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Institutional change in India’s capital markets

Ajay Shah

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## Contents

1 Two alternative styles ........................................... 3

2 Information processing by securities markets ................. 4

3 Market efficiency and transactions costs ....................... 6

4 Transactions costs and market institutions .................... 7

5 The political economy of institutional change ................. 11

6 Institutional change on India’s equity market ................. 12
  6.1 Problems as of 1992 ......................................... 12
  6.2 SEBI ......................................................... 14
  6.3 NSE ......................................................... 14
  6.4 NSCC ......................................................... 15
  6.5 NSDL ......................................................... 16
  6.6 Impact of reforms ........................................... 16

7 Institutional change on India’s debt market .................... 20
  7.1 Problems as of 1992 ......................................... 20
  7.2 Innovations in market design after the Scam ................. 23
  7.3 Impact of reforms ........................................... 24

8 Problems faced today, and the agenda for reforms .......... 24
  8.1 Transition to rolling settlement on the equity market .... 26
  8.2 New approaches towards market design on the debt market 27
    8.2.1 Settlement procedures ................................ 27
    8.2.2 Trading procedures .................................... 28
  8.3 Exchange–traded derivatives on equity and debt .......... 29
    8.3.1 The Role for Derivatives .............................. 29
    8.3.2 Components of a Derivatives Exchange .............. 29
    8.3.3 Is India ready for derivatives? ....................... 30
    8.3.4 Areas where useful derivatives markets could come about 31

9 Conclusion ......................................................... 31
From the early 1980s onwards, there has been a shift in India’s economic policy regime, away from direct influences upon resource allocation by the State, towards a greater role for markets. One major plank of these reforms has been an attempt at developing financial markets as an alternative vehicle determining the allocation of capital in the economy.

In India, the financial sector (and securities markets in particular) attracted heightened attention from policy makers in the aftermath of the Scam of 1992. This led to a set of State initiatives on the equity and debt markets in the following years. In this article, we primarily deal with changes in institutions governing securities issued by firms, i.e. shares and bonds.

In addition, the problems in East Asia in 1997 have led to a heightened appreciation, worldwide, of the vital importance for a developing country of a financial sector which effectively processes information and wisely allocates resources. Stiglitz (1998) describes the financial sector as ‘the brain of the economy’. Most policy-oriented economists have talked about the need for strengthening the financial sector.

In this article, we seek to understand the functioning of capital markets in India from this perspective, where a well functioning market is defined as one which performs the information processing function effectively, and hence channels capital wisely. We seek to link up this abstract picture with Indian institutional realities and contemporary debates about public policy in connection with financial markets.

1 Two alternative styles

Market economies uses financial markets to guide resource allocation. Here, households create savings, and firms compete in obtaining access to capital. Every project proposed by a firm can be viewed as an idea to produce certain goods using certain technologies (this includes the choice of raw materials, technology and managerial team), and financial markets play a major role by denying resources to certain projects.

There are two fairly different approaches which can be adopted in allocating scarce savings to the most deserving investment projects.

One style of functioning, called “OTC contracting” is based on direct evaluation by intermediaries who process information. This is the style seen in India in the traditional financing patterns of IDBI, ICICI, banks, etc. In OTC contracting, individuals who work for finance companies, such as IDBI, evaluate the merits of alternative projects which appear before them, and allocate resources to the projects which (they feel) offer the best risk/return tradeoffs.

The allocative efficiency of financial systems based on OTC contracting depends upon (a) the information available to employees of these finance companies (b) the incentives that they have to expend energy and effort in processing this information well and (c) the incentives that they have to finally make decisions based on their analysis. In India, the operation of banks and financial institutions is unsatisfactory on all these three counts:

1. The information set which is brought to bear upon project evaluation is limited.

2. The contractual relationship between the finance company and the employee is not conducive to maximising the quality of information processing, especially with government-
owned finance companies.

3. Finally, there are external pressures which seek to distort funding decisions, especially with government-owned finance companies.

These three problems are hardly unique to India; they have afflicted banking systems worldwide, with varying degrees of severity (Caprio 1997). Weaknesses of information processing by banks played a prominent role in producing the East Asian Crisis of 1997, and Japan’s macroeconomic problems today are partly related to the estimated $1 trillion in bad loans given out by the Japanese banking system. The recurrence of banking crises across time and space suggests that we should seek structural explanations. The three problems highlighted above are concerned with the poor incentives of employees of finance companies to process information wisely.

When OTC contracting takes place under institutional arrangements which inadequately address these problems, as is common with public sector banks and financial institutions in India, it is associated with poor information processing. Conversely, we may expect superior information processing when OTC contracting takes place under institutional arrangements which generate better incentives for employees, such as venture capital funds, private equity funds, and private banks.

The alternative style of functioning that can be adopted by a financial system relies upon securities markets. Here, trading on an secondary market for securities issued by a firm (primarily bonds and shares) determines their price. Firms can raise funds by selling additional securities, but the price that the newly issued securities command will obviously be quite close to those that were previously issued. The allocative efficiency of financial systems based on securities markets depends upon the extent to which security prices on the secondary market reflect the risk and return of alternative securities. In a well-functioning market, more risky securities should command lower prices – firms which seek to invest in more risky projects should suffer a higher cost of capital as compared with firms that embark upon less risky projects.

A key difference between OTC transactions and exchange transactions lies in the fact that trades on exchanges takes place under anonymity. This encourages a focus of information processing upon market prices. In contrast, OTC transactions take place between known counterparties. Political and personal motives play a larger role with OTC contracting.

This distinction – between transactions conducted OTC or through a securities market – is of central importance in understanding the different problems of different components of the financial system. In this article, we will focus upon the ingredients which engender effective information processing by securities markets.

2 Information processing by securities markets

Information processing on securities markets is done by a class of economic agents called ‘speculators’. Speculators form assessments of the fair value of a security, based on information processing about risk and return in the future. When a speculator feels that the market price of a security is low as compared with his assessment of the fair value, he buys the security, and vice versa.
The critical feature which fosters efficient information processing in speculative markets is incentive compatibility. A speculator works for himself, he directly earns profits if his information processing is accurate and he directly suffers losses if he undertakes trades based on poor information processing. This is in sharp contrast with the problems faced by banks and financial institutions in motivating their employees. In addition, as Milton Friedman observed many years ago (Friedman 1966), there is an innate process of selection through which speculators who do poor information processing tend to accumulate losses and exit from speculative activities.

It is possible to have corporate forms of organisation in speculation, such as mutual funds or FIIs which do active fund management. These would face the same problems faced by banks in terms of motivating employees in information processing. In India, around 90% of the trading volume on the equity market comes from individuals. Hence, the bulk of the speculative activities on India’s equity market are based on well-functioning incentive structures for successful information gathering and forecasting.

When a speculator buys a security trading at below its fair value, this action tends to restore its price closer to the fair value, and vice versa. In this fashion, the activities of speculators play an equilibrating role, pushing security prices towards levels which reflect a complete assessment of future risk and return.\(^1\) The prices produced by modern securities markets are a public good; they can be observed at zero cost in newspapers or on the Internet.

Information flows into securities markets tend to be rich and diverse, owing to the broad-based participation in markets. This is in contrast with the restricted information flows that characterise OTC interactions. In the deeply interlinked production processes of the modern economy, a bewildering array of apparently unrelated information has a bearing upon the future risk and return from a security. Speculative markets give incentives to a wide variety of agents in the economy to obtain these pieces of information, and pool them into the publicly observed price. Company insiders, and the individuals outside the firm who directly interact with it, are often a valuable source of information when they choose to become speculators: they command a ‘technology’ for obtaining information and interpreting it at a low cost.

In summary, the modern securities markets can be viewed as an information processing device where ‘workers’ who obtain information and successfully process it are rewarded with speculative profits. The self-interest of myriad individual speculators in the economy is harnessed to obtain information gathering and analysis. This structure avoids the three problems listed in Section 1 which afflict information processing with OTC transactions.\(^2\)

In recent decades, the term ‘market efficiency’ (Samuelson 1965, Fama 1970, 1991) has been

\(^1\)See Hart & Kreps (1986) for a contrary example, of a class of theoretical models where speculators can be destabilising. Friedman’s intuition is best visualised as a process of natural selection. In Luo (1998), an extreme model where agents do not learn from their mistakes or by observing other agents, the natural selection process alone generates (asymptotic) market efficiency. To the extent that learning does take place, we may expect a greater convergence upon efficiency.

