How the financial sector in India was reformed

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Contents

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The role of the State, and that of public policy, in the development of the financial sector is much debated. There is a considerable consensus about the role of the State in producing the public goods of financial regulation. Beyond that, whether the State can play a role in shaping the design of markets, or to what extent the State should do so, is questionable.

There appears to be a contradiction in having the State play a role in developing a competitive market system that enables efficient capital allocation and risk sharing. But financial market systems in developed and emerging markets have been known to be vulnerable to capture by vested interests (Rajan and Zingales, 2003). Inefficient ways of organising markets, such as floor trading or telephone markets, are associated with rents captured by the insiders who dominate those markets. Thus there does appear to be a role for intervention from the State to help financial market systems move towards a competitive outcome with a lack of entry barriers and an absence of rents accruing to participants with concentrated market power.

Of course, these problems can also be induced by malfunctioning state intervention. India is a very interesting case study which helps us understand both the impact of State guided financial sector development, with stories of success as well as failure.

1 Background: State-dominated finance

The Indian financial system remained a relatively free but unsophisticated market system upto the seventies. This included a private banking sector, fragmented but active stock markets, active commodity spot and futures markets. The first milestone of India's socialism was in the 1950s with the closing of the capital account. More changes came in the 1960s and 1970s, with the nationalisation of financial service providers. This changed the structure of the financial services industry from a fairly competitive sector to one dominated by large public sector monopolies.

The main target of the nationalisation drive was the banking sector. Interest rates for a broad range of transactions were set by the central bank. The central bank shifted focus to an elaborate system of price and quantity controls on finance.

The State developed monolithic finance companies that were monopolies in providing a wide range of financial services. This included "development financial institutions" (IDBI, ICICI, IFCI), insurance (LIC, GIC) and fund management (EPFO for pensions, UTI for mutual funds). These public sector organisations had rigid investment guidelines that were dictated by the State and effectively enabled the State to appropriate resources.

This period also saw the closure of commodity derivatives markets. This took place in the latter part of the 1960s, when these markets saw a large number of trader defaults during a period of three consecutive drought years.

At the end of the seventies, the equity market was the only component of Indian finance

that retained a relatively private sector character. Even here, the State is believed to have used UTI, the only mutual fund in the country, to influence stock prices. Also, while secondary market price discovery was relatively free, the Controller of Capital Issues (CCI) dictated whether, and at what price, firms could sell shares to the public.

The global financial system, which could have acted as a competitive check on the flaws in domestic financial sector policy, had no role to play. Capital controls ensured that India's households and India's firms had no choice but to go through India's financial system.

By the late 1980s, the following were key weaknesses in Indian finance:

- Most banks were state-owned and had negligible equity capital. Basic concepts of accounting, asset classification, and provisioning were absent.
- Banks, pension funds and insurance companies were forced to purchase government bonds as their primary investments.
- The largest of the local stock exchanges, Bombay Stock Exchange (BSE), was a closed market. The exchange focussed on the interests of broker members, did not have outreach across the country, and did not have appropriate structures for governance and regulation.
- Apart from a small currency forward market and local commodity derivatives markets, there were no financial derivatives markets.
- Financial transactions were controlled by the RBI (setting interest rates on various products) and the Ministry of Finance (controlling the price at which securities were issued), with a plethora of price and quantity restrictions.
- The financial industry was riddled with entry barriers in every sub-industry. It was extremely difficult to start a bank, a mutual fund, a brokerage firm, an insurance company, a pension fund, a securities exchange or a broking firm. Apart from banking, foreign firms could not operate in any of these areas.
- A comprehensive system of capital controls was in place, which ensured that domestic households and domestic firms had to go to the domestic financial system, in order to access financial services.

Few areas of the Indian economy were as dominated by the State as was finance. The full range of interventions contaminated resource allocation in fundamental ways. It was difficult for an entrepreneur to build a company without obtaining support from the State in order to access equity or debt capital. This led to directly unproductive, rent-seeking activities (Bhagwati, 1982; Krueger, 1974). The State had incentives to introduce greater controls since these would increase rents.

Towards the end of the 1980s, new economic forces came into play which emphasised the need for modernisation of the financial system.

1. The higher economic growth of the 1980s had been accompanied by a boom in IPOs, and a considerable growth in the size of the stock market. This increased the interest from the rest of the country in stock market participation. These factors placed new stresses on the traditional south-Bombay club market.

2. In 1990, India went through a balance of payments crisis. The government needed to find non-debt capital inflows to fund the current account deficit. The government targeted foreign equity capital through FDI and portfolio flows as the desired form of capital inflows. This led to new demands upon the financial market system to cater to the needs of foreign firms (Echeverri-Gent, 1999; Shah and Patnaik, Forthcoming).

3. The final and immediate trigger for reforms was the bond and stock market crisis of 1991-1992. This event involved weak supervision and governance of banks, faulty settlement system run by the Reserve Bank of India for government bonds, and weaknesses in the Bombay Stock Exchange (Basu and Dalal, 2001; Barua and Varma, 1993).

   This crisis served to highlight the difficulties of the traditional functioning of the Ministry of Finance (MoF) and the Reserve Bank of India (RBI). For both the MoF and the RBI, this was a very visible embarassment, particularly because it took place at a time when India was trying to attract foreign investors into the country.

At the time of the 1991 crisis, India's financial sector had the following components: equity markets, bond markets, commodity markets, and the fund management sectors of insurance, mutual fund, pensions. All of these were targets for the financial sector reforms in the period after 1991. The end goal for the reforms was to enable liberal access to the financial sector, both for firms as well as investors. The broad principles to acheive this end was to foster competition and enabling institutional innovation (Varma, 2002).

There were two alternative approaches in the policy discussion: The first was to consider the reforms of the existing institutions. The second was to create completely new institutions. Institution building is expensive in terms of the human resources required. In addition, institutions take time to build and establish themselves to the point at which they could be effective. Both the lack of available capable human resources and the lack of time for institutions to establish themselves became arguments for reforming existing institutions, rather than building new ones.

Thus there was an initial bias in favour of reforming existing institutions rather than build new ones. However, there was one set of institutions that did not exist and needed to be built from scratch. These were the financial sector regulators. It was strongly felt that moving from a largely state-controlled environment to a free-market environment could not be done without having a strong regulatory capacity. The market manipulation crisis of 1991-1992 reinforced the view that this capacity was missing. Another argument was that an independent regulator in place would be more effective in driving the reforms of the existing markets.

Thus, the first step undertaken by the MoF was to create independent regulators for some parts of finance: equity in 1988 and insurance in 1999.

2 The reform of the equity market

As of 1990, the Indian equity market had archaic practices in trading, clearing and settlement. A lot of the differences between Indian market and international market practices stemmed from trade settement practices. Settlement was done on a bi-weekly period: traders could carry forward positions beyond the trading day to the next, and continue this roll-over of positions upto two weeks forward.

There was also a practice of carrying positions forward beyond the settlement cycle, using a mechanism called *badla*. The ability to trade for settlement in the future, as done with a forward or a futures contract, is a valuable component of any financial system. However, most markets in the world had a clear distinction between the spot and the forwards market. India did not – forward positions were taken in the form of *badla* and these were part of the spot market process itself. Very few market transactions were spot transactions – *badla* was the default. Moreover, poor risk management at the Indian exchanges meant that *badla* presented high systemic risk for equity investors.

Stock exchanges in India had a dubious reputation in their role as a transparent mechanism for price discovery. A large number of transactions were done outside of the exchange. Actual trade prices often diverged from those reported to customers.

The exchanges were largely left to regulate and supervise themselves. They ran as self-regulating organisations, typically as an association of brokers. This was similar to the organisational structure of the New York Stock Exchange. However, there was no formal regulatory capacity to monitor and supervise these exchanges.

The exchanges presented two sets of problems from the point of view of competition policy. The BSE was a closed club, and would not give memberships to new securities firms. Further, BSE was a monopoly. A key priority for reforms was to introduce contestability into the market for exchanges and into the market for brokerage firms.

2.1 Breaking the status quo: creating new institutions

Lessons from OTCEI

Even before the crisis of 1991, there had been a demand from domestic financial institutions (DFIs) to reform Indian equity markets. Liquidity on the exchanges lacked the depth the DFIs needed to execute large transactions. They also faced problems with brokers front-

running against their orders, or the lack of resilience of liquidity once it was known that the DFIs had placed orders in the market.

These problems in secondary market liquidity led to a first attempt to innovate on a design for the equity markets. This attempt was made by the DFIs and became the Over The Counter Exchange of India, Ltd. (OTCEI). OTCEI was inspired by the NASDAQ system of using multiple, competing market makers. This exchange started as a national market that was limited to trading shares that had very low liquidity on the existing exchanges. OTCEI was unable to create a liquid market and was ultimately considered a failure in financial institution building.

However, OTCEI had a significant role to play in the reforms that followed. The first lesson learnt was that the failure of the OTCEI stemmed from problems of transplanting an international market design into India. Second, it reinforced the idea that an effort by the government to create viable financial market institutions was not credible. This raised the level of complacency among the incumbent exchanges and incumbent brokers about future attempts by the government to build a competing exchange. These lessons shaped the next attempts in market reforms.

Securities and Exchange Board of India (SEBI)

The next step taken was to strengthen the regulatory processes for equity markets. SEBI was created as an independent regulator with a clear and sole focus on regulation of securities markets. This was a major milestone in Indian economic policy thinking. It marked a sharp contrast with the prevalent style of the regulatory functions at the central bank, where a wide range of functions merged together, contaminating the independence and end effect of each function. In contrast, SEBI was the first element of India's financial architecture that was modern in the approach to focus on one function.

SEBI was created by adminstrative order in 1988. It became operational as an independent regulator when the SEBI Act was passed in 1992. Simultaneously, the Controller of Capital Issues (CCI) was closed down.

The creation of a new and independent regulator led to focussed reforms of the equity markets. SEBI imposed a greater degree of constraint on the freedom of the existing exchanges, and engaged in conflicts with incumbent market participants.

The Bombay Stock Exchange (BSE) demonstrated that they were highly effective in blocking reforms in the equity market (Ramakrishna, 2004). Early in SEBI's life, modest reforms were attempted on issues such as a requirement to unbundle the brokerage fee from the price for a share when a broker issued a contract note to a customer. The BSE went on strike in protest against this move. Such intransigence persuaded policy makers that incremental reform of the incumbent exchanges was not feasible. They then pushed for more fundamental reform and shifted focus onto the creation of a new exchange that would

compete with the BSE.

National Stock Exchange of India Ltd. (NSE)

There were two guiding principles that drove the design of the new exchange: first, that the price discovery process should be as transparent as possible; second, the exchange should support competition - there should be equal access for all equity market participants. The salient features that differentiated the design of the NSE from the existing exchanges were:

1. National platform that offered equal access to traders from all corners of a widespread geographical area,
2. A competitive market in securities intermediation, with a steady pace of entry and exit,
3. Orders matched electronically, on the basis of price-time priority,
4. Anonymous trading followed by guaranteed settlement,
5. Demutalised governance structure, as opposed to being an association of brokers, with a professional management team running the operations of the exchange.

