provide multiple trading interfaces for their clients to access. Some of the features desired are listed below.

  - Order management which includes order placement, modification and cancellation online confirmations of orders and trades.
  - Users should be able to set their own alerts on their portfolio or the market
  - View their account balance
  - View information such as news and stock quotes. This service has already been provided by various brokerage firms.

  These activities should be accessible via multiple interfaces such as IVR, wireless devices, kiosks at brokers offices etc. Security solutions for all of these interactions would need to be implemented to maintain client privacy and prevent frauds.
- *Order routing screens for mutual funds* An order routing screen can be given to mutual funds which would help them route orders directly to any broker. The dealers at the mutual fund can see the status of their orders via this view screen. This resolves the time spent in matching the broker trade confirmations with the mutual fund dealer's orders by matching it in real-time.

- **Middle office**

  The additional facilities required at the middle office would be:
  - Real time MTM valuation of client portfolio.
  - Real time VaR and SPAN margin calculation on client portfolio on change of price or composition of portfolio.
  - Alerts whenever the risk exposure has been crossed.
  - The users at the member firms or the mutual funds should be able to configure an order rule book for individual investors or a fund.
  - The users at member firms should be able to define margins for specific clients.
  - More compliance rules should be configurable at the user's behest to decrease risk exposure based on the investor's risk taking ability.
  - Comprehensive collateral checking capability. This feature is available in the back office software, Pradnya.

- **Back office**

  Besides the standard features of accounts, billing and reports, additional features desired would be:

  Digital signing of contract notes: Implementation of e-signing of contract notes would bring down costs for brokerage firms substantially over a period of time. Firms like *ICICI Direct* have already implemented this solution successfully.

  Centralised information per member firm: This would enhance risk management and prevent the chances of replication of data, and irregular updates of localised databases at branches. Restricted information can also be shared with the end clients.

  Customer profiling and analysis of prior investment patterns. Details of types of investments, frauds/payment patterns would be stored. This would be viewable based on the access rights of the user.

  The software should be able to track the positions taken by clients for arbitrage or hedging strategies with alerts to warn the client of potential losses.

  A case study of a back office software with features that optimally supports derivatives trading is *Pradnya*. *Pradnya* takes care of the four basic engines through which the complete process of back office management is automated.

  - Trade Management ensures that the broker's position is always in tune with the Exchange. Some of the features are:
    - End of day trades import in specified format.
    - Net position matching.
    - Confirmation.
    - Calculating taxes.
    - Contract printing.
    - Position matching with daily obligation statements.
    - *Sauda*/Trade transfers with application of changed brokerages for before contract, after contract, after bill processing.
    - Creating bills with delivery charges application, calculating taxes, posting *valan* summary into accounts.
    - Posting net positions for delivery processing.

- Accounts management is responsible for tracking accounts. The features in this module are:
  - Acknowledgement of cheques received from clients.
  - Auto posting of cheques received.
  - Auto generation of pay-in slips for the bank.
  - Auto posting of cheques issued.
  - Auto printing of payment advice and cheques on pay-out day.
  - Voucher entry - debit/credit notes.
- Securities management is responsible for keeping a track of inward and outward movements of securities. The features are:
  - Entry of physical shares received and allocation of the same, creating reports as required by the Exchange.
  - Importing demat share details file from DP and allocation of the same.
  - Creating pay-in instructions for DP.
  - Advice for pay-in to exchange and clients.
  - Pool position processing and monitoring.
- Report management can create reports on the fly for user-defined parameters. The reports allow you to drill down the report till you reach the trade that created the business. There is complete integration between trade management and account management.

- **Messaging middleware** Capital markets intermediaries need to co-ordinate and accept an internationally accepted messaging standard to speed up the communication between them.

  ISO 15022 is the new emerging International Standards Organization (ISO) message standard for the securities industry to allow real-time electronic exchange of securities transactions. This standard is notable for two reasons. First, it converges the existing standards from the two major industry standard groups, the Society for Worldwide Interbank Financial Telecommunications (SWIFT) and the Financial Information eXchange Protocol Ltd. (FPL). For the first time, it will link the front office and back office operations of the securities industry. SWIFT provides secure messaging services mainly for the back office transactions and FPL for the front office transactions.

Secondly, the standard will support XML which describes content independent of the presentation. The data elements are identified by tags and are contained in nested structures that conform to a set of parsing rules for open access. XML is being widely adopted as the standard protocol for exchanging information electronically. ISO 15022 XML is defining the standard tags and business rules for the securities industry that will encompass the current standards.

The middleware consists of an ISO 15022 engine that sends and receives messages from one entity to the other. Adapters need to be developed to interface between existing software to these engines. The middleware is responsible for guaranteeing the delivery of messages in the correct sequential order and re-sending messages in the event that any messages get missed.

6 Summary

Derivatives trading, combined with the advent of $T + 3$, has resulted in the need for each capital market intermediaries to rethink the way its IT infrastructure setup needs to be done.

There is a need to reduce costs, enable faster trading processes and reduce the steps involved. Some of the software already existing will be able to handle these requirements with minor customisations. Analytic tools and better risk management software needs to be integrated in the current setup.

The intermediaries would need to put focus of providing better customer satisfaction by adding CRM software and centralisation of client information.

Frontiers