\(^2\)This perspective upon securities markets, and the role of speculators therein, is in sharp contrast with the hostility towards speculation which has dominated public discourse in India in the last fifty years. This is partly caused by confusing terminology: the term ‘speculation’ is often mixed up with ‘market manipulation’ or ‘systemic risk’. We define speculation as the activity of gathering and processing information, which leads to valuation of securities on organised markets. This need not involve market manipulation or systemic risk in a well functioning financial system.
applied to describe the state where market prices accurately reflect forecasts of future risk and return associated with alternative securities.

3 Market efficiency and transactions costs

If speculators are to gather and process information in order to obtain forecasts, their knowledge and analytical capabilities are obviously important. If we treat these capabilities as being fixed, then from the perspective of public policy, what institutional arrangements would maximise the quality of information gathering and information processing by speculators?

1. Legal requirements for copious public information disclosure, and penalties for false information disclosure, would improve the information set available to speculators, and

2. Institutions in the securities markets which impose the lowest possible transactions costs upon speculators would improve market efficiency.

The second objective – market institutions which minimise transactions costs – is a central idea in the normative economics of financial markets. Let $\lambda$ denote transactions costs. A speculator who buys a security when the price is $p_1$ ends up spending a little more: $p_1(1 + \lambda)$. Suppose he sells the security when the price is at $p_2$; including transactions costs he realises only $p_2(1 - \lambda)$. In this sequence of transactions, termed “a round trip”, the transactions costs add up to $\lambda(p_1 + p_2)$. On average, we think that $p_1$ and $p_2$ are close to each other, so the round trip costs are often approximated by $2\lambda p_1$.

A first, direct, consequence of transactions costs is that small mispricings (i.e. deviations between market price and ‘fair value’) do not generate speculative corrections. If a speculator feels that a security is worth $\bar{p}$ and it is trading at $p_t$, no trade takes place if $|p_t - \bar{p}| < 2\lambda p_t$. Hence, the speculative process cannot correct pricing errors inside the band $p_t \pm \lambda p_t$. Thus every level of transactions costs is associated with a degree of noise in prices. This noise has further ramifications which could seriously hurt market efficiency (DeLong et al. 1990, Black 1986).

Suppose $|p_t - \bar{p}| > 2\lambda p_t$, and speculators do embark upon profitable trades. In this case, the round trip costs $(2\lambda p_t)$ diminish the profitability of speculative activities, and serve to diminish market efficiency. Speculators would expend smaller resources on obtaining and processing information in a world with a high $\lambda$.

Speculators are not the only users of the transactional services of securities markets. Trades which are not motivated by the objective of obtaining speculative profits are called information-less trades. Information-less users need to convert funds into securities or securities into funds for reasons external to market prices. A common example of information-less users in a market is the importers and exporters who trade on the currency market as a side consequence of their core activities; most orders placed by them are not attempts at obtaining speculative profits.

For information-less users, the equity and debt markets make it possible to participate in long–term projects while retaining the option of asset liquidation. This yields greater flexibility as compared with the debt contracts used in traditional financial institutions, which are held until maturity. This role of financial markets in providing liquidity has been known ever since John
R. Hicks. A modern extension of this argument is the idea of the *liquidity premium*, whereby investors require a higher rate of return (at equilibrium) when transactions involve large costs (Amihud & Mendelson 1986).

Through these considerations, market liquidity also assists other economic agents; however these aspects are not as important as information processing by speculators, resource allocation, and the problem of maximising the economic growth obtained from a given supply of savings.

### 4 Transactions costs and market institutions

The above discussion focuses our attention upon low transactions costs as a central input towards obtaining market efficiency. In modern parlance, a ‘liquid market’ is one where transactions costs are low.

What determines transactions costs? At a basic level, *market size* obviously matters. If there are only a few buyer and sellers, then search costs will be high and transacting will prove to be costly. Large economies have an intrinsic advantage – it is relatively easy for the US government securities market to obtain high liquidity given the trillions of dollars of debt issued by the US government. Within India, smaller securities face greater hurdles in obtaining liquidity as compared with large securities. It is intrinsically easy to obtain a liquid market for the dollar–rupee (where importers and exporters assuredly generate around $80 billion in trading volume a year), and it is intrinsically hard to obtain a liquid market for a Rs.1 billion corporate bond issue.

From the viewpoint of public policy and institutional design, the size of securities cannot be altered. What policy can aim to do is obtaining the best possible liquidity for whatever securities exist. In this enterprise, myriad details of market design (Shah 1998) assume importance. Market mechanisms influence transactions costs, and there is a rich interplay between problems of public policy, market mechanisms and transactions costs. When we translate the abstract problem of ‘institutional development in the financial sector’ into ground realities, one of the most important issues is the tangible problem of evolving market mechanisms which generate the lowest possible transactions costs.

Let us turn to the operations of a securities exchange, and analyse the multi-faceted hurdles faced by a user of the liquidity services of the exchange. The steps involved may be summarised as follows:

1. Exchanges are generally inaccessible to users, except through intermediaries called ‘brokers’. The user approaches a broker, conveys his requirements, and a trade could take place. Costs faced here include innate liquidity costs of the market and intermediation fees.

2. The next step is called ‘clearing’, where the exchange assesses the net positions of all brokerage firms, requires exchange of funds (from buyers) for securities (from sellers), and handles defaulting brokerage firms (if any). If clearing works correctly, buyers who have paid money get securities, and sellers who have supplied securities get funds. When clearing fails to work well, it introduces risks for users of the market.
3. The final step is called ‘settlement’, where new holders of securities try to actually transfer the title into their own names. When settlement processes fail to work well, they introduce costs for users of the market.

As we go through these steps of trading, clearing and settlement, users suffer numerous costs. Shah & Thomas (1999) offer a twelve-fold qualitative enumeration of these costs, with some insight into how alternative market designs impact upon them.

**Denial of access** The first hurdle that users face is an explicit or implicit denial of access to market liquidity.

This can take place owing to basic market structure. Inter–bank markets are notoriously inaccessible to non-bank users, who have to pay intermediation costs associated with a small club of banks who have market access. Another problem which leads to denial of access is primitive technology. In India’s equity market, prior to the use of satellite–based communications, users outside Bombay effectively faced enormously higher transactions costs and were all but denied access to the market.

**Market down-time** This cost occurs when a user wants to access liquidity services but is unable to do so because the market is closed (either because of holidays, a strike by exchange staff, a payments crisis, a technical breakdown, etc.). A market which is closed is equivalent to a completely illiquid market. NSE’s recent experience with unreliable satellites has generated massive transactions costs for many market participants.

**Market Impact Cost** Every organised financial market has distinct prices for buying and selling small (predetermined) quantities, called ‘ask’ and ‘bid’ prices. For example, a glance at NSE today reveals that shares of Reliance are trading at 114.35/114.4. The difference between these is called the ‘bid-ask spread’. These quotes pertain to a quantity of 50 shares. They mean that a buyer of 50 shares pays Rs.114.4 and a seller gets Rs.114.35. Larger transactions would, of course, show wider spreads.

It is common to interpret \((\text{bid}+\text{ask})/2\) as an “ideal” price. In this case, it is Rs.114.375. Compared with the ideal price, a buyer of 50 shares pays a premium of Rs.0.025. This is 0.022% above the ideal price. Then we say “the market impact cost in buying 50 shares of Reliance is 0.022%”. Market impact cost obviously rises for larger transactions, and can differ between buying and selling. Figure 1 shows one example of market impact cost at all transactions sizes.

From an economic perspective, the bid-ask spread reflects the innate economic cost of liquidity services of the market. Once the basic structures of trading–clearing–settlement are well in place, market impact cost is the most important component of transactions costs. This is particularly important for large transactions.

**Market Inefficiencies** Users can be subjected to the risk of buying or selling shares at prices which are away from the true value. Specifically, when market manipulation is present, the
typical information-less user loses money (on average) in connection with his transactions; these losses are best treated as transaction costs.

When a regulatory agency effectively enforces laws proscribing market manipulation, it thus serves to reduce these costs.