NSE started trading bonds in June 1994, and equity in November 1994. Orders from all across the country were pooled into the same trading floor. The electronic order matching system increased the speed and the transparency of the price discovery process. The number of brokers who were able to access a common order flow was unprecented. What was even more interesting was the collapse of the geographical dispersion of investors: brokers from any corner of the country had instantaneous access to exactly the same information about prices and depth.

The impact was tremendous (Shah and Thomas, 1996, 1997, 1999). By the end of 1996, a little more than a year after NSE started equity market trading:

- The liquidity on the most frequently traded shares had shifted from the BSE to the NSE.
- Brokerage fees had dropped from an estimated 2.5 percent to less than 0.50 percent.
- Daily traded volumes had gone up by more than 100 percent.
- Most significantly, the BSE had transformed itself from a venerable, open-outcry exchange to an electronic limit order book exchange.

  The transformation of the BSE was a powerful sign of the success of the NSE. This transformation, which had earlier been debated and dismissed by incumbents as irrational and impossible to implement rapidly, was acheived in less than a year after the competitive pressure from the NSE. This highlights the importance of competition in financial sector reforms policy.

The success of the NSE gave greater confidence to policy makers as architects of market reforms. This eased the way for the next steps of the reforms and inspired greater policy activism in the securities markets.

The National Securities Clearing Corporation, Ltd. (NSCCL)

One of the integral differences between the electronic trading system at the NSE as compared to the traditional open outcry (or the dealer-based architectures such as that found in bond markets all over the world) is the *anonymity* of counterparties involved in a trade. In traditional trading systems, counterparty credit risk management involved knowing your counterparty. This restricted traders to a subset of counterparties whose credit risk they were confident of taking.

In contrast, all trades at the NSE had a common counterparty: the clearing corporation. This was implemented through the legal mechanism of novation at the National Securities Clearing Corporation Ltd. (NSCCL). An innovation in financial institutions in India, NSCCL was set up in 1996 as a fully-owned subsidiary of the NSE.

Operationally, the separation between the clearing corporation and the exchange meant that any systemic impact of counterparty defaults could affect the clearing function, but would permit trading to continue unimpaired. It also permitted the NSCCL to focus on evaluating counterparty credit risk, and NSE to focus on operational and trading system risks.

NSCCL as the common counterparty to all trades had a dramatic impact on the trading at NSE. Risk management by NSCC brought all traders in India on an equal footing, and eliminated the reputational advantage of being a large firm or an old firm. Order flow was no longer fragmented across counterparties with different credit risk. Trading participation could, and did, become anonymous because with no fear of counterparty default, there was no longer a need to reveal the identity of traders. This helped to enhance competition in the equity market, and in turn, enhance liquidity. By bringing a diverse set of market participants from across the country, who did not know each other, NSE was able to become a truly "national" market for equity.

The National Securities Depository Ltd. (NSDL)

The last part of the securities market infrastructure dealt with the settlement process, which involved the actual transfer of ownership of the asset from seller to the buyer. One of the operational problems at the new national exchange was how to ensure settlement of trades where the buyer was in the northern corner of Srinagar, and the seller could be in the southern tip of Kanyakumari. Such transactions were afflicted by the presence of fraudulent share certificates, and incidents of theft of certificates.

The bigger problem was the increasing incidence of fraud physical shares after 1990. Anecdotal evidence points to a steady increase of buyers receiving fake shares, reflecting improvements in the technologies of scanning and reprography. The policy reaction to this was to discuss, create, and pass the Depositories Act in 1996. The Act enabled the creation of a depository that would be the repository of all shares issued in the country.

The first attempt at creating a depository was managed by one of the largest custodian firms in India in 1988. The project aimed to create single central registry of ownership, where the shares would be immobilised (held in physical form). However, immobilisation proved to be a stumbling block: the project ran into cost and scheduling over-runs.

An effort to create a depository began at the NSE in 1995. The design aimed to create a central registry of ownership of shares where the shares would be dematerialised rather than immobilised. Once the Depositories Act was passed in 1996, the project at NSE was separated out as as an independent entity called NSDL.

In a manner similar to the effect of the clearing corporation that eliminated differences between counterparties and permitted for pooling of orders on an exchange, the depository also became a great equaliser across geographical locations and service providers. As an equity investor, there was now no difference where the investor lived, or who their broker was. This helped enhance competition in the market.

Innovations in information systems: Nifty, MIBOR

Nifty: The NSE-50 index

> The transparency of price discovery on the stock exchanges had led to increased volumes and efficiency of the stock markets. The increased focus on the equity markets made it important to create and disseminate a high quality index of market performance. This information would support and enhance daily intra-day price discovery. In addition, it would set the foundation for the next stage of development of the fund management industry into index funds, index futures, index options, and benchmarking of fund managers using the index.
>
> This led to the NSE-50 index (Shah and Thomas, 1998). The *largest* stocks by market capitalisation was selected, so that the index would represent as much of the country's market capitalisation as possible. Simultaneously the *most liquid* stocks were selected so that the index would be tradeable.
>
> The transparency of liquidity at NSE threw up opportunities to use new measures of liquidity in selecting the most liquid stocks, which was the innovation in Nifty. Liquidity was calculated using exact information from the computerised market, for the transactions costs faced when doing a trade on the index portfolio on the exchange. This was a step forward compared with the imprecise measurement of liquidity that was traditionally used to create stock market indexes.

Typically a stock market index, once entrenched, is difficult to displace from a market setting where they are widely used. A case in point is the Dow Jones index, which continues to act as the principal stock market indicator in the US. In India, the BSE Sensex was extremely well established, and even today plays a role much like the Dow Jones index. As of end-2005 however, Nifty had become the index of choice in a variety of transaction-intensive activities. Today, it is the dominant index based on which index funds are managed, as well as the dominant index based on which equity index-based derivatives products are traded.

NSE MIBID-MIBOR: The Mumbai Interbank BID and the Mumbai Interbank Offer Rates.

The next innovation in information systems came with the use of the polling method to collect price information for interest rate and commodity markets. The polled benchmark rate was first implemented by the NSE to collect short-term interest rates from the dealers in the fixed income markets, typically from banks. This was the MIBOR.

The MIBOR, like the London Inter-Bank Offer Rate (LIBOR), is calculated as a robust average of rates quoted by dealers in the market. It uses the 'adaptive trimmed mean' to optimally compute a trimmed mean, as compared with the fixed trimmed mean used by LIBOR (Shah, 2000).

The same methodology was later used to poll benchmark spot market prices for commodities that traded futures at the commodity derivative exchanges.

These innovations in better information capture and rapid release, in areas such as Nifty, MIBOR, the NCDEX polled rates, added up to a far-reaching strengthening of the informational foundations of the decision making of private economic agents.

3 Impact of the reforms on securities market outcomes

3.1 Impact on transparency in prices

The first and biggest impact was that there was a unique stock price across the entire country for firms.

Prior to the reforms, equity markets were fragmented across multiple local exchanges. The high costs of telecommunication and physical settlement meant that arbitrage between different exchanges was costly. This, in turn, meant that the price of a stock that was widely traded could vary widely on different exchanges. The closing prices reported on Bombay and other metropolitan cities often differed by as much as one percent even on

stocks like Reliance Industries. These differences were exacerbated for smaller towns and cities, and for less liquid stocks.

After the reforms, there are only two exchanges in India for all practical purposes, the BSE and the NSE. The difference in closing prices between the two are insignficant. There is an active set of arbitrage brokers that equalises prices between these two exchanges, even intra-day. Therefore, the price for an underlying security is unique and well-observed.

3.2 Impact on the costs of financial services

Shah and Thomas (1997) document transactions costs in the equity market before and after the reforms. An updated version is presented in Table 1, which demonstrates the significant reduction in transactions costs since the start of the reforms.

One observation is that the reduction in the costs was not a one-time change. These costs have continued to reduce with time. Another observation comes from the juxtaposition of these costs against those in the New York Stock Exchange (NYSE). The NSE costs of trading were lower than those reported at the NYSE as of 1997. This might be evidence that a fully transparent trading system such as the electronic limit order book of the NSE is a more efficient transaction system than the market making system of the NYSE.

Table 1 Transactions costs in India's equity market (percent)

	India			New York Stock Exchange
Cost Component	1993	1997	2004	1997
	(Before NSE)	(After NSE)		
Trading	3.75	0.65	0.35	1.23
Brokerage	3	0.5	0.25	1
Market Impact Cost	0.75	0.15	0.1	0.23
Clearing				
Counterparty Risk	Present	In Part	0	0
Settlement	1.25	1.5	0.03	0.05
Back Office	0.75	0.75	0.03	0.05
Bad Paper Risk	0.5	0.75	0	0
Total	5	2.15	0.38	1.28

3.3 Impact on market liquidity

At the firm level, we can measure improvements which have taken place in two dimensions: improvements in **levels of liquidity** and improvements in the **resilience of liquidity**.

3.3.1 Levels of liquidity

Thomas (2003b) examines various measures of liquidity to document how they have changed before and after the reforms. These measures used are **Traded Volumes, Turnover Ratio, Trading Intensity and Trade Size**. Figures 1 and 2 show the distribution of these measures for all firms trading on the NSE in 1996, when the reforms had just been put in place.[1] Thomas (2003b) then compares the 1996 values against the same measures for all firms that were listed and traded on the NSE in 2002, by which time the reforms would have been well entrenched. In all cases, kernel density plots are shown with the x-axis in log scale.

Figures 1 and 2 show consistent improvement in these levels in the market. Not only have the average traded volumes gone up in 2002 compared with 1996, but the peak levels of traded volumes have also increased. The distribution of traded volumes has flattened, which tells us that there is more homogeniety in the liquidity across different firms.

This improvement is mirrored in the figures on trading intensity and turnover ratio. There is greater homogeniety in trading intensity across firms in 2002. Similary, the average turnover ratio has gone up in 2002. Furthermore, the fraction of firms that have turnover ratios greater than one, has increased from 4.5 percent in 1996 to 11.3 percent in 2002. This shows that the liquidity across firms of different sizes is becoming increasingly homogenous.

A final interesting observation is that the average size of transactions has dropped in 2002 compared to 1996. This might be evidence that the market has become more accessible to a larger fraction of retail investors after the reforms.

3.3.2 Robustness of liquidity

A sophisticated financial market is one where a steady supply of liquidity is assured. Such a market is one where we would expect adverse news to rapidly lead to lower prices, but where the market liquidity does not dry up. In other words, a robust market is one where liquidity remains despite price volatility: there is lower *liquidity risk* in a well-developed market. The robustness of liquidity in the Indian equity markets have been proved to hold even on days of extreme price fluctuations.