**Unreliable order processing by broker** These are the costs introduced when brokers do not reliably execute orders given to them. Traditionally, on India’s equity market, intermediaries attached a low priority to small investors, and gave them unreliable services, driving up the transactions costs faced by small investors.

Reliable order processing is generally a question of the degree of automation of trading and associated support systems in brokerage firms. The degree of competition in the brokerage industry is also important in giving incentives to intermediaries to improve systems and be able to cope with a wide variety of users. Eliminating entry barriers into intermediation would generally improve the reliability of order processing.

**Fees to Intermediaries** We will distinguish between two components of the costs of intermediation: the fees directly charged which the user observes, and the less visible costs which users suffer in the form of prices which are different from the best prices available on the market.

Intermediation costs are strongly a function of entry barriers in intermediation. With free entry, intermediation costs drop to levels consistent with zero economic profit. However, entry barriers prevent this outcome on most financial markets.

The ‘less visible costs’ are closely related to the way in which the market is organised. The ideal market structure is one characterised by transparency and price–time priority. Transparency refers to the ability of a user to monitor the best buy and sell prices on the market at all times, and verify the price claimed by the intermediary. Price–time priority is a property of markets where every order is assuredly matched against the best price
available in the country, and if two orders exist at the same price then the order which came first is given precedence.

India’s equity market before 1994 suffered from these problems – entry barriers into intermediation, non-transparency and a lack of price–time priority – and hence featured high costs of intermediation. India’s debt and currency markets today suffer from these three problems also.

**Counterparty risk** Most financial markets in existence have significant delays between the time the trade takes place and the time that the trade is completely settled. In this intervening period, the buyer and the seller are exposed to the credit risk of each other. If one leg defaults, the other experiences losses. This is called ‘counterparty risk’. India’s equity market has a long tradition of payments crises which have often halted the market.

The modern approach to coping with counterparty risk is the idea of ‘novation’, where a new credit enhancement institution called the “clearing corporation”, interposes itself into every transaction, buying from one leg and selling to the other. Even if one leg defaults, the clearing corporation fulfills its obligations to the other leg. Through this, the clearing corporation eliminates the risk to each side of bankruptcy of the other.

India’s debt and currency markets are effectively restricted to a small club of banks, and hence feature low counterparty risk. However, this homogeneous club would require risk premia in order to trade with economic agents who are not club members. This serves as an entry barrier in intermediation. Entry into these markets would not be possible without a clearing corporation.

**Initial Margin** The credit enhancement of a clearing corporation is not achieved at zero cost; it requires that both sides pay collateral, called ‘initial margin’, to the clearing corporation. The cost of capital on this initial margin is a part of the cost of liquidity services that they face.

From a policy perspective, the initial margin charged by a clearing corporation should be the minimum level at which adequate safety can be obtained. Mistakes in either direction are common. Margin levels are either too low – which makes the clearing corporation vulnerable – or too high – which imposes excessive transactions costs upon users.

**Back office costs** When users are forced to expend labour and capital into the processing of funds and securities after the trade, these ‘back office costs’ are a component of the transactions costs imposed by the market. Back office costs have traditionally been very high in India’s equity market, owing to the use of physical share certificates, but the advent of the depository has generated dramatic reductions. Back office costs are particularly high in India’s debt market through the lack of netting and a clearing corporation.

**Resolving bad certificates** When markets suffer from stolen or fake certificates, this generates costs for the user. On India’s equity market, this has led to a large scale of criminal activities, with underworld elements involved in counterfeiting and theft of share certificates.
Once electronic settlement is done, at the depository, the probability of encountering bad paper drops to zero.

**Delays in payments** When users are forced to pay in funds early, and receive funds late, they lose the time value of money. These delays derive from India’s slow payments system, and from administrative inefficiencies.

**Transaction Taxes** Transactions taxes serve to reduce market liquidity (i.e., raise transactions costs). There are three forms of transactions taxes in India today: stamp duty, the service tax on brokerage, and the SEBI transaction fee. Of these, stamp duty dominates. Stamp duty has been abolished for trades settled through the depository. It is a major hurdle preventing a liquid debt market. It is particularly onerous on the real estate market.

5  **The political economy of institutional change**

As the preceding discussion implies, transactions costs are greatly influenced by the design of market mechanisms. Radical changes of market mechanisms are often the best way to produce dramatic reductions in transactions costs. However, such reforms have traditionally faced opposition from individuals who possess skills in *existing* market mechanisms. This is partly owing to the common problem that institutional change obsoletes existing human capital and necessitates fresh investments in obtaining skills. In addition, the resistance of market participants to institutional change is most pronounced when a new form of market organisation hurts revenues of intermediaries – e.g. through improved market transparency or through reduced entry barriers into intermediation.

This gives us a paradoxical situation, where many individuals who have excellent knowledge of existing market mechanisms (and their flaws) generally advocate conservatism in policy debates. Through the 1990s, market intermediaries and associations of intermediaries in India have generally advocated incremental change, or no change, to existing market institutions. This problem is seen with stock brokers, in the context of the functioning of stock markets, and banks, on issues of new market mechanisms for the currency and debt markets.

This conservatism of market participants is not peculiar to India; it is observed in every country. The most important new idea in market organisation of the last two decades is computerised order matching, which is also called ‘the open electronic limit order book market’ (Black 1971, Glosten 1994). This is a form of market organisation which has transparency and anonymity, both of which are inimical to market intermediaries who derive rents from non–transparent markets and cartel formation.

Electronic order–matching first appeared in small markets, like Toronto and Mexico, or new markets, like NSE. These successes paved the way for adoption in larger markets, like Paris, Tokyo and London (Domowitz 1990, Melamed & Tamarkin 1996). In November 1997, the London Stock Exchange commenced trading through order matching, and Indian readers of *The Financial Times* witnessed a replay of the debates which took place in India’s equity market in 1993 and 1994. In each situation, the introduction of computerised order matching has en-
countered strong political opposition from existing intermediaries who foresee reduced revenues
when market transparency improves.

6  Institutional change on India’s equity market

The equity market was high on the reforms agenda after the Scam of 1992.

6.1 Problems as of 1992

The problems of the equity market, at the time, may be summarised as follows:

1. As of 1992, the Bombay Stock Exchange (BSE) was a monopoly. It was an association
   of brokers, and imposed entry barriers, which led to elevated costs of intermediation.
   Membership was limited to individuals; limited liability firms could not become brokerage
   firms.

2. Trading took place by ‘open outcry’ on the trading floor, which was inaccessible to users. It
   was routine for brokers to charge the investor a price that was different from that actually
   transacted at. In fact, the normal market practice involved brokers charging users one
   single consolidated price, instead of unbundling the trade price and the brokerage fee.

3. As with all trading floors, there was no price–time priority, so users of the market were not
   assured that a trade was executed at the best possible price.

4. A variety of manipulative practices abounded, so that external users of a market often
   found themselves at the losing end of price movements. The BSE is run by brokers, which
   limits the quality of enforcement which can be undertaken against errant brokers.

5. Floor–based trading, the inefficiencies in clearing and settlement (described ahead), entry
   barriers into brokerage, and the low standards of technology and organisational complexity
   that accompanied the ban upon corporate membership of the BSE led to an environment
   where order execution was unreliable and costly. It was typical for below 50% of orders to
   obtain execution on a given day.

6. Retail investors, and particularly users of the market outside Bombay, accessed market
   liquidity through a chain of intermediaries called “sub–brokers”. Each sub–broker in the
   chain introduced a mark-up in the price, in the absence of the unbundling of professional
   fees from the trade price. It was not uncommon for investors in small towns to face four
   intermediaries before their order reached the BSE floor, and to face mark-ups in excess of
   10% as compared with the actual trade price.

7. The market used ‘futures–style settlement’ with fortnightly settlement. This means that
   trading was supposed to take place for a fortnight until a predetermined ‘expiration date’.
   Open positions on the expiration date only would go into actual settlement, where funds
and securities were exchanged. In practice, there was little discipline on ensuring a reliable fortnightly settlement cycle.

8. A peculiar market practice called *badla* allowed brokers to carry positions across settlement periods. In other words, even open positions at the end of the fortnight did not always have to be settled.

9. The efficiencies of the exchange clearinghouse only applied for the largest 100 stocks. For other stocks, clearing and settlement were done bilaterally, which introduced further inefficiencies and costs.

10. The use of futures–style trading for a fortnight (or more), coupled with *badla*, is fraught with counterparty risk. Normally, collateral (margin) requirements are used to ensure capital adequacy, and reduce the fragility of the clearing system. Primitive notions of margins existed at the BSE on paper, but they were not enforced. A critical feature of the modern approach to clearing is “novation” at a clearing corporation; the BSE has neither a clearing corporation nor novation. The BSE clearinghouse functioned on a best–efforts basis – if shares or funds appeared at one end, they would be delivered to the other; the clearinghouse itself took no interest in measuring and containing counterparty risk.

Small–scale problems of partial or delayed payments took place on every settlement, and major crises, which required closing down the exchange while a compromise was worked out, took place once every two to three years.

A recent and prominent example was seen in April 1995 in the context of shares of the firm ‘M. S. Shoes’, where a default involving a total exposure of Rs.180 million, and losses of around one–fifth of this, led to a payments crisis on the BSE which halted the functioning of the exchange for three days.

11. The final leg of the trade was physical settlement, where share certificates were printed on paper. This was intrinsically vulnerable to theft, counterfeiting, inaccurate signature verification, administrative inefficiencies, and a variety of other malpractice. Involuntary and deliberate delays in settlement could take place both at the BSE and at the firm. Many firms used the power of delaying settlement as a tool to support manipulation of their own stock. The problems were somewhat simpler for investors in Bombay, who could physically visit the BSE broker, the BSE clearinghouse, or the company’s Registrar, and accelerate transfer. For investors outside Bombay, who lacked this recourse and were crippled by the exorbitantly expensive telephone system, delays of six months between purchasing a stock and the transfer of legal title were common. If stock splits, rights issues, or dividend pay-outs took place during this period, it was common for the purchaser to not obtain the benefits.

These problems led to an extremely poorly functioning equity market. From late 1993 onwards, the Indian State embarked on a radical reforms program which completely transformed market institutions (Shah & Thomas 1997). This program consisted of creating four new securities market institutions: the Securities and Exchanges Board of India (SEBI), the National
Stock Exchange (NSE), the National Securities Clearing Corporation (NSCC) and the National Securities Depository (NSDL).³

6.2 SEBI

The Securities and Exchanges Board of India (SEBI) was formed in 1988. It has gradually adopted many important roles in the area of policy formulation, regulation, enforcement and market development. This is in contrast with conditions prior to SEBI, where exchanges underwent little scrutiny or enforcement.

Today, SEBI vets every element of market design in India’s securities markets, it attempts enforcement against problems such as market manipulation and payments crises, and performs oversight of market intermediaries.

In late 1993, SEBI banned badla. This was a major milestone in two respects - this marked the commencement of a major role for SEBI, and it curtailed the market manipulation and systemic risk that accompanied badla. However, these reforms were reversed in 1995 and late 1997 through efforts by SEBI to resuscitate badla.

6.3 NSE

NSE was a new exchange owned by IDBI, UTI and other public sector institutions. NSE is a securities exchange which marks a radical break with the past. The regime in which trading on NSE operates is characterised by four key innovations:

1. The physical floor was replaced by anonymous, computerised order matching with strict price–time priority.

2. The limitations of being in Bombay, and the limitations of India’s public telecom network, were avoided by using satellite communications. Today, NSE is a network of 2,000 satellite terminals at locations all over India. On a typical day, 3,500 traders login to the trading computer over this network. This is larger than the capacity of the largest trading floors in the world.

3. The conflicts of interest, and lack of focus, associated with exchanges run by brokers were eliminated using a new form of exchange organisation: NSE is a limited liability company, and brokers are franchisees. Brokers do not own NSE, hence NSE’s staff is free of pressures from brokers and is better able to perform regulatory and enforcement functions.

4. Traditional practices, of unreliable fortnightly settlement cycle with the escape clause of badla were replaced by a strict weekly settlement cycle without badla.

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³SEBI was created in 1988, but it was from 1993 onwards that it found its voice. NSE was created in 1993, but equities trading at NSE commenced in November 1994. NSCC was created in April 1994 and started performing ‘novation’ from June 1994 onwards. NSDL was inaugurated in November 1996.
Equity trading at NSE commenced in November 1994. The BSE responded rapidly by moving to similar technology in March 1995. The improvements that accompanied this regime–shift may be summarised as follows:

**Transparency** Users could look at a price on a computer screen before placing an order.

**Anonymity** Electronic trading is completely transparent about prices and quantities, and completely opaque about identities. The traditional importance of cartels and market manipulation on India’s equity market greatly diminished owing to the completely anonymous trading environments.

**Competition in the brokerage industry** The rise of NSE led to the entry of 1,000 new brokerage firms. This eliminated the profits that had been sustained at the BSE by restricting entry into the brokerage industry. This led to a sharp reduction in transactions costs through lower brokerage fees.

**Operational Efficiency** Automation eliminated the vagaries of manual trading.

**Gains outside Bombay** Users outside Bombay, who faced many intermediaries on their journey to the BSE floor, benefited even more than users in Bombay. NSE’s satellite–based trading gave equal access to the trading floor from all locations in India, and was a major impetus to financial sector development in cities outside Bombay.

### 6.4 NSCC

On the BSE floor, where trading lacked anonymity, there was a degree of control over counterparty risk that traders on the floor could exercise. If A knew that B was near bankruptcy, he could choose to not trade against B on the floor.

Anonymous trading eliminates cartels and greatly limits market manipulation; however it also eliminates this limited control over counterparty risk that economic agents on the trading floor possess. When anonymous trading began at NSE, it generated an extreme version of counterparty risk.

NSE found a modern solution to this problem: a clearing corporation which does ‘novation’. The National Securities Clearing Corporation (NSCC) becomes the legal counterparty to the net obligations of each brokerage firm. If any firm goes bankrupt, NSCC lives up to its obligations to the other side. This eliminates counterparty risk and the possibility of payments crises.

The clearing corporation effectively supplies credit guarantees to all brokerage firms. It needs to ensure that its integrity is not violated when one or more brokerage firms fail. For this, clearing corporations need to evolve a sophisticated ‘risk containment’ framework, involving collateral and intra–day monitoring. NSCC has a flawless record of reliable settlement schedules from inception, i.e. from early 1996 onwards. It marks an important milestone in the institutional development of India’s financial system.
6.5 NSDL

The final leg of a transaction is where the title on a security is changed from the seller to the buyer. Procedures in India, which used share certificates printed on paper, were fraught with operational costs and risk. Many criminal activities were based on the theft or counterfeiting of share certificates. In one episode, the problems in settlement on the equity market had macro-economic consequences: in late 1993, FII inflows into India were significantly hampered by the inability of certificate–processing systems in India to cope with the inflows of funds.

In November 1996, the National Securities Depository Ltd. (NSDL) came into being. The depository maintains a computer record of ownership of securities, and dispenses with physical share certificates. This eliminates the potential for crime, and sharply cuts down the operational costs associated with physical share certificates. In 1997 and 1998, SEBI strongly supported the adoption of the depository by making it mandatory for institutional investors to settle through the depository for a stated set of stocks; this set has enlarged over time. As of the time of writing, two years after NSDL commenced operations, 52% of the settlements taking place on NSE use NSDL. For the most important stocks in the country (members of the NSE-50 index), over 85% of the settlements taking place on NSE go through NSDL.

Hence, the equity market has completed more than half of the problem of migrating to ‘de-materialised’ (or ‘demat’) settlement. It is likely that the complete transition, to an environment where all settlements are done electronically, will be accomplished by late 1999.

6.6 Impact of reforms

India’s equity market has been transformed owing to the reforms of 1994–98. These reforms have transformed market practices, sharply lowered transactions costs, and improved market efficiency. In no other part of India’s financial sector has such a radical reforms agenda been executed, in such a short time.

It is interesting to observe that the direction adopted on the equity market in India was not one that would follow from a mechanical adoption of market practice in OECD countries. This is in contrast with commonly held positions in India, particularly on the debt and currency markets. The equity market in the United States, for example, relies on floor-based trading (as opposed to electronic trading used in India). It relies on a market controlled by a closed club of intermediaries (as opposed to free entry into intermediation in India, with the exchange being outside the control of intermediaries). Similarly, many key ideas and techniques used in NSCC (value at risk) and NSDL (dematerialisation) are not found in securities market institutions of many OECD countries, where market designs came about many decades ago, prior to modern financial economics and computer technology.