An example of an extreme price fluctuation took place after the general elections in 2004. The NSE index dropped by an unprecedented 21 percent in the first two hours of trading on 17^{th} May, 2004 (National Stock Exchange, 2004). The market closed at a drop of 11 percent, which was 1.5 times worse than the worst drop ever seen previously. Despite this, the equity market institutions did not collapse. Unlike in the period before reforms, markets stayed open for business. What is more, the liquidity in the market remained

[1]The four figures of liquidity measures were put together by Renuka Sane and team at Infotech Financials Pvt. Ltd. The data was obtained from the *NSE Release A* CDs.

Figure 1 Comparison of standard measures of liquidity 1, 1996 vs. 2002

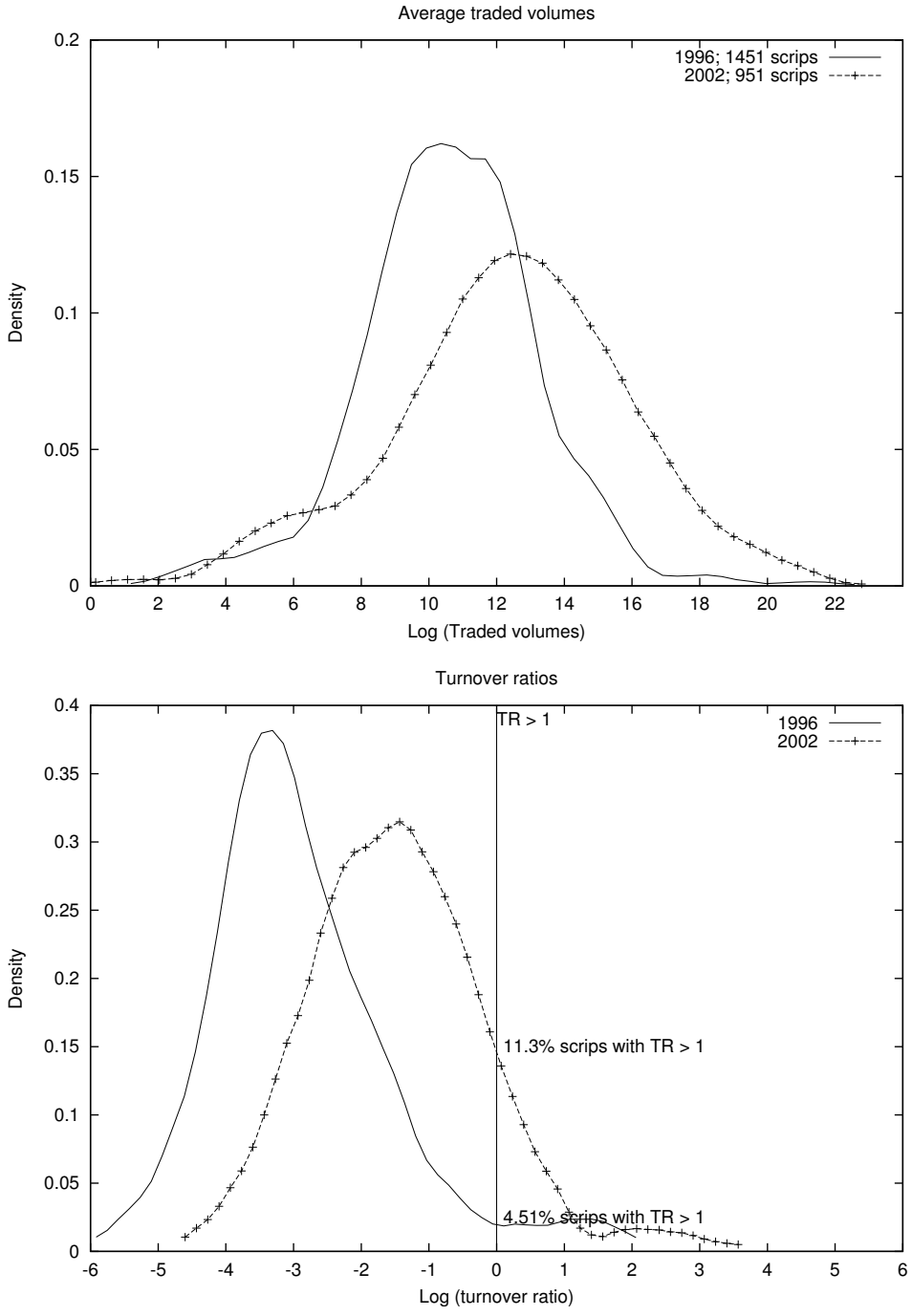


Figure 2 Comparison of standard measures of liquidity 2, 1996 vs. 2002

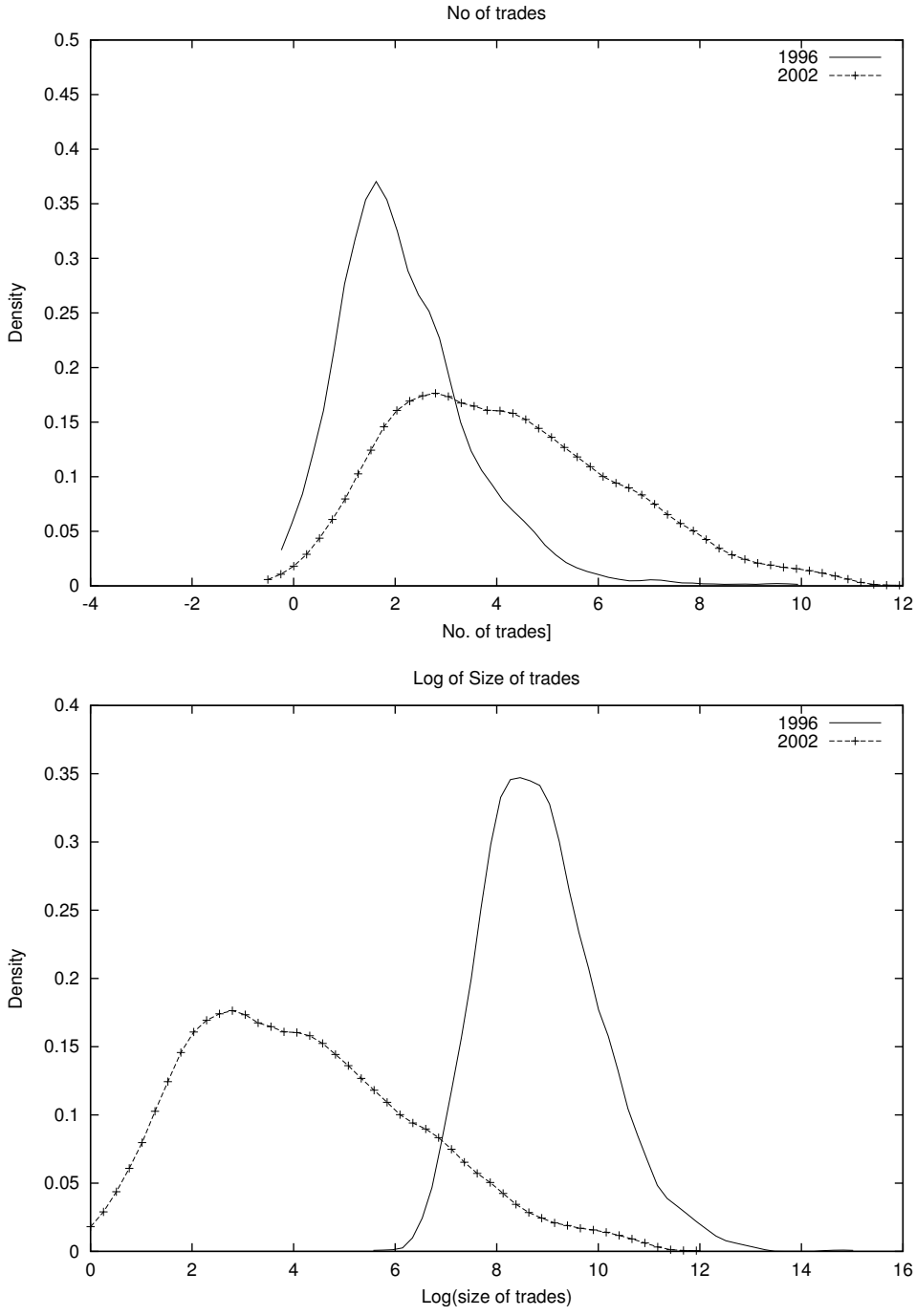
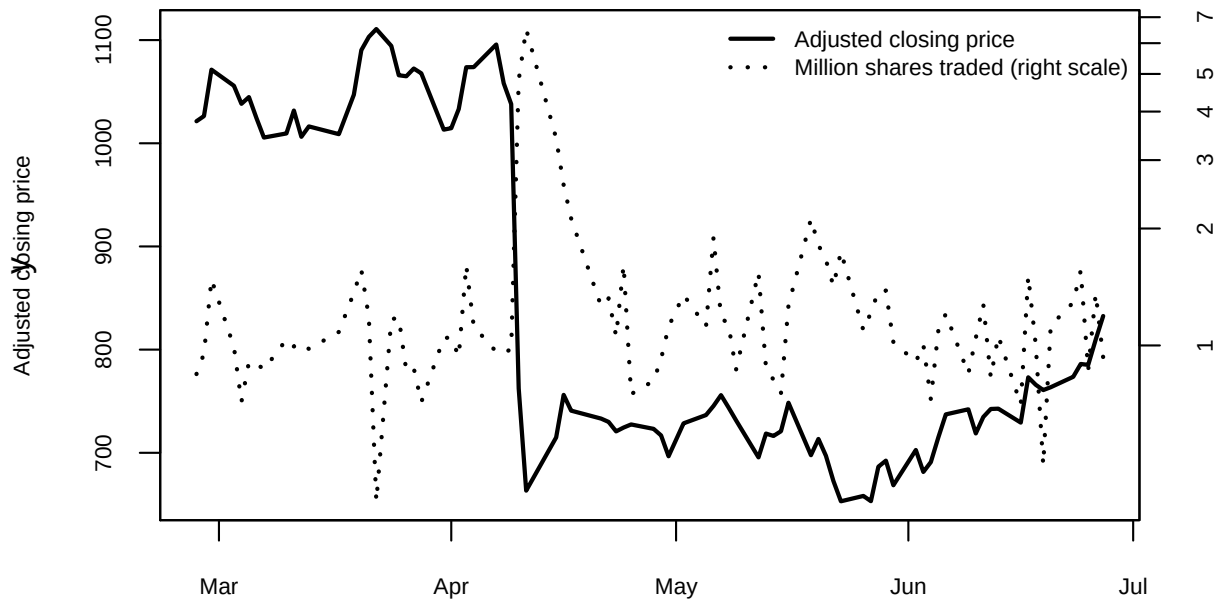


Figure 3 Resilience of liquidity in Infosys in April 2003



sound. Price discovery at this time was concentrated on the Nifty futures market, where the bid–offer spread remained tight.

This resilience of liquidity is not restricted to trading in the index, but it is also seen in liquidity of single stocks. For example, on 10 April, 2003, one of the largest firms in the country, Infosys, announced a gloomy earnings outlook. Infosys signaled that it was unlikely to be able to maintain the high earnings growth associated with the software industry.