Institutional development lies at the essence of these reforms, and along with a host of new market practices, four new institutions have arisen over this period: SEBI, NSE, NSCC and NSDL. Three of these – NSE, the clearing corporation and the depository – were born in a remarkable two–year period from November 1994 to November 1996.

We can summarise these changes in two ways. The first consists of asking how elements of market design have changed. This is shown in Table 1. Improved ideas in market design should
Table 1 Elements of market design on India’s equity market: 1994 and 1998

Eight elements of market design, derived from Shah (1998).

<table>
<thead>
<tr>
<th>Feature</th>
<th>1994</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Product standardisation</td>
<td>Adequate standardisation</td>
<td>Unchanged</td>
</tr>
<tr>
<td>2. Aggregation and revelation of order flow</td>
<td>Fragmented market through</td>
<td>Order flow observed on nationwide exchange(s). Fragmentation across exchanges and phone market persists, to a smaller extent.</td>
</tr>
<tr>
<td></td>
<td>geographical distance and through phone market. Order flow unobserved.</td>
<td></td>
</tr>
<tr>
<td>4. Anonymity</td>
<td>Absent</td>
<td>Complete</td>
</tr>
<tr>
<td>5. Counterparty risk</td>
<td>Present</td>
<td>Absent on NSE</td>
</tr>
<tr>
<td>6. Settlement</td>
<td>Purely paper</td>
<td>Partly through depository</td>
</tr>
<tr>
<td>7. Enforcement / prosecution</td>
<td>Very poor</td>
<td>Poor</td>
</tr>
<tr>
<td>8. Futures trading</td>
<td>Absent</td>
<td>Unchanged</td>
</tr>
</tbody>
</table>

generate lower transactions costs. This is shown at two levels – Table 2 uses the qualitative classification used in Section 4 above, and Table 3 tries to estimate the transactions costs, as percent of price, faced by retail investors.

We see dramatic gains as compared to the situation as of 1994. For users of physical paper, transactions costs have halved; for those who have started using NSDL, transactions costs have come down to one–tenth of previous levels. For users of NSDL, transactions costs on India’s equity market are now comparable to those seen on the best markets overseas. This is a remarkable accomplishment, especially considering that these reforms began as recently as 1994; within the intervening four years, the introduction of NSE, NSCC and NSDL has dropped transactions costs by a factor of ten, to levels comparable with the best practices observed internationally. The BSE has harnessed similar gains through the introduction of electronic trading and connectivity to NSDL; however BSE continues to suffer from counterparty risk owing to the lack of novation at a clearing corporation, and poor design and enforcement of the risk containment system.

If progress has been made on the issues of Section 3 – i.e. lowering transactions costs – then have these had an impact on the issues of Section 2, i.e. the ability of securities markets to process information, and to form securities prices which accurately reflect forecasts of future risk and return associated with a security?

It is easiest to obtain evidence about these changes upon the BSE, since data from the pre–reforms period is also observed there (Shah & Thomas 1996). Gains in liquidity do seem to have gone along with gains in market efficiency. In the post-reforms period, the time–series of
Table 2 Qualitative view of liquidity on India’s equity market: 1994 and 1998

An approximate depiction of India’s equity market in terms of twelve components (Shah & Thomas 1999). The terms used in this table are approximate. They reflect both a comparison between the transactions costs seen on these markets, and a comparison of how different these transactions costs are as compared to what they could be given improved market mechanisms. The values for 1998 assume the use of the depository and the clearing corporation.

<table>
<thead>
<tr>
<th>Component</th>
<th>1994</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trading</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denial of Access</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Market Down-time</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Fees to Intermediaries</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Unreliable order processing</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Market Inefficiencies</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Market Impact Cost</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Clearing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counterparty Risk</td>
<td>High</td>
<td>0</td>
</tr>
<tr>
<td>Initial Margin</td>
<td>0</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Settlement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back office costs</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Bad certificates</td>
<td>High</td>
<td>0</td>
</tr>
<tr>
<td>Delays in payment</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Transaction Taxes</td>
<td>Moderate</td>
<td>0</td>
</tr>
</tbody>
</table>
An attempt at quantifying transactions costs faced by retail investors (i.e. with small delivery–oriented transactions). It is assumed that trades are done on NSE, using the clearing corporation, which leads to an elimination of counterparty risk; however, all other exchanges in India continue to exhibit counterparty risk. Similarly, NSE is the most liquid exchange, so the market impact cost is lowest here, but trades done on other exchanges would suffer higher market impact cost. For comparison, the best values observed internationally are included. All values are in percent, for a one–way transaction. For example, total transactions costs of around 0.6% today mean that in order to buy shares worth Rs.100, the user must spend around Rs.100.6.

<table>
<thead>
<tr>
<th>Component</th>
<th>India</th>
<th>Best in the world</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1994</td>
<td>Today</td>
</tr>
<tr>
<td></td>
<td>Physical</td>
<td>Demat</td>
</tr>
<tr>
<td><strong>Trading</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fees to intermediaries</td>
<td>3.00</td>
<td>0.50</td>
</tr>
<tr>
<td>Market impact cost</td>
<td>0.75</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Clearing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counterparty risk</td>
<td>Present</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Settlement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paperwork</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>Bad paper risk</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>Stamp duty</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>&gt; 5.25</td>
<td>2.25</td>
</tr>
</tbody>
</table>
stock returns exhibits statistical properties which are more consonant with market efficiency as compared with the pre–reforms period. This picture – of improvement in market efficiency at BSE – understates the gains obtained in market efficiency in India, since the major market in the country is now NSE, while these comparisons have been done against the post–reforms BSE.

Improvements in the securities markets, along with reforms on the primary market and capital account convertibility for foreign investors, have significantly altered the capital structure choices of Indian firms. In 1993–94 and 1994-95, firms significantly reduced their leverage through primary market issues of equity. The debt–equity ratio of the corporate sector as a whole dropped from 2.04 in 1991–92 to 1.3 in 1994–95.

Finally, in Table 4, we offers some evidence about the information processing by the equity market. The P/E ratio (market capitalisation upon net profit) is a valuation measure which reveals expectations of the stock market. Firms which are awarded high P/E ratios by the market should be firms which have low risk and high expected growth. Table 4 shows the extent to which portfolios formed by sorting on P/E prove to have differential net profit growth in the future. These results suggest that information processing was poor in the early years through a combination of (a) weak institutions, (b) the Scam of 1992 and (c) the policy surprises associated with the liberalisation of the early 1990s. In recent years, the ‘forecast accuracy’ of the market’s P/E has improved considerably: this partly reflects a more stable policy environment and institutional development on the equity market. These results also show that P/E ratios forecast net profit growth as much as five years in the future.

7 Institutional change on India’s debt market

7.1 Problems as of 1992

The problems of the debt market, as of 1992, may be summarised as follows:

1. In 1992, debt trading took place without an exchange in the picture. Trades were bilaterally struck between known counterparties without anonymity. This form of trading suffered from the problems of OTC contracting. Personal and political influences impacted upon trade prices; each leg of the transaction was exposed to the credit risk of the other; there was no price–time priority to ensure that each trade took place at the best price in the country. Dealer markets suffer from a fragmentation of orders and trades; information about trades and trading intentions is not publicly visible. There is no sense in which a market–wide best–buy and best–sell price could be publicly observed.

2. The problem of credit risk served to narrow the market down to a “club market”, a set of participants with homogeneous credit risk.

3. The lack of anonymity made it easier to form and enforce cartels. The Indian debt market is small when compared with the size of the largest five banks and a variety of manipulative cartels operated from time to time. Dealer markets are vulnerable to problems with cartels; the dealer market intrinsically involves a small number of entities, and once a few large
Table 4 Rank correlations between P/E and future profit growth at the level of twenty portfolios sorted by P/E

All stocks are sorted by P/E (of 31st March of the year) and twenty portfolios are formed. The P/E and future net profit growth of each portfolio is calculated, and Spearman’s rank correlation is used to measure the association.

<table>
<thead>
<tr>
<th>P/E in year</th>
<th>Forecasting net profit growth upto year</th>
<th>Spearman rank correlation</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>One–year out forecasts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>1990–91</td>
<td>0.3624</td>
<td>1.58</td>
</tr>
<tr>
<td>1991</td>
<td>1991–92</td>
<td>0.1248</td>
<td>0.54</td>
</tr>
<tr>
<td>1992</td>
<td>1992–93</td>
<td>0.4271</td>
<td>1.86</td>
</tr>
<tr>
<td>1993</td>
<td>1993–94</td>
<td>0.1820</td>
<td>0.79</td>
</tr>
<tr>
<td>1994</td>
<td>1994–95</td>
<td>0.3594</td>
<td>1.57</td>
</tr>
<tr>
<td>1995</td>
<td>1995–96</td>
<td>0.8211</td>
<td>3.58</td>
</tr>
<tr>
<td>1996</td>
<td>1996–97</td>
<td>0.7173</td>
<td>3.13</td>
</tr>
<tr>
<td>1997</td>
<td>1997–98</td>
<td>0.6797</td>
<td>2.96</td>
</tr>
<tr>
<td><strong>Two–year out forecasts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>1991–92</td>
<td>0.0541</td>
<td>0.24</td>
</tr>
<tr>
<td>1991</td>
<td>1992–93</td>
<td>-0.1068</td>
<td>-0.47</td>
</tr>
<tr>
<td>1992</td>
<td>1993–94</td>
<td>0.3789</td>
<td>1.65</td>
</tr>
<tr>
<td>1993</td>
<td>1994–95</td>
<td>0.5128</td>
<td>2.24</td>
</tr>
<tr>
<td>1994</td>
<td>1995–96</td>
<td>0.5128</td>
<td>2.24</td>
</tr>
<tr>
<td>1995</td>
<td>1996–97</td>
<td>0.6677</td>
<td>2.91</td>
</tr>
<tr>
<td>1996</td>
<td>1997–98</td>
<td>0.7549</td>
<td>3.29</td>
</tr>
<tr>
<td><strong>Five–year out forecasts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>1994–95</td>
<td>-0.0617</td>
<td>-0.27</td>
</tr>
<tr>
<td>1991</td>
<td>1995–96</td>
<td>0.4932</td>
<td>2.15</td>
</tr>
<tr>
<td>1992</td>
<td>1996–97</td>
<td>0.4586</td>
<td>2.00</td>
</tr>
<tr>
<td>1993</td>
<td>1997–98</td>
<td>0.6406</td>
<td>2.79</td>
</tr>
</tbody>
</table>
dealers agree to form a cartel, the public observability of their actions makes it harder for a cartel member to fink.

4. As with the BSE of 1992, the debt market relied on dealers rather than brokers. Every trade was structured as a dealer buying or selling in a principal capacity. As with the BSE, dealers did not unbundle their intermediation fees from the transaction price. Economic agents who traded against a dealer were unable to shop around looking for a dealer with the lowest intermediation charges. Economic agents who traded through any dealer had no guarantee of obtaining the best price, owing to the absence of price–time priority.

5. Trading took place by telephone in Bombay. Hence, the debt market was effectively restricted to Bombay. This is similar to the BSE floor, which effectively restricted market access to Bombay.

6. Since trades took place bilaterally, trade prices were not centrally reported and observed, even ex–post.

7. There were serious problems with settlement of trades. The Reserve Bank tracks ownership of government securities in a database called the SGL. All trades must be reported to the RBI, which records the change in title from the seller to the buyer. SGL was maintained manually.

8. Market participants faced the risk of an SGL request “bouncing”. Suppose $A$ sold to $B$ and then $B$ sold to $C$. When $B$ sent the change of title to SGL, there was a risk that this request would bounce if the first trade ($B$ buying from $A$) had not yet taken effect. Hence market participants took to exchanging “bankers receipts (BRs)” which were IOUs for bonds. When $B$ sold to $C$, all that $C$ got was an IOU where $B$ promised to deliver bonds at some later date. This would translate into actual SGL entries after the $A \rightarrow B$ trade took effect. In practice, given the freewheeling nature of the market, it was only a matter of time before IOUs were issued on IOUs, and photocopies of bonds and IOUs were used as a basis for further IOUs. Dubious forms of netting took place as practitioners tried to reduce the complexities of settling trades, and innovated in finding new ways to abuse the system.

   The purchase and sale of these IOUs effectively constituted highly leveraged transactions in the absence of internal controls and risk management.

9. The protracted delays involved in settlement, coupled with the ‘open interest’ in the form of outstanding IOUs, led to grave reconciliation problems in the back offices of banks. These were particularly pronounced owing to the lack of modern computerised procedures in the back offices. Many major banks, including foreign banks, did not have a clear idea of what their positions were when investigations took place after the Scam.

10. This confusion about settlement procedures spilled over into fund movements as well. Suppose a bank “bought bonds” from $X$ by paying money and obtaining an IOU. Suppose
X later bought back this IOU by paying money. Over this set of transactions, the bank effectively gave a loan to X. The terms of this loan could be almost anything, negotiated between X and the dealer working at the bank. The complexity of reconciliation coupled with the inefficiency of the back office made it easy for dealers to disguise soft loans to favoured counterparties, implemented in this fashion, from their superiors.

This was the mechanics of how funds from the banking system found their way into badla financing on the BSE; they were short–term loans that were profitable for X as long as the stock market went up. Given the extreme leverage that was possible using badla, fairly modest sums of money could generate a significant impact upon stock prices. In this sense, the “stock market scam of 1992” should better be termed the “debt and stock market scam of 1992”.

These problems were present from the middle 1980s onwards. However, the increase in transaction volume in the early 1990s, and the euphoria on the stock market following the liberalisation of 1991, were the triggers which converted these systemic problems into a crisis. Most systemic crises in the financial sector are rooted in uncontrolled leverage; the Scam of 1992 can be attributed to a two–stage leverage – one stage at the inter–bank debt market (using IOUs) and another on the stock market (using badla).

7.2 Innovations in market design after the Scam

Three major reforms took place after the Scam:

**Improvements to SGL** The RBI moved to computerise the SGL and implement a form of a ‘delivery versus payment’ system.

**Enforcement of a “trade for trade” regime** The RBI setup a strong regulatory system which required that every trade must settle with funds and bonds; IOUs and netting were prohibited.

**Trade reporting at NSE** A limited degree of transparency came about through the Wholesale Debt Market (WDM) at NSE, where roughly half the trading volume of India’s debt market is reported. WDM is not a ‘liquid market’ where trades can be executed. Yet, it marks a step forward insofar as it produces reveals useful data about prices and traded quantities intra–day.

These reforms have served to close the windows through which the pervasive failures of clearing and settlement generated the Scam of 1992. Today, SGL works much more effectively as compared with 1992. IOUs and uncontrolled leverage are completely absent. In this sense, one objective, of preventing the recurrence of the Scam of 1992, has clearly been met.

However, these reforms did not address the core problem of the debt market, the reliance on distributed dealers interacting by telephone in Bombay. This problem, and the “trade for trade” regime, which forbids all forms of netting, is a major hindrance to obtaining market liquidity.
Table 5 Elements of market design on India’s debt market: 1994 and 1998

Eight elements of market design, derived from Shah (1998).

<table>
<thead>
<tr>
<th>Feature</th>
<th>1994</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Product standardisation</td>
<td>Adequate standardisation</td>
<td>Unchanged</td>
</tr>
<tr>
<td>2. Aggregation and revelation of order flow</td>
<td>Fragmented market through geographical distance and through phone market. Order flow unobserved.</td>
<td>Unchanged</td>
</tr>
<tr>
<td>3. Intermediaries</td>
<td>Broker / dealers, fraught with agency problems. Oligopolistic pricing.</td>
<td>Unchanged</td>
</tr>
<tr>
<td>4. Anonymity</td>
<td>Absent</td>
<td>Unchanged</td>
</tr>
<tr>
<td>5. Counterparty risk</td>
<td>Present</td>
<td>Unchanged</td>
</tr>
<tr>
<td>6. Settlement</td>
<td>Purely paper</td>
<td>Purely through depository</td>
</tr>
<tr>
<td>7. Enforcement / prosecution</td>
<td>Poor</td>
<td>Improved</td>
</tr>
<tr>
<td>8. Futures trading</td>
<td>Absent</td>
<td>Unchanged</td>
</tr>
</tbody>
</table>

7.3 Impact of reforms

We can summarise the changes which took place in two ways. The first consists of asking how elements of market design have changed. This is shown in Table 5. Improved ideas in market design should generate lower transactions costs. This is shown qualitatively in Table 6 using the qualitative classification used in Section 4 above.