The valuation of the market dropped sharply and dramatically. Over a two-day period, the price fell by 36%, one of the largest-ever two-day price changes of a large stock in India. However, as Figure 3 shows, the supply of liquidity on the market remained steady. The number of shares transacted per day, summing across NSE and BSE, rose sharply on the date of the announcement (10 April) but then fell back to pre-event levels.[2]

Table 2 goes closer to the details of these events. The news broke on 10 April 2003. The average level of turnover, prior to the event, was 1,025,670 shares per day. The event was associated with a massive *increase* in trading, as myriad speculators participated in price discovery. From 10 April to 17 April, turnover was in the range from 2 million shares a day to 6.5 million shares a day. This shows no negative impact of this highly negative

[2]The measurement of liquidity, and hence resilience, ought to be based on *impact cost* and not turnover. Ideally, what needs to be done is to merge the order book at NSE and BSE, and compute the impact cost available across this "merged" liquidity of both markets. However, order book snapshots data for BSE is not observed. Hence, the number of shares traded is used as a proxy for liquidity. The number of shares, rather than turnover in rupee value, is more useful since it does not vary with movements in prices.

Table 2 Price and turnover of Infosys

Date	Adj. closing price (Rupees)	NSE+BSE turnover (Number of shares)
Pre-event		
4	1073.80	1119145
7	1095.72	963174
8	1058.13	954262
9	1037.99	979878
Event		
10	762.44	4822068
11	663.34	6524268
15	714.92	3412717
16	756.13	2586204
17	740.85	2122830
21	733.15	1261185
22	729.92	1322230
Post-event		
23	720.75	1056386
24	724.46	1610804
25	727.48	749380
28	723.21	810668

news event upon liquidity; the liquidity of the market did not dry up in response to bad news. After this news was absorbed into the price, the liquidity of the market returned to normal conditions. The mean turnover in the 30 trading days from 23 April onwards was 1,169,973 shares per day, which statistically was insignificantly different from the mean turnover of the 30 days prior to 10 April.[3]

3.4 Impact on the rate of diffusion of innovations

A significant but intangible payoff from the development of these institutions for the equity market has been their adaptation and application in other financial sectors (Table 3).

The new ideas in market design were successfully applied to launch one of the world's most successful equity derivatives markets (Thomas, 2003a). Both the BSE and the NSE started trading equity index futures in 2000. The institutional cost of starting an entirely new market was negligible: the same trading platform and clearing corporation that was used to trade equity was used to trade derivatives in a relatively short period of time. With

[3]In an OLS regression on intercept, with a dummy variable for the pre-event days, the results were as follows. The coefficient of `before` was -0.13315 with a t statistic of -1.805. The R^2 was 0.04. When the dependent variable was re-expressed as the log of the number of shares traded, the coefficient of `before` was -0.10917 with a t statistic of -1.622. The R^2 was 0.03. These results suggest that, if anything, the post-event turnover was *higher* than the pre-event turnover. Note that the few days with event-related elevated turnover were removed from this regression.

these institutions in place, the bottlenecks to the development of a completely new market were changes that was required in the legal and regulatory institutions, as well as in the development of skills amongst the investors to trade these products.

This infrastructure has been deployed in other asset markets as well:

The national electronic limit order book has been deployed to trade commodity futures.

The framework of a national central clearing corporation, providing novation on all market trades, has been deployed to clear trades on the spot bond market, OTC interest rate derivatives, OTC foreign exchange products, as well as commodity futures.

The national depository is in place for the settlement of government as well as corporate bonds and warehouse receipts for commodities like gold.

In the case of trading and clearing, different institutions have been created for different underlying financials such as interest rates and commodities. However, for the settlement of these trades, the very same depository has been used. This exploits increasing returns-to-scale and returns-to-scope arguments in developing financial institutions.

In all cases, there are increasing returns to scale to the human capital that was developed while the financial institutions were being established. For example, the first chairman of the clearing corporation developed for bond market transactions had earlier been the managing director of the NSE.[4]

4 Scaling up reforms to other parts of finance

These visible success of equity market reforms gave tremendous credibility to the reforms process - strengthening the regulator and building market institutions to improve competition in the sector.

However, while this led to a strong push for similar reforms in other parts of finance, the manner in which the initial reforms were implemented varied widely. The scope of reforms in a sector appears to be shaped by two factors: the political strength of incumbent institutions, and the extent of public sector presence in the sector. In India, the State dominated the insurance and the banking sector, where the impact of the reforms have been the slowest. The State had a lower involvement in the commodity markets, and the least in the case of equity where reforms have made huge strides in institutional development and change.

[4]Dr. R. H. Patil, the first Managing Director of the NSE, was the Chairman under whom CCIL was conceptualised and implemented.

Table 3 Innovations in Indian Finance

Character of reform	Reform	Action
Informational foundations	ATM for reference rates from dealer markets	**Innovator**: NSE MIBID-MIBOR (1998) **Followers**: NCDEX reference rates from CMIE and CRISIL (2003) **Next?** Fixed income, currency markets.
Governance	Demutualisation	**Innovator**: NSE (1994), BSE (2005) **Followers**: Commodity derivatives exchanges (2002-03)
Trading systems	Nation-wide electronic trading	**Innovator**: NSE (1994) **Followers**: BSE (1995), Commodity derivatives exchanges (2002-03), CCIL's CBLO (2003) **Next**? Spot markets for currency, debt, commodities.
	Evening session	**Innovator**: MCX (2003) **Followers**: NCDEX (2003) **Next**? NSE, BSE
Clearing systems	Netting by novation with central counterparty	**Innovator**: NSCCL (1996) **Followers**: CCIL for bonds (2001); NSCC for NCDEX (2003) **Next**? BSE; other commodity exchanges
Settlement systems	Basics: depository	**Innovator**: The RBI SGL (1992) **Followers**: Equity market (1996)
	Fully fledged depository	**Innovator**: NSDL (1996) **Followers**: CDSL (1997 onwards) **Next**? GOI bonds

4.1 Banking services

As with other developing economies, the banking sector in India has traditionally been the largest component of the financial sector. Prior to 1991, Indian banking was dominated by government-owned banks. These banks controlled over 90 percent of the banking sector assets. However, most of these banks were inadequately capitalised. At the time, banking regulation meant stringent administrative control on the banks' business: interest rates on deposits and lending were administratively determined.

Banking sector reforms and its impact on the industry has been documented in several papers. Mohan and Prasad (2005); Basu (2005); Hanson (2005); Mor *et al.* (2005) are some of the more recent ones. These papers identify the path of reforms in this sector as having taken three tracks:

- Improved competition: an increase in the number of private banks (nine in 1993 and two in 2003),
- Improved prudential norms related to capital adequacy, asset classification and income recognition in line with international norms, as well as increased disclosure levels,
- An attempt to improve the autonomy of the public sector banks.

Competition in the form of new private and foreign national banks has probably been the driver for the most effective changes in banking services. With the entry of private sector banks, there has been a significant increase in the use of information and communication technologies in the quality of banking services provided (Hanson, 2005). While the innovations has been driven by the private sector banks, they appear to be rapidly adopted by the public sector banks as well. Data from the post-reform period upto 2000 shows that there have been no persistent gaps in profitability between private and public sector banks (Sarkar *et al.*, 1998; Kumbhakar and Sarkar, 2003; Bhaumik and Dimova, 2004). The evidence is less clear about whether the same can be said about differences in efficiency between the private and the public sector banks.

The other area of significant improvement has been banking regulation. Two events caused a new approach to monitoring and supervision of banks: the first was the bond and equity market crisis of 1991–1992, and the second was the Basle Capital Accord of 1988. The first caused a tigher regulatory focus and control on the investment portfolio of banks. The second led gradually towards a less administrative approach in the RBI banking supervision. There was a focus on improving internal controls at banks, more market-based capital adequacy norms, and a better framework to recognise and resolve the problem of Non-Performing Assets (NPAs).

For instance, the RBI introduced a scheme of Prompt Corrective Action (PCA) as part of more market-oriented regulation. Under the PCA, banks that fail to meet threshold levels of capital adequacy, asset quality or profitability, would lose their operational autonomy

and have to function under the direction of the RBI. Banks with the capability to monitor their own risks had more freedom in setting terms of loans to industries as well as interest rates on deposits (Mohan and Prasad, 2005; Mor *et al.*, 2005).

Today, all banks and financial institutions have to meet frequent reporting requirements, inspections and audits. The annual inspection of the banks and financial institutions by the RBI is detailed and attempts to cover all aspects of the business. Inspection reports of a bank are reviewed by the Board of Financial Supervision at the RBI.[5]

The capital adequacy of banks have also improved dramatically compared to the start of the reforms. This is partly because of the RBI adopting the Basle norms. Initially, banks used the Basle Capital Accord for capital allocation, which was done once at the end of a financial year. In 2003, the RBI introduced Risk Based Supervision (RBS) in preparation for the implementation of Basel-II Accord. In the RBS, the supervisory control of a bank by the RBI would be determined by the risk profile of the specific bank. Other prudential norms that have been strengthened include an increase in minimum capital, 90 day norms for asset classification, and risk weights for interest rate risk.

The improvement in the capital adequacy of the banking sector as a whole was also partly driven by the happy coincidence of the public sector bank portfolios being excessively weighted in their exposure to GOI bonds during the time of a significant drop in interest rates. When the banks reweighted their portfolios by swapping out the high-cost GOI bonds for lower cost issues, they were able to use the ensuing profits to recapitalise their portfolios.

However, despite this progress in the quality of the banks portfolio and the quality of their services, the evidence seems to suggest that there is still significant scope for growth in the size and reach of the banking sector in India. This is particularly observed in the area of firm credit (Banerjee *et al.*, 2005) where the rates at which funds are lent have remained high through the reforms period. Despite the improvements in processes to monitor and supervise the capital adequacy of banks, banks still appear to prefer an overexposure to GOI bonds (Patnaik and Shah, 2004) rather than provide financing for infrastructure and industry projects. Another piece of evidence that the banking sector needs to grow is that India still has some of the highest costs of financial intermediation by world standards (Farrell and Lund, 2005; Mor *et al.*, 2005; Hanson, 2005).

This might be partly driven by the relatively slow development of financial market infrastructure, and partly by a slow development of the procedures and systems for better risk measurement and risk management. A Real-Time Gross Settlement system was implemented only by January 2004. There have been several delays in the project to implement a national electronic funds transfer system since the start of the reforms. The first phase of this was put in place only in 2004, which linked the payment systems across a subset of the

[5]The Board of Financial Supervision is a committee comprising the RBI governor, the deputy governors and four other directors. It was setup in in 1994.

banks in metropolitan cities.[6] The Credit Information Bureau of India, Ltd. (CIBIL) has been operational since 2000. However, the presence of this organisation has yet to make an tangible impact on the transparency of the credit market, or the availability of credit on a wider scale, at more efficient rates. There is a interest rate forwards and swaps market, that has acheived increasing depth and volume since 2003, where the main participants are the banks. However, the contracts in this market tend to cater to short term interest rate risk management with little focus on longer term interest rate volatility. The development of an interest rate futures market where longer term contracts can be traded has not made any progress since it was first announced in the Budget Speech of 2003.