As a consequence of the reforms, India’s debt market is much less vulnerable to systemic crises. However, the reforms have failed to obtain a liquid, efficient bond market. We can easily contrast the modest changes seen in Table 5 against the major changes which took place on the equity market (Table 1). Similarly, the altered transactions costs seen on the equity market (Table 2) are in sharp contrast with the modest changes seen in Table 6.

The central question faced in policy formulation connected with the bond market, today, is about how the market design can be altered so as to obtain a liquid, efficient bond market. We return to this problem in Section 8.2.

8 Problems faced today, and the agenda for reforms

From this conceptual and historical perspective, as we look forward from late 1998, what are the most important issues in the agenda for public policy?

4Also see http://www.igidr.ac.in/~ajayshah for many related issues.
Table 6 Qualitative view of liquidity on India’s debt market: 1994 and 1998

An approximate depiction of India’s debt market in terms of twelve components (Shah & Thomas 1999). The terms used in this table are approximate. They reflect both a comparison between the transactions costs seen on these markets, and a comparison of how different these transactions costs are as compared to what they could be given improved market mechanisms.

<table>
<thead>
<tr>
<th>Component</th>
<th>1994</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trading</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denial of Access</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Market Down-time</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Fees to Intermediaries</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Unreliable order processing</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Market Inefficiencies</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Market Impact Cost</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Clearing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counterparty Risk</td>
<td>High</td>
<td>Reduced</td>
</tr>
<tr>
<td>Initial Margin</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Settlement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back office costs</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Bad certificates</td>
<td>High</td>
<td>0</td>
</tr>
<tr>
<td>Delays in payment</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Transaction Taxes</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
8.1 Transition to rolling settlement on the equity market

NSE took a major step when it moved from the unreliable fortnightly settlement cycle, historically prevalent in India, to a reliable weekly settlement cycle. Today, the BSE also uses a reliable weekly settlement cycle, albeit with *badla*.

These market practices are all instances of ‘futures–style settlement’. This suffers from two kinds of blemishes - the ‘spot market’ prices behave like futures prices, and the regulatory problems that are normally observed on futures markets show up on the cash market. A futures market requires a different regulatory framework. Indeed many of the problems that have been observed on India’s equity market are problems commonly seen on futures markets, and many of the solutions adopted in recent years are inspired by futures markets.

The international standard for the spot market consists of using ‘rolling settlement’ instead of futures–style settlement. The Group of 30 has recommended that rolling settlement should replace futures–style settlement. Every major market, other than France, uses rolling settlement on the cash market. Futures–style settlement involves netting of positions through the settlement period (which is Wednesday to Tuesday in the case of NSE) and settlement of open positions a few days later (five days in the case of NSE). Rolling settlement allows netting only within the day; all open positions at the end of the day have to settle. A few days later (five days in the case of NSE), settlement takes place. This is called T+5 rolling settlement, to convey the idea that settlement takes place five days after ’T’, the date on which trading took place.

Ideally, India’s cash market should be based on four principles:

1. Electronic trading with complete anonymity,
2. Novation at the clearing corporation,
3. All settlement through the depository,
4. Rolling settlement.

The first objective listed here has already been fully met. Novation at the clearing corporation is taking place on the largest market (NSE) though not at other exchanges. The process of depository adoption is half complete. The missing link, today, is rolling settlement.

How would the transition to rolling settlement be achieved? It is common to point to four elements which pave the way for rolling settlement:

- **Depository adoption.** As mentioned in Section 6.5, depository adoption right now is half complete if we look at the overall equity market. However, there is an important subset of stocks (members of the NSE-50 index) where over 85% of settlements are taking place through NSDL. For these stocks, this first requirement has been met.

- **Loans against shares.** RBI has been increasingly liberal in terms of policies about loans against shares, so the second condition is increasingly being met.
• **Stock lending.** SEBI’s stock-lending scheme has been in place for over a year, but only a handful of stock-lending transactions have taken place. Several intermediaries (including SHCIL, Deutsche Bank, Reliance Capital and NSCC) have been working towards building viable stocklending facilities. When these are in place, the third condition will be met.

• **Equity derivatives.** It is now likely that trading in index futures will commence from January 1999. When this happens, the fourth condition will be met.

The outlook in each of these areas is hence promising. It is now useful to discuss the modalities of transition to rolling settlement. SEBI should draw upon the success story of its intervention in the context of adoption of the depository to formulate a similar strategy for rolling settlement. Currently, SEBI chooses a date $T$ for each stock when it goes into a restricted list where institutions cannot settle using physical certificates. Additionally, a requirement should be placed that six months after $T$, that stock should only be traded using rolling settlement in the country; that futures–style settlement should be disallowed from this point onwards.

A hundred stocks – the securities which make up the NSE-50 and Nifty Junior market indexes – account for over 95% of the trading volume in India. It is quite practical to see an ideal regime operating for these hundred stocks by middle 1999, embodying electronic trading, with novation at the clearing corporation and rolling settlement through the depository.

### 8.2 New approaches towards market design on the debt market

#### 8.2.1 Settlement procedures

Today, RBI requires that every trade on the debt market should settle, and this settlement takes between one to five days. Existing procedures for moving funds and securities are highly cumbersome. The back office of the largest bank is unable to process more than a hundred trades a day; this is in sharp contrast with the equity market where the smallest of NSE brokers process in excess of a thousand trades a day. The essential feature which generates this difference in transactions costs is the use of netting at the clearing corporation on the equity market, as a way to dramatically simplify settlement. The trade for trade regime, by forbidding netting, yields these enhanced transactions costs.

In the context of the equity market, the discussion above focused on the migration to a spot market based on T+5 rolling settlement, with depository settlement, as a short–run objective for reforms on the equity market. In debt markets, internationally, this process has gone into its logical destination in the form of “real–time gross settlement” (RTGS) systems. RTGS is the ideal form of a spot market, where complete settlement is attempted a few seconds after the trade is struck. RTGS requires infrastructure for real–time movement of funds and securities.

It is interesting to observe that rolling settlement involves intra–day netting while RTGS involves no netting. In this sense, RTGS can be viewed as an implementation of RBI’s existing trade–for–trade regime where the time elapsed between trade and settlement is shrunk to a few seconds.

Both alternatives – either rolling settlement with intra–day netting or RTGS – could possibly yield a liquid, efficient market given modern trading procedures. Both alternatives would work
much better than the existing trade–for–trade regime. RTGS makes greater demands in terms of widely accessible infrastructure for instant movement of funds and securities.

However, there is a strong sense in which either procedure would fail to solve the problems of illiquidity and market inefficiencies on the debt market if the basic problems in trading are not resolved. We now turn to these problems.

8.2.2 Trading procedures

Earlier, we have seen how the core failures of the trading process seen in Section 7.1 have not yet been addressed. The debt market would obtain major gains in liquidity and market efficiency if four key principles governed trading: (a) anonymity, (b) price–time priority, (c) nation–wide market, and (d) free entry into intermediation.

Anonymity eliminates personal or political influences upon price formation; it focuses the information processing of market participants upon prices and quantities. Cartel enforcement would become essentially impossible under anonymity.

Price–time priority consists of establishing market infrastructure which ensures that every order in the country is assured the best price. This would immediately emphasise the agency function of an intermediary. When an economic agent approaches an intermediary in order to execute a trade, the execution price would be the same regardless of which intermediary is chosen. The market would possess liquidity, and the intermediary would merely be a way of obtaining access to this liquidity. Intermediaries would unbundle their intermediation charges, and competitive pressures would start operating upon these fees.