The stagnancy in both lending patterns and cost levels, particularly in comparison with the Indian equity market where the transactions costs have reached some of the lowest in world, suggests that the banking sector has yet to reach the competitive market structure that the reforms started with.

It is suggested that the dominant public sector nature is one of the single most important factor that slows the pace of reforms in the banking services sector (Bhattacharya and Patel, 2005, 2003; Varma, 2002; Hanson and Kathuria, 1999). That the public sector nature has mattered can be seen in the following:

- The RBI's implementation of improved prudential norms has been paced to match the pace at which the public sector banks can implement the same.

  For example, the RBI implemented the PCA scheme only after the public sector banks were able to shore up their capital base from Treasury profits during the period of falling interest rates.

- Government ownership still handicaps the public sector banks in terms of salaries and compensations to their staff.

  For instance, the Comptroller and Auditor General of India (CAG, which is the auditor for the government) has powers to question and ascertain blame for commercial decisions of public sector banks. The Central Vigilance Commission (CVC) also has the authority to question these bank officials in order to check corruption. The actions of the CAG and CVC could have an adverse impact on the decision making process in the public sector banks (Banerjee *et al.*, 2005).

- Government ownership blunts and distorts incentive structures that underlie the functioning of the intermediaries. These distortions often serve to undermine safety systems that are put in place through regulation (Bhattacharya and Patel, 2003).

One last problem weighing against a rapid pace of decisive reforms in the banking sector is the multiplicity of roles that the RBI has to play. At the level of financial architecture, the policies and practices in banking regulation and supervision are constrained, because the RBI suffers from numerous conflicts of interest arising out of its multiple roles. For

[6]Other parts of the infrastructure that needs to be implemented is presented in (Mor, 2005).

instance, the RBI is the investment banker for GOI as well as the banking sector regulator. The investment banking role generates incentives to force banks to hold government bonds, which could conflict with the role of ensuring well-regulated and well-supervised banks.

This multiplicity of roles resulting in conflict of interest, which in turn acts as a barrier to the development of the financial sector, is observed in the central banks of other countries as well, some of which have since undertaken reforms of their financial market architecture.[7] In order to take the reforms process forward, there is a pressing need for thought on how to better design the overall financial architecture in India, so as to reduce these conflicts and burdens on the RBI.

4.2 Commodity derivatives markets

In 1995, commodity derivatives markets in India had a structure like the old equity market structure. These markets were very old, even older than the BSE. Most had been shut down during the mid-sixties. When they re-opened in the seventies, futures could trade only on a set of seven "non-essential" commodities.

Futures trading on any single commodity was heavily fragmented across multiple locations. This sometimes involved situations where there were more than three exchanges trading the same commodity in a 50 km radius. Price discovery was done by open outcry, and counterparty risk was rampant. Even though the legal contracts specified physical settlement, settlement was done on price differences (cash settlement) rather than physical settlement, due to problems with standardisation of the commodities.

The market regulator is the Forwards Markets Commission (FMC), which is part of the Department of Consumer Affairs.

In 1995, when volumes on the under-one-year old national, electronic limit order book NSE crossed the volumes of the 120-year old BSE, the FMC started thinking about reforms in the commodity derivatives markets, similar to the equity market reforms. Some aspects of the development of the commodity derivatives markets are quite remarkable:

- Unlike with the other financial sectors, where the first step of reforms was the development and strengthening of the regulator, the first focus of the commodity derivatives markets reforms was the development of market institutions. Despite the fact that the underlying agricultural commodity market had very strong controls on pricing as well as cultivation, the reforms started with financial institution development for the derivatives markets.

  It was also remarkable that the drive for the institutional reforms came almost solely from the FMC in their desire to improve and expand the scope of commodity deriva-

[7] The financial markets in the UK is a good example from the developed markets. South Korea is a good example of clarity on financial architecture from a developing market closer to our home territory.

tives markets. Most unusually, it was the incumbent regulator that was the driver for market innovation in these markets.

- Debates on the development of derivatives markets often state that derivatives markets cannot be developed if the relevant spot markets are not well developed in terms of efficient price discovery and robust liquidity. The primary concern was that futures prices could be manipulated in the absence of a reliable benchmark price in the underlying market. The flip side of the debate asserts that derivatives markets help improve the liquidity of the underlying spot market.

  There were similar concerns voiced about the development of equity derivatives markets in India (Gupta, 1998), which was concerned that such market manipulation of futures contracts would then lead to systemic spot market failures.

  In the case of commodity derivatives markets, the FMC took the decision to promote the development of commodity derivatives markets. The premise was that with increasing globalisation and integration with world markets, there was an urgent need for the risk management products.[8]

The FMC drew lessons from the success of the equity markets reforms. In 1996, they experimented with mandating that some of the existing commodity exchanges adopt the electronic limit order book trading and clearing corporation based risk-management systems of the equity markets. However, even in the largest of the existing commodity exchanges, revenues were not sufficient to bear the cost of conversion from the status quo into the microstructure of the equity markets.

The next attempt was in 2000, and aimed to create new national level commodity derivatives exchanges, similar to the NSE. Three such exchanges became operational by the end of 2003. These are the National Multi-Commodity Exchange (NMCE), the Multi-Commodity Exchange (MCX) and the National Commodities Derivatives Exchange (NCDEX).

At the time, equity derivative markets had been operational and trading for three years. The equity markets took 1.5 years to establish themselves, with volumes matching those of the equity spot markets. In contrast, the commodity derivatives markets took three months to establish significant volumes and revenues in trading.

There are some concerns about financial architecture when it comes to the separation of SEBI and the FMC. International experience has emphasised the unity of commodity futures trading with the remainder of securities trading. India has a separate regulator for the commodity futures markets. While the commodity futures markets have made enormous progress, thanks to courageous decisions at the FMC to break with the status

[8] A significant difference between the equity and the commodity futures markets in that many commodities had a State-determined Minimum Support Price (MSP), which had been put into place largely as a risk containment measure for agriculturalists against price fluctuations. The MSP imposed strong economic limits on how freely the market could determine the price. It also imposed a heavy burden on the state's finances to bridge the gap between the market price and the MSP.

quo in India and move towards modern market design, the binding constraint in Indian progress in this area is now the problem of financial architecture. A next step in progress in this area could be a merger of the FMC and SEBI. This would usher in a single regulator dealing with all kinds of financial securities trading, dealing with a competitive market inhabited by the existing exchanges.

4.3 Insurance

The reforms process in the insurance sector has followed a predictable path of liberalisation.

The insurance sector in independent India was dominated by public sector monopolies – Life Insurance Corporation (LIC) in the life insurance sector and General Insurance Corporation (GIC). The reforms of this sector began with setting up the Insurance Regulatory and Development Authority (IRDA) by an Act of Parliament in 1999. With the IRDA in place, the next step taken was opening up the sector to a competitive market structure, and free market pricing.

The two visible outcomes are an increase in the number of insurance companies and products available to the Indian public. Instead of public sector monopolies, over a dozen insurance companies now compete for customer business.

However, the insurance industry continues to be hobbled by basic problems. For example, a great deal of sale of "insurance" products is merely tax arbitrage, where a fund management product is given preferential tax treatment under the garb of a minimal insurance character. IRDA has failed to rein in the industry in this regard, and focus preferential tax treatment only upon 100% insurance products.

A second problem lies in sales practices. The insurance sector has pioneered unhealthy sales practices in India. In 2004, there was a flow of Rs.60,000 crore of premium income going into the insurance industry. Of this, as much as Rs.6,000 crore, or roughly 10%, went back to sales agents. This shows an enormous burden of sales costs, which detract from the usefulness of these products for customers.

4.4 Debt market

An extreme example of the different approach taken in financial sector reforms has been debt market reforms. The debt market has had a strong public sector presence. The dominant traded instruments are Government of India securities. The dominant trading participants are the banks, a large fraction of which are public sector banks.

The ownership of the role of bond market regulator was not explicitly defined. When SEBI was created to regulate "securities markets", the markets for bonds did not fall within their mandate due to confusion in the financial architecture prevalent in India.

The RBI, by virtue of having the dual mandate of being investment banker to the Government of India (GOI) and the regulator of the banking sector, became the regulator of the market trading GOI bonds by default. Thus, the bond market did not benefit from an independent regulator, as the equity markets did. Instead, the development of the bond market has taken place within the confines of the conflicts of interest and focus at the RBI. Therefore, even though the bond markets faced the same forces of the fiscal crisis and the 1992 market manipulation episode for reform, the mode and mechanism of the reforms implementation has been very different.

In contrast to the approach of the equity market at the MoF, which **separated** the activity of regulation and market development by creating new institutions, the RBI took these responsibilities upon itself. There is a clear separation between the regulator (SEBI) and the regulated entities (NSE, BSE, NSDL, etc) in the equity market, with a clear legal architecture. The same functions for the bond markets, such as the exchange and the depository, lie inside the RBI.

The nature of the reforms in the bond market has been extremely conservative. The reforms have erred on the side of controls on the price of assets and behaviour of participants rather than the modern approach of building institutions and competition. It was only by the end of the nineties that serious institutional reforms on the debt market commenced.

The first effort was creating a clearing corporation for debt market trades. This was the Clearing Corporation of India Ltd. (CCIL) that was set up in 1999 (Clearing Corporation of India, 2004). The first trades that were cleared at CCIL were spot market trades in government bonds, with trading restricted only to a few entities.

CCIL today has progressed to clearing trades for Over The Counter (OTC) foreign exchange spot and forward deals. There is also a healthy trading of interest rate derivative products such as the Collateralised Lending and Borrowing Obligations (CBLO).

The next institutional development was the creation of the Negotiated Dealing System (NDS). This was originally touted to be an electronic platform to enable dealers to more efficiently and transparently negotiate deals. On the same platform, traders could also report, clear and settle their transactions within under 15 minutes of the trade having been struck. The NDS became operational in 2002. In the first two years, the NDS and the CCIL together was used as a clearing and settlement system for bond market trades amongst the large debt market participants. The trading itself remained a phone–based dealer market.

In 2005, the NDS progressed to an electronic limit order book market like the Indian equity markets. This exchange still faces the conflict of being a monopoly exchange that is operated and managed by the regulator itself. The evolution of the outcomes of price efficiency and liquidity resilience from this market in the next few years should prove an interesting case study in market microstructure development.

4.5 Differences between bonds and equities

The bond markets and the equity markets present a useful case-study in comparing the impact of financial sector reforms. Both markets initially suffered from the same problems of poor liquidity and weak price efficiency. The reforms of both markets suggested the need to build institutions to improve competition and transparency. However, at the end of the first phase of reforms, these two markets stand different stages of development, as measured by various characteristics:

4.5.1 Market expansion to a larger trading base

Equity market reforms involved developing institutions that expanded both the **scope** – larger number and capital capacity of participants – and the **reach** – traders spread over a much wider geographical location – of equity market instruments (Section 5.2 and 5.3).

Neither of these outcomes have been yet taken place in the debt market. The participants of the markets remained the same, both in their identity – RBI-registered entities like banks and DFIs, mutual funds, pension funds, insurance companies – as well as in their location – the market remains restricted to the debt trading community in South Bombay.

4.5.2 Pace of market development

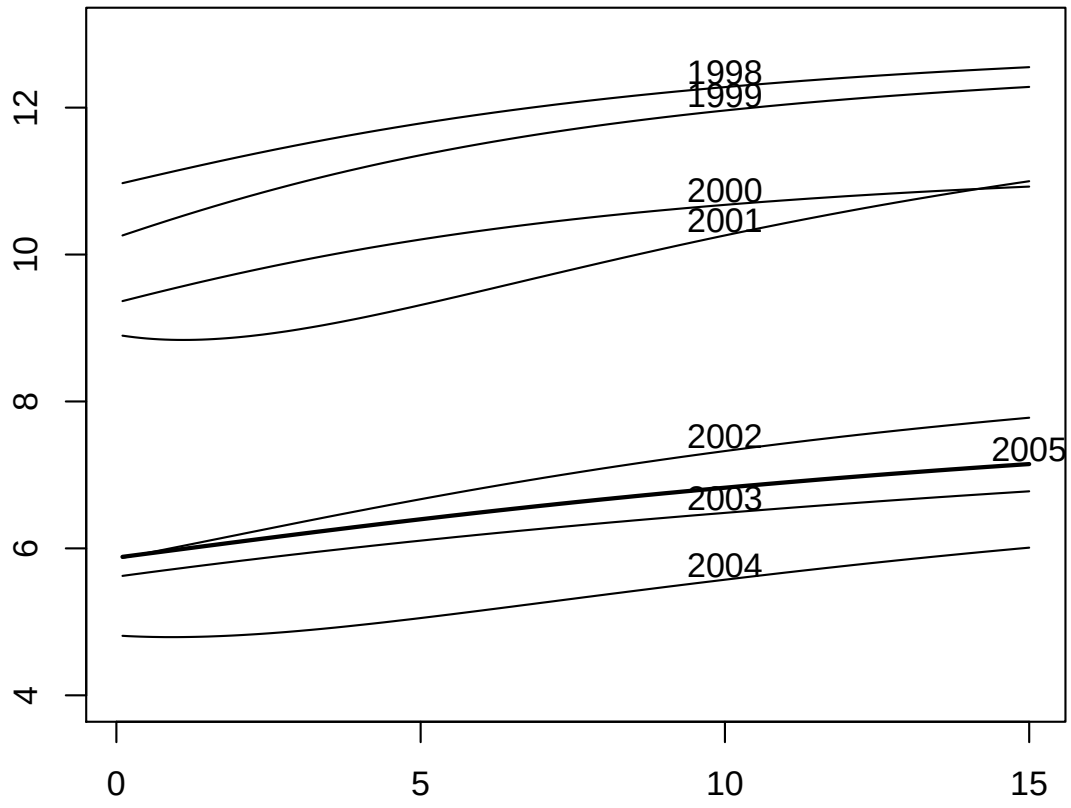
The pace of debt market development has been far slower than developments in all the other financial sectors (Table 4). This slow pace is particularly striking when reforms in both the equity and the debt market were inititiated simultaneously and were targeted to solve similar problems.

Table 4 Lags in institution development in the Indian debt market

Institution	**Original development**	**Adoption for debt market**
Electronic trading on a single platform	Equity, 1994; Commodity futures, 2004	2005, 11 years later
National access to trading	Equity, 1994; Commodity futures, 2004	Absent
Clearing corporation	Equity, 1996	1999, three years later
Independent regulator	Equity, 1992; Insurance, 1999	Not yet even considered.
Competition between exchanges	Equity, 1994; commodities, 2004	Absent
Entry barriers	Removed for equity, 1994; Commodities, 2004	Barriers present

Figure 4 The remarkable drop in interest rates

The yield curve, as of early March in each year, is plotted on this graph. Apart from 2005, interest rates fell in each one of these years.



4.5.3 Resilience in liquidity

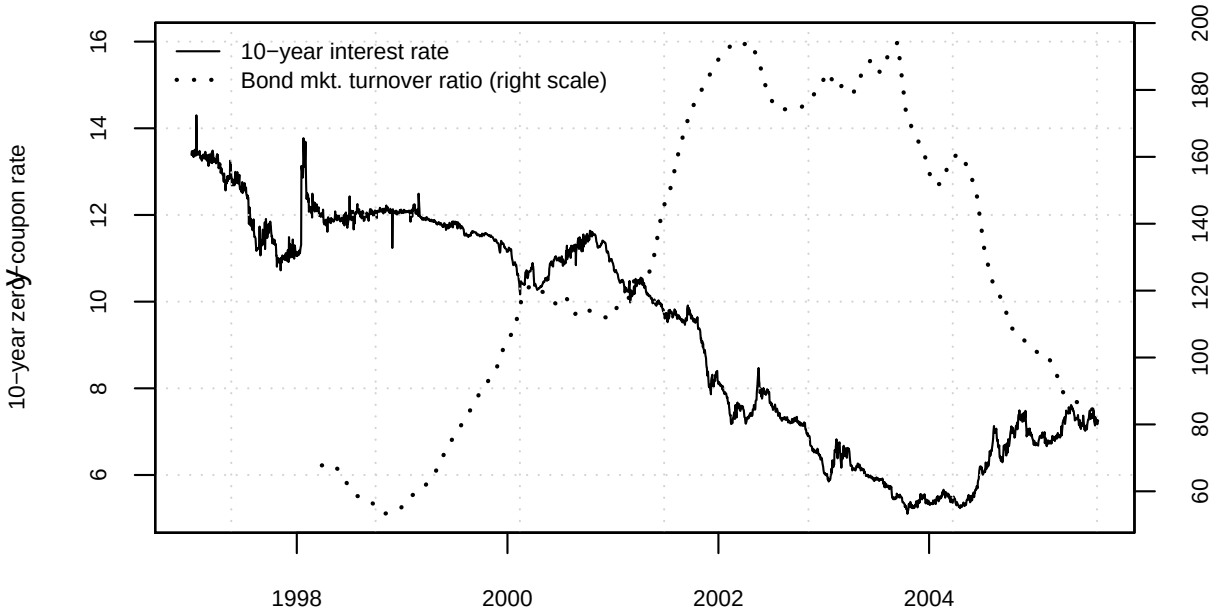
The debt market in India has suffered from persistent problems of liquidity. First, liquidity is fragmented across the yield curve, even after the interest rates were liberalised in 1998. For example, in the early-nineties, trading took place mostly in bonds at the short end of the maturity spectrum. Towards the mid-ninties, trading had shifted to the long end of the yield curve. Between 1999 and 2005, the focus has been on the medium end of the yield curve.[9]

Secondly, the liquidity in the market appears to lack resilience. There are sharp and extreme changes in liquidity with changes in the level of the interest rate curve.

[9]Impact cost is the best measure of liquidity. However, direct comparisons between the equity and debt market, of impact cost, is not meaningful since the determinants of liquidity – such as volatility and asymmetric information – differ greatly. Given that bond prices have low volatility, other things being equal, the impact cost on any bond market ought always to be lower than those on an equity market.

Figure 5 Bond market turnover ratio

This figure juxtaposes the daily time-series of the 10-year rate on the NSE zero coupon yield curve, against the monthly time-series of the bond market turnover ratio.



India had a remarkable set of years, from 1999 to 2004, where interest rates fell dramatically. This is shown in Figure 4. The bond market turnover ratio was 84% in August 1999. It rose dramatically to a level of 194% in April 2002 and stayed at such high levels till September 2003. However, by August 2005, the turnover ratio had dropped back to 84%, back to the levels of August 1999.

As Figure 5 illustrates, these dates tally up exactly with the story of interest rates. Bond market liquidity was strong when interest rates were falling, i.e. when positive price changes were being experienced. When interest rates turned, the bond market liquidity dropped back to levels prevalent as of six years ago. This seems to suggest that a lack of resilience in bond market liquidity.

4.5.4 Comparing the resilience of the equity and bond markets

If we define resilience as the relationship of the turnover ratio upon lagged returns,[10] the relationships prevalent on the equity market and the bond market can be statistically tested.

[10]Ideally, measurement of liquidity and hence resilience should be based on *impact cost* and not turnover. However, given the non-transparency of the bond market, turnover ratio data is the only liquidity measure that is observed.

Table 5 Comparing resilience of the equity and bond markets

Monthly turnover ratio time-series are used from March 1998 till August 2005. Equity spot market volumes are summed across NSE and BSE. In the case of the bond market, turnover recorded at the RBI is used. Returns on the equity market are proxied by monthly Nifty returns. Returns on the bond market are proxied by returns on the notional 10-year bond off the NSE zero coupon yield curve (Thomas and Pawaskar, 2000). These tables present OLS models to explain the turnover ratio in a month against lagged returns over the last 12 months. Both returns and TR time-series are I(0) and present no problems when using the OLS.

	Equity		Debt	
	Coefficient	t	Coefficient	t
Lag 1	−2.8451	−2.50	0.5862	0.48
Lag 2	−2.5848	−2.28	2.7270	2.81
Lag 3	−1.8172	−1.60	3.6832	3.95
Lag 4	−0.9385	−0.82	3.8831	4.18
Lag 5	−1.2352	−1.09	3.6880	3.91
Lag 6	−1.8579	−1.66	3.6762	3.87
Lag 7	−0.8954	−0.81	3.2089	3.45
Lag 8	−1.0244	−0.91	2.8579	3.15
Lag 9	−1.0573	−0.95	3.2250	3.54
Lag 10	−0.7940	−0.71	2.9692	3.21
Lag 11	−0.2474	−0.22	2.3015	2.44
Lag 12	0.1876	0.17	1.4644	1.58
R^2	0.2445		0.5553	

The R^2 of the equity market regression is 0.2445.
The R^2 of the bond market regression is higher at 0.5553.

Table 5 shows results of this calculation. Previous values of Nifty returns have a significant effect on stock market turnover ratio for two months. However, these seem to be contrary to our expectation: the equity market TR is *higher* following months of negative Nifty returns.[11]

On the bond market, current liquidity is dependent on bond market returns from much longer in the past. Here, the coefficients are all positive, which means that higher turnover is associated with higher bond market returns, and vice versa. These results suggest that bond market resiliency is weaker than that of the equity market.[12]

4.5.5 Pace of innovation

The reforms in the equity market have enabled the market to leap from a pure-equity market in 1990 to one spanning spot, derivatives, and fund management products like mutual funds and exchange traded funds.