A single nation–wide market – as opposed to a club market operating by telephone in Bombay – would harness orders from all over the country. The pooling of these orders would generate enhanced liquidity. Conversely, a nation–wide market would carry the benefits of a liquid debt market to locations all over the country. The experience of the NSE has shown that India’s financial sector is not located in Bombay – prior to NSE, 85% of equity trading took place in Bombay, but today only 35% of NSE’s trading volume originates from Bombay.\(^5\)

Finally, free entry into intermediation would shrink intermediation costs. Free entry into intermediation blends very well with a market that works with anonymity and price–time priority; incumbent intermediaries need not know or accept a new intermediary into their club in order to trade against him on an anonymous trading screen. However, free entry into intermediation does raise concerns about credit risk, which can be addressed using novation at the clearing corporation. Similarly, an RTGS system could implicitly throw up entry barriers into intermediation if RTGS requires forms of connectivity into infrastructure for funds transfer which only a few intermediaries have access to.

Reshaping the debt market around these four principles would imply institutional change which would be comparable with the experience of the equity market from 1994 to 1996. It is likely that these changes would yield a much more liquid and efficient market.

\(^5\)Ever since the early 1970s, retail investors have owned shares but not government securities, and SGL does not interface with retail investors. However, once SGL is linked to NSDL, the same procedures and distribution channels used nationwide by NSDL to account for half the settlement volume on the (highly retail) equity market become accessible to the debt market.
8.3 Exchange–traded derivatives on equity and debt

Financial derivatives are tools through which risk exposures of economic agents can be rapidly altered at minimal transactions costs (Shah 1997). The enhanced price volatility in the liberalised economic environment, coupled with the manifest advantages of markets where risk could be transferred among economic agents in the economy, has inspired many independent initiatives aiming to create derivatives markets in the country. In the equity, currency, debt and commodity markets, a variety of progress has been made towards the creation of markets for derivatives instruments, such as futures and options (Thomas 1998).

In addition to its allocative functions, the financial system can enable welfare–improvement through the reallocation of risk. Derivatives markets are a highly effective way through which this risk transfer can be achieved.

From the perspective of market efficiency, and the ability of the financial system to process information and formulate forecasts of risk and return, derivatives play a role in two ways. Derivatives trading generally tends to reduce transactions costs on the underlying cash market. Specifically, derivatives trading is an instrument through which market impact cost in Table 3 could become smaller. In addition, access to derivatives improves the profits from speculative activities; this leads to enhanced levels of investment in the economy into information production and information processing. Internationally, the onset of derivatives trading has been accompanied by enhanced levels of market efficiency.

In this section, we describe the role of derivatives in the modern economy, outline the building blocks required to build a derivatives exchange, and discuss some policy issues about derivatives markets in India.

8.3.1 The Role for Derivatives

Risk owing to price volatility is pervasive in the modern market economy. Drawing upon Mason (1995), we can employ a functional classification of the three major ‘technologies’ which the financial system offers for the reduction of risk:

**Diversification** reduces risk through combining less than perfectly correlated assets.

**Insurance** refers to securities or contracts which limit risk in exchange for the payment of a premium.

**Hedging** refers to offsetting a risk exposure using a financial transaction.

Financial derivatives, such as futures and options, can be used for hedging and insurance, and hence help economic agents obtain better control over the risks that they encounter.

8.3.2 Components of a Derivatives Exchange

A derivatives exchange is made up of four components: the definition of a traded product, a trading mechanism, a clearing facility, and settlement procedures.
1. **Product**

   Derivatives exchanges trade completely standardised products. The exchange defines the traded product, and traders have no flexibility in altering the terms. An example of such a product could be a futures contract on an index, or options on a security, or options on coffee, etc. All aspects of the traded contract would need to be specified, including the expiration date, date of making delivery, the exact specification of the grade and quantity of the goods which will be delivered, etc. India’s experience in this area is described in Chauhan (1997) and Thomas (1997).

2. **Trading**

   A derivatives exchange needs a trading system. The modern consensus in the securities industry is that liquidity is maximised using the open electronic limit order book market, where trading takes place in anonymity, where individuals all across the country have equal access to the trading floor, and prices and liquidity are transparent.

3. **Clearing**

   Trading on a derivatives exchange takes place anonymously; the buyer does not know the identity of the seller, and vice versa. This would only be feasible if credit risk were eliminated. This is done through novation at the clearing corporation.

4. **Settlement**

   Derivatives can involve the exchange of funds and goods. For example, the holder of an option to buy coffee might choose to exercise the option, delivering funds and taking delivery of coffee. The derivatives exchange needs to establish smooth procedures for settlement.

### 8.3.3 Is India ready for derivatives?

As we approach the date when trading in exchange–traded derivatives commences, many observers are apprehensive about the potential for fraud, bankruptcy, or crises emanating from this market. Hence, the question “Are we ready for derivatives” is often voiced.

The main effort towards building exchange–traded derivatives in India is that of NSE (Chauhan 1998). NSE’s developmental effort towards starting derivatives trading, i.e. the four elements listed above, was completed in December 1996. After this, the onset of trading has been held up by regulatory and legal problems. SEBI’s L. C. Gupta Committee, which was constituted to draft a policy framework for exchange traded derivatives in November 1996, submitted its report in February 1998 (Gupta 1998).

Some observers have advocated caution in the introduction of equity derivatives on the grounds that these are “highly leveraged instruments”. However, given the use of futures–style settlement on the spot market for equity, a greater extent of leverage is already present on India’s spot market for equity. The danger of a payments crisis on NSE’s proposed index futures market is lower than that on the spot market on either NSE or BSE, which are presently the centres of highly leveraged trading in India. It is only when India’s equity market moves into rolling settlement that we will see greater leverage on the index futures market as compared with the cash market. In addition, India’s cash market for equity is fraught with risk owing to the use of
physical certificates, where forgery and theft is common. The index futures market will be less risky in this dimension insofar as cash settlement is used.

Another source of concern is market manipulation. Index-based derivatives are intrinsically safer than the trading on the cash market, since it is much harder for manipulators to distort the level of an index as compared with the difficulties presently observed with illiquid securities on the cash market.

In summary, it appears that the risks with respect to clearing and market manipulation that derive from trading in index derivatives are lower than the risks presently observed with futures-style settlement on the cash market.

8.3.4 Areas where useful derivatives markets could come about

The treatment above has emphasised derivatives based on the equity index, for three reasons: (a) this is one area where conditions are ripe for the onset of exchange-traded derivatives in India, (b) NSE and SEBI have developed the institutional mechanisms required to make this possible, and (c) in the near future, there is little doubt that stock index futures and options will commence trading.

In one area, that of currency risk, a large derivative market already exists in India in the form of the dollar-rupee forward market. Here, the migration from OTC contracting to an anonymous exchange environment (in the form of a dollar-rupee futures market) would yield improvements in liquidity and market efficiency.

There are several other areas where exchange-traded derivatives are similarly quite feasible, though much less progress has been made in terms of establishing the institutional framework and obtaining the regulatory approvals. These include futures and options on short-dated interest rates, and on a variety of commodities such as cotton, sugar, rice and wheat. In each of these areas, the onset of derivatives trading will give economic agents tools to alter their risk exposure when desired, and generate improvements in market quality (enhanced liquidity and market efficiency) on the underlying cash market.

9 Conclusion

The East Asian crisis has led to heightened interest in the financial sector, and in the role of the State in a better functioning financial system. This article has documented a remarkable episode, from 1993 to 1996, when State interventions had a profound impact upon market quality on India’s equity market. Over this period, SEBI rose from dormancy, and three new securities market institutions were created – NSE, NSCC and NSDL. These changes have taken place over an extremely short time-period.

On the subject of the equity market, the two central questions in the reforms agenda concern the initiation and expansion of exchange-traded derivatives, and a complete transition to rolling settlement. It is possible to obtain major progress on these problems within the coming year.

Going beyond the equity market, the principles of market design and the institutional arrangements which have proved successful on the equity market can be fruitfully applied in three
other areas: the market for government debt, the currency market, and commodity markets. These three areas presently feature primitive market institutions, as compared with the technological and institutional sophistication now visible on the equity market. The use of anonymous, electronic exchanges, with novation at the clearing corporation, is likely to yield major gains in market efficiency in these three areas as well.

References


Shah, A. & Thomas, S. (1996), How automation and competition have changed the BSE, Technical report, Centre for Monitoring Indian Economy.