In the case of debt assets, the dominant instruments available in 1990 were Government of India bonds, as well as fixed income investments such as fixed deposits and post-office savings. Today, these are still the dominant debt instruments available to investors. Despite the rise in interest rate volatility in 1999, there are no interest rate risk hedging tools that are available to debt investors. The years 2002–2005 has seen the development of an OTC interest rate swap and forwards market. However, these are not accessible to the other debt investors like pension funds, trusts and trust funds, retail investors who hold mortgages, pension investments and savings in fixed deposit schemes. The lack of interest rate hedging also has an adverse impact on the development of a robust corporate credit market.

Thus, there has been a marked difference between the pace of market innovations in debt and equity markets. This has translated into a gulf between financial services provided by the equity and the debt markets in India. One of the possible reasons for the slow pace was likely the conflict of interests between the RBI as an incumbent regulator and the incumbent market participants. These conflicts of interests would have been exacerbated by the dominance of the public sector nature of the banks. We do a more careful examination of these reasons in Section 6.

[11] What appears to have happened with the stock market results is that after 2001, there was a shift in trading from the spot market to the derivatives market, which has depressed the turnover ratio. This has coincided with strong powerful returns. Hence, it statistically appears that positive returns have depressed the turnover ratio. The conclusion that one can reliably draw from the results for the equity market TR is that lagged returns do not dampen turnover on the equity market.

[12] Granger causality testing in these two problems, with 12 lags, shows that there is one-way causality from 10-year bond returns to bond market TR, at a 99.9% level of significance. In contrast, on the equity market, there is no causality in either direction between Nifty returns and the equity market turnover ratio.

5 Impact of reforms on economic outcomes

5.1 Impact on competition

The reforms have altered the competitive structure of the various industries in the financial sector (Varma, 2002). Going in reverse order by barriers to entry, the situation may be summarised as follows:

Securities firms The brokerage industry is the most competitive part of Indian finance. New entrants like Indiabulls, Geojit Securities and ICICI direct have come to be some of the biggest firms, and many large brokerage firms of the early 1990s have faded. There is vigorous competition, with birth and death by roughly a dozen firms every year. This is an area where foreign firms are able to compete on the domestic market.

Stock exchanges and depositories These industries have become a duopoly between NSE and BSE, and NSDL and CDSL. There are no government-induced entry barriers preventing a new exchange/depository from coming up. In the case of depositories, there is an "open access", pro-competitive, legal framework which ensures that the market-share of a dominant depository does not inexorably go to 100%.

Mutual funds UTI dropped from near-100% market share to below 25% in the mutual fund industry. A series of public sector mutual funds have proved unprofitable and have hence exited the industry. There are few difficult barriers faced in starting a new mutual fund. This is an area where foreign firms are able to compete on the domestic market.

Insurance While many new insurance companies are now in operation, the domination of the public sector incumbents, LIC and GIC, has not been dented. Entry is possible, but foreign ownership is capped at 26%.

Banking It is difficult to obtain permissions to start a bank. Foreign banks are practically banned from opening new branches. Even domestic banks have to take permission from the RBI, to open one branch at a time. Many rules have been designed to favour public sector banks. These weaknesses in policy have led to poor competition in banking.

Table 6 compares the biggest 10 banks in the country in 2004-05 against the situation 13 years earlier, in 1991-92. The 10-firm concentration ratio did drop significantly, from 92.86% to 62.99%. This suggests high growth on the part of smaller banks. However, the *names* of the biggest banks are remarkably alike. The new names of 2004-05 are shown in boldface. Of these, ICICI was always a big bank, and is not in the list for 1991-92 purely on account of not being classified as a bank. Apart from this, there are only two new names in 2004-05. The domination of the public sector

Table 6 Biggest 10 banks: 1991-92 versus 2004-05

1991-92			2004-05		
	Bank	Tot. assets		Bank	Tot. assets
1	State Bank Of India	94753	1	State Bank Of India	460071
2	Bank Of India	23214	2	**I C I C I Bank Ltd.**	168435
3	Bank Of Baroda	21399	3	Punjab National Bank	126418
4	Punjab National Bank	19268	4	Canara Bank	110305
5	Canara Bank	16457	5	Bank Of India	95004
6	Uco Bank	11742	6	Bank Of Baroda	94664
7	Indian Bank	11042	7	Union Bank Of India	72442
8	Indian Overseas Bank	9395	8	**Central Bank Of India**	68878
9	Union Bank Of India	8783	9	Uco Bank	54589
10	Syndicate Bank	8437	10	**Oriental Bank Of Commerce**	54069
10-firm concentration ratio		92.86	10-firm concentration ratio		62.99

is also highly visible. There are no private or foreign banks in the 2004-05 list, other than ICICI Bank.

Bond market The level of competition in the bond market today is similar to the pre-reforms telecommunications sector. Here, the regulator is a government agency which combines policy and regulation. The RBI plays the role in the bond market which the DOT used to play in telecom. There is a monopoly depository (SGL), run by the RBI. There is a monopoly clearing corporation (CCIL) which is owned by a consortium of banks. There is a monopoly exchange (NDS), run by the RBI. The monopolist controls rules of entry.

5.2 Impact on the debt vs. equity patterns in firm financing

There is an extensive literature that compares "bank-dominated" financial systems against "market-dominated" financial systems. In the latter, the dominant forces shaping the allocation of capital are the stock market and the bond market. In contrast, bank-dominated financial systems accord primacy to banks in shaping resource allocation. Since earlier financial sector reforms had a focus on equity market development in India, we seek to understand if these made an impact on the financing decisions of Indian firms.

When seeking to understand corporate financial structure, researchers have a choice between *flow* and *stock* measures.[13]

Flow measures suffer from a lack of appropriate marking to market. For example, when tariffs are reduced, a large drop in the value of many factories ought to be registered in the year of tariff reduction. This is generally not captured by accounting procedures.

[13]Green *et al.* (2002) have an extensive discussion of difficulties of measurement in corporate finance.

Stock measures at book value suffer from difficulties with treatment of inflation and depreciation. For example, old assets such as steel factories of TISCO tend to be wrongly portrayed on the balance sheet as having a low value.

We present some evidence on changes in corporate financial sources based on *market-value measurement of stocks*, which does not suffer from the difficulties of measurement of flows.

1. Evidence for large companies

   The debt and equity in accounting data for firms tells us about the structure of intermediation associated with the *stock* of capital in the firm. A measure of the success of the equity market reforms would be that firms are able to more readily access equity financing compared to debt. There is some evidence that this shift is taking place in India (Shirai, 2004; Topalova, 2004; Love and Peria, 2005). We analyse the shift from debt to equity by examining patterns in the debt-equity ratios for Indian firms between 1989 and 2004.

   On the books of a firm, equity and debt are generally priced at historical value which leads to distorted inferences. In our analysis, we use the market value of equity.[14] At any point in time, the market value of all firms is comparable, and constitutes a superior measure of the equity capital in a firm as compared with the book value of equity.

   One problem in using the market value is that the shares issued by some firms are highly illiquid, and the market values cannot be trusted.[15] Hence, we limit ourselves to the universe of firms in the CMIE COSPI index, which consists of all firms where trading took place on atleast 66% of the days in the last three months. For these firms, a reliable estimate of the market value of equity is readily available.[16]

   Unlike equity, debt in India is an opaque market. Most firm debt is held in the form of loans rather than bonds. In addition, since there is no active corporate bond market in India, these bonds are not liquid and therefore, cannot be valued using a market price. Hence, we use the book value of debt. We expect that this is likely to lead to an *over-estimate* of the value of debt, since corporate debt is high yield and generally trades at a discount to book value.

   The debt-equity data for Indian firms from 1989-90 to 2004-05 are shown in Table 7. The traditional debt-equity ratios, based on book value, shows that the Indian corporate sector deleveraged dramatically from 1.82 in 1992-93 to 0.97 in 2004-05. The story is even more dramatic when the market value of equity is used: this shows deleveraging from 2.19 times in 1989-90 to 0.36 today.

   The table shows that the period of successful equity market reforms (as opposed to

[14] This is similar to the computation of Table IIIa in Rajan and Zingales (1995).

[15] For example, one firm exists, which has near-zero trading volume, and a market capitalisation of Rs.1 trillion.

[16] As of August 2005, there were 2,573 firms in this set.

Table 7 Financing patterns of COSPI firms

The data used is for the CMIE COSPI companies, to avoid spurious results associated with companies where negligible equity trading takes place. In 1989-90, the book value of equity of these companies was Rs.57,251 crore and the book value of debt was Rs.81,936 crore. This implied a debt-equity ratio of 1.43. However, the market value of equity was Rs.37,425 crore. Using this more-accurate value, the debt-equity ratio in 1989-90 worked out to 2.19.

Year	Net worth	Borrowings	Mkt. Cap.	Debt-equity ratio	
	Rs. Crore	Rs. Crore	Rs. Crore	Book value	Market value
1989-90	57251	81936	37425	1.43	2.19
1990-91	70942	119226	55176	1.68	2.16
1991-92	79832	144513	213688	1.81	0.68
1992-93	96784	176448	140783	1.82	1.25
1993-94	130440	188152	326136	1.44	0.58
1994-95	186770	228337	343954	1.22	0.66
1995-96	232232	274652	400927	1.18	0.69
1996-97	266614	309156	375466	1.16	0.82
1997-98	303115	355763	444224	1.17	0.80
1998-99	327772	390536	444904	1.19	0.88
1999-00	368628	423518	842887	1.15	0.50
2000-01	403298	445073	494933	1.10	0.90
2001-02	420432	508018	563447	1.21	0.90
2002-03	464156	508165	545741	1.09	0.93
2003-04	522034	493936	1176976	0.95	0.42
2004-05	621838	602419	1673743	0.97	0.36

a relatively stagnant banking sector and debt market) has been associated with a visible rise in the importance of equity as a source of financing. For large firms, the Indian financial system is moving to an equity market dominated one, rather than a banking dominated one.

This is contrary to findings that the use of debt financing has increased over the last decade (Mitton, 2005). The study finds that it is particularly so in emerging markets, where one of the factors driving the rise in debt financing has been higher domestic supply of funds. The other important factor is shown to be opening up to the international economy.

5.3 Impact on the stock of capital in the economy

Another way of obtaining evidence on the alternative modes of firm financing is to examine the stock of capital associated with financing mechanisms. Intuitively, this may be viewed as the composition of the portfolio of a representative household in India at a point in time. Three key facts, as of December 2005, are:

- The market capitalisation of the largest 2,573 firms added up to Rs.24.71 trillion.[17]
- The non-food credit of the (entire) banking system was Rs.12.95 trillion. It is estimated that 20% of this was to individuals, leaving 80% or roughly Rs.10 trillion for firms.
- The market capitalisation of the corporate bond market was estimated at Rs.4 trillion.[18]

These three estimates are done on a marked-to-market basis, and do not suffer from the problems of accounting notions of value. This suggests that the securities markets shaped Rs.25 trillion of resources, compared with Rs.9 trillion through the banking system. This ratio is suggestive of the increasing domination of securities markets in resource allocation. Furthermore, it points to the domination of equity financing.

We may take away two useful messages from the estimates above: the securities markets to banking ratio is atleast 25:9, and the equity/bonds/banks breakdown is atleast 21:4:9. In either case, we have measured banking fully but undercounted the two kinds of securities.

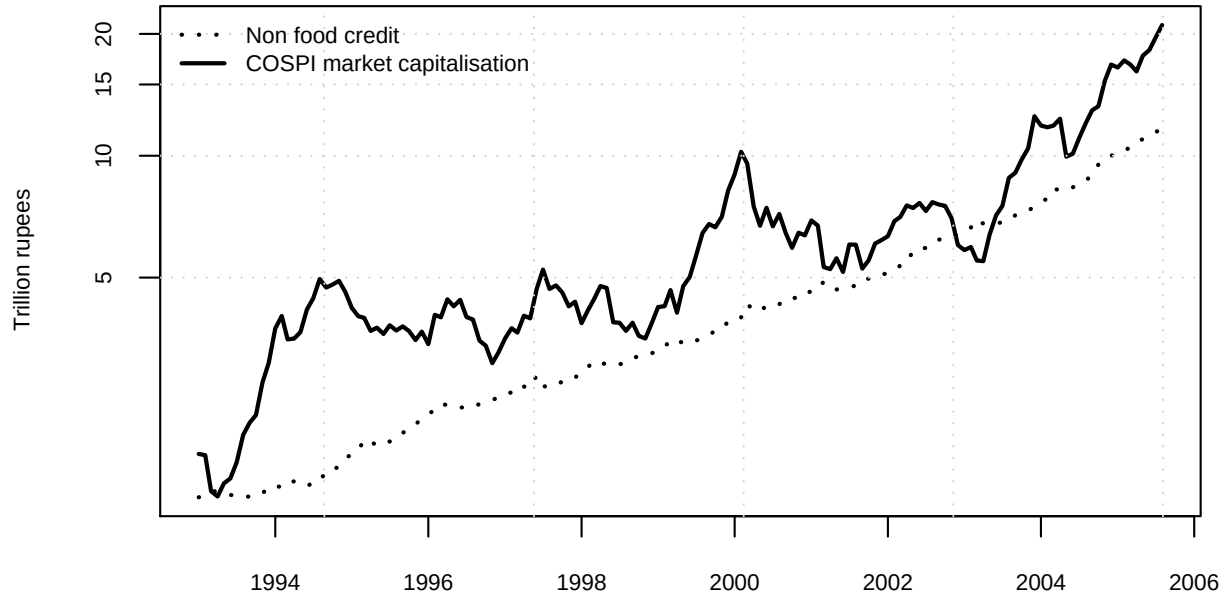
These relationships are not an artifact of one point in time. Figure 6 shows that for most of the period after 1993, the market value of the COSPI companies has been substantially larger than the (market value) of non-food credit.

[17] This estimate *understates* the importance of the equity market, since it only counts the 2,573 largest firms.

[18] The stock of dematerialised corporate bonds at NSDL was a little more than Rs.3 trillion, and the stock of commercial paper was at Rs.0.25 trillion. These add up to Rs.3.25 trillion. Based on this, it is estimated that the total stock of corporate debt securities stands at Rs. 4 trillion.

There is a slight double-counting here, to the extent that banks own corporate bonds.

Figure 6 Equity versus bank financing



The evidence suggests that both entrepreneurs and households have most likely adapted their financing patterns in favour of the securities markets and, particularly, the equity market.

6 Lessons learnt

Financial sector reforms started with the aim to improve the competitive structure and financial market institutions in India. These reforms were applied across the board, but have achieved a mixed bag of results at the end of a decade. Why was there such a marked difference between the pace of market development between debt and equity markets in India? How did radical changes on the equity market come about? We offer some possible lessons from our observations on the reforms, and their impact on the Indian equity and debt market outcomes, to understand how we might achieve far-reaching change in Indian economics.

6.1 Mechanical imitation often fails

The creation and subsequent failure of the OTCEI was an important lesson while designing financial sector institutions. The design of the OTCEI was based on that of the NASDAQ, which was a successful exchange in the US.

Thus, despite being aware that the largest international markets were primarily based on dealers or market makers, the equity reforms design team elected to create a new kind of market: the electronic limit order book market, without market makers. In a departure from traditional notions about stock exchange governance, NSE started as a demutualised exchange structure.

These ideas did not flow from "international benchmarking" or "following international best practices". These decisions were based on reasoning from first principles. It is fascinating to see that in the mid 1990s and late 1990s, radical change came to NYSE, CME, CBOT, LSE and NASDAQ, all of which have moved towards the Indian structure of demutualised exchanges with electronic order book markets without market makers.

In contrast, the RBI has generally followed "international best practice" in the design and development of the bond market. This effort at imitation of institutions without solving underlying problems of incentives was accompanied by a lack of clarifying the issues of ownership, governance and regulation of market institutions.

It is interesting to observe that once the CCIL was set up to act as counterparty to debt market trades, the size of the debt market and the innovations in debt products have increased. It is very unusual, by international standards, to have trades on an OTC debt market being subject to the netting and risk management of a clearing corporation. The idea of CCIL did not flow from imitating international best practice; it came through thinking from first principles based on the success of NSCC on the Indian equity market.

Thus, one lesson that we should draw from India's successes and failures in finance is that mechanical adoption of first world institutions often fails to deliver results in India (Pritchett and Woolcock, 2004).[19] The fact that the US bond market is an OTC market and is the most liquid bond market in the world did not imply that the correct choice for India is an OTC market.

6.2 It is important to focus on *financial architecture*

The creation of an independent regulator, SEBI, was a fundamental step in reforms on the equity markets. This marked a change in financial architecture (Merton and Bodie, 1995). The key design features were:

- SEBI was an autonomous regulator for the securities markets.
- SEBI had no responsibilities for service provision. SEBI only regulated service providers.
- SEBI had no mandate to trade on the markets that it regulated.

[19] As Pritchett & Woolcock observe, asking a practitioner in an OECD country to discuss policy issues in a developing country is like asking a New York cab driver to design a car.

- SEBI did not inherit an industry dominated by an incumbent public sector presence.
- SEBI started with a clean slate on staffing, and was able to evolve superior HR practices.
- The equity market reforms were initiated with minimal restrictions on foreign brokers, foreign mutual funds and foreign investors entering the market.

While there has been much attention focussed on NSE, NSCCL and NSDL in equity market development, it is important to note that these agencies are unlikely to have been created or encouraged to play a key role in a far-reaching reforms program, if there had been problems with the foundations of SEBI.

If SEBI had a different mandate or faced internal conflicts of interest, then NSE, NSCCL and NSDL would likely have faced problems in implementing the reforms program. As a counter-example, once they were established, it was equally feasible for the RBI to harness similar (if not the same) institutions in the bond and the currency market. But this was not the case.

What appears to have been most effective was the three-way relationship – among the Ministry of Finance, SEBI and the institutions of NSE, NSCCL and NSDL – in advocating and advancing the reforms of the equity market. A lack of conviction and participation at any of these organisations could have delivered a substantially inferior set of outcomes to the reforms.

It is also important to point out that when the reforms looked inevitable, the industy incumbents were prompt to respond and reform to the challenges of competition. For example, the incumbent exchange, BSE, also achieved revolutionary change in going from a broker-run open-outcry exchange to a modern demutualised electronic exchange. BSE had started as a conservative organisation which lobbied to block reforms and prevent change. While competition was crucial to push the BSE to reform, it is admirable that it was able to reinvent itself.

This is in contrast with public sector firms in the other industries. For example, in the mutual fund industry, the public sector firms were not able to continue in the face of competition. In the case of the bond market and banking, the questions about reforms in the financial architecture are related to larger debates about the RBI itself. As Chandavarkar (2005) observes: *The Reserve Bank of India alone has remained inexplicably immune to reform and the global trend of legal independence and modernisation of central banks.... Independence implies accountability, transparency and the creation of an executive (not advisory) monetary policy committee; revamping its inflated and overly hierarchical organisation; and divestiture of supervisory and quasi-fiscal functions.*

6.3 New institutions lead change

For the successful implementation of radical equity market reforms, it was important that SEBI, NSE, NSCCL and NSDL started as new agencies. The observation from the Indian reforms experience has been that new agencies are likely to be more independent of incumbent views and pressures.

For example, the FMC obtained major progress on the commodity futures markets by initiating the creation of NMCE, NCDEX and MCX. The RBI created CCIL, which continues to be the source of innovative products and services in the debt markets. In both cases, the new agencies have carried in innovations from the equity market reforms program. The new institutions – NMCE, NCDEX, MCX and CCIL – become change agents in otherwise stagnant markets.

However, the commodity and the debt market reforms have yet achieved relatively limited impact, partly owing to the fact that both the FMC and the RBI are themselves incumbent institutions and vulnerable to incumbent pressues. The basic issues of clarifying the financial architecture had not been addressed.

6.4 Competition can overcome weak enforcement

The success in the regulation of the securities markets involves three major elements: competition policy, disclosure, and enforcement. As a first approximation, the weakest function in SEBI has been that of enforcement. SEBI has routinely failed to prove malpractice in court. Potential wrongdoers are likely to perceive SEBI as only being a weak deterrent in terms of the risk of prosecution and punishment in the future.

Yet, the equity market has shaped up as a highly liquid and efficient market. The key factors here appear to be SEBI's success on *disclosure rules* and *competition policy*. At the level of exchange infrastructure, SEBI has a framework with competition between institutions. More importantly, the equity market itself is one where prices are shaped through speculative price discovery with direct participation by millions of households. It is this direct participation of households that has reduced the market power of any single economic agent.

This large mass of rational speculators has proved to be remarkably effective at checking market malpractice such as market manipulation. If a price is "too low" on the trading screen, a large mass of buyers from all across the country steps in, and vice versa. This large mass of market participants upholds market efficiency, even though the hands-on supervisory efforts by SEBI, in the area of prosecution, have been weak.

6.5 Radical change is possible, *but* ...

Indian finance, like Indian telecom, offers a lesson that radical change *is* possible. In finance, clear thinking on the part of key people at NSE and NSDL gave revolutionary rather than incremental change, and laid a sound foundation for the Indian financial system. India's households and India's firms have utilised the modern equity market to shift towards a domination of the equity market in Indian finance. However, the implementation of radical ideas would have not been possible without policy support from the MoF and the SEBI.

Financial sector reforms are relatively easy in terms of the political economy, since ordinary voters are not affected by bureacratic loss of turf, or the loss of rents suffered by incumbents. Indeed, the hardest problems of political economy were probably in the equity market - where India did get through with radical change over the 1993-2001 period. The complexities of the political economy of change in the equity market can be illustrated by a simple calculation. The erstwhile BSE structure had roughly 800 members with a seat value of roughly $1 million per seat, adding up to somewhat below $1 billion. Ten years later, the demutualised BSE has a seat value of roughly one-fourth this amount. In other words, reforms on the equity market induced a ten-year holding period return for erstwhile BSE members of -13% per year on an asset of a billion dollars.

The bureacratic turf problems of reshaping financial architecture present a relatively small challenge, compared with these direct economic interests.

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