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**Doing Business in India:
What has liberalization changed?**

by

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Doing Business in India:

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Abstract

The Indian economic reforms that began in 1991 have unleashed progressive forces in the Indian economy in the past decade. During the economic boom of 1991-96, domestic and foreign private investment surged, without significantly altering the structure and operation of existing Indian firms. The ensuing slowdown during 1996-99 revealed the internal weaknesses of Indian industry and started to drive changes. The evolving relationship between Indian and foreign firms reflects the changes ushered in by the reforms. This paper suggests two relatively neglected areas of pending reform: the need for reform to percolate to the local level and the need to build a public lobby for reform. Because technology lies at the heart of international competitiveness, this paper then reviews technology and innovation in the periods before and after 1991. Before 1991, the tremendous investment in R&D, with its heavy emphasis on indigenisation, failed to enhance the efficiency and productivity of Indian industry. The pressure brought by the liberalization of 1991-99 spurred fundamental changes in technology and innovation, especially at the micro-level. Indian firms have become more efficient, imported more foreign technology, and restructured and increased in-house R&D.

INNOVATION

by Nadir Godrej¹

What is the reason that our nation
Isn't well known for innovation?
We spend so little on R and D
And the results are poor, obviously.
And I, for one, would lay the charge
Quite squarely on our Licence Raj.
A licence then was a sinecure
A perfect method to ensure
A steady stream of easy dough
And this went on and on, you know.
The dinosaurs that roamed the land,
I'm sure that you will understand,
Had no need to innovate
For after all they were doing great.
But in '91 the meteor hit.
And stirred things up quite a bit.
As dinosaurs were now laid low
The nimbler mammals start to grow.
In other lands it is a fact
Is all that many can afford
And in this field we have scored.
There is no doubt we have the brains
And therefore some have taken pains
To organise our talent pools,
As software firms, computer schools
That clearly pass every test
And are considered the very best.
Sometimes it is our many flaws
Such as the lack of patent laws,
Our many years of price controls
And endless number of poor souls,
That enabled us to take the lead

The smaller firms are quick to act.
Entrepreneurs don't hesitate
It is their task to innovate.
But smaller firms faced disruption
They're harder hit by corruption
And more entangled in red tape
Which in India you can't escape.
And because of this sorry state
Both big and small didn't innovate.
One strategy then was to steal,
Pretend to reinvent the wheel,
So ideas known in other nations
Were passed off here as innovations.
The picture that I paint is bleak
But now is the time for me to speak
Of areas where it can be said
That Indians are a bit ahead
In low cost goods we specialise
Simple products in a tiny size,
In processes that succeed
In developing generic drugs
And pesticides for all the bugs
And that is all I have to say
I wish you all a good day.
For those of you who swear by prose
You must admit, a tiny dose
Of early morning, rhyming verse
As long as it is crisp and terse
Can serve to wake, if not the dead,
Those who, still think, they are in bed.
The bell has rung, get up, stand straight
It's not too late, let's innovate.

Industry in India is characterized by contrast. The British economist Joan Robinson once said about India that whatever could be said about it, so could the opposite². Even a casual visitor to India would experience this contrast: a typical street scene would involve a bullock-cart being overtaken by a Hindustan Motors Ambassador (a 1960s model Morris Oxford) being overtaken by a 1990s Suzuki or Opel Astra. What makes the scene distinctively Indian is that both the bullock-cart and Ambassador could have been built anything from thirty years ago to thirty days ago. Software firms in Bangalore and Hyderabad have much more in common with firms in Silicon Valley than with the state fertilizer factory in Talcher, which celebrated its silver jubilee before producing its first ton of fertilizer. A visit to the Finance Ministry convinces one that the Indian bureaucrat is being cast in a new mould of market-oriented individuals with an international outlook. One remains convinced until one visits certain other ministries and meets bureaucrats who, one suspects, have not yet had the end of the cold war brought to their attention.

I. Introduction: Much change, but not everywhere

Let me begin with a series of random facts:

- i. The Indian car market in 1999 at 600,000 vehicles passed China, turning India into the third largest car market in Asia (after Japan and South Korea). In 1991, the Indian car market was sixth, after Japan, South Korea, China, Taiwan, and Malaysia.
- ii. India has one of the world's most efficient cable TV systems, with 30 million connections and a daily cable audience estimated at over 100 million people³. An average rental of Rs 150 per month provides around 40 channels, through over 30,000 independent cable TV operators. This is from a standing start: in 1991, India had one TV channel, the state-owned Doordarshan.
- iii. At country # 177 of 209 countries in 1997, India remains one of the world's poorest countries, with 16% of the world's population but 35% of the world's population below the poverty line (World Bank 1999).
- iv. Azim Premji, who owns 75% of the Indian firm Wipro (mainly in IT, but which has its origins as a family business in soap and edible oil) is one of the world's ten richest men. Briefly, in February 2000, he was reputed to be the world's third richest, based on a stock market valuation for Wipro that had risen 800 times in the last eight years.

- v. Successful Indian software firms like Infosys, Wipro and NIIT, all of which have seen sky-rocketing stock market valuations and P/E ratios of 100+, are lobbying the Indian government to permit them to purchase foreign firms for \$1 billion with no prior approval.
- vi. In May 2000, the Indian opposition organized a National Strike against liberalization, demanding in particular that the government roll back the modest subsidy cuts that it had announced in the February 2000 budget. Sonia Gandhi, as leader of the Congress opposition, rose in parliament to support the strike. The general tone was one of “just politics”.
- vii. A survey by the Centre for the Study of Developing Societies (CSDS) asked people what they thought of the economic reforms. Eighty percent of the population had not noticed any change in economic policies in the last ten years⁴.
- viii. Hindustan Motors, which for 40 years has made essentially the same 1960 Morris Oxford, the Ambassador, at its factory near Calcutta, continued to be decently profitable even in 1995. It is only in the last three years that making a 40 year old model with indifferent quality finally seems to be an unprofitable activity – sales of the Ambassador have fallen to under 1% of the Indian car market.
- ix. The Talcher unit of Fertilizer Corporation of India, the state-owned fertilizer factory recently celebrated its silver jubilee. It is yet to produce its first kilogram of fertilizer. A few years ago, its workers went on strike (one wonders from what) demanding higher wages. The same government that put through the 1991–93 reforms gave in to the demand.
- x. The Uttar Pradesh government, one of the most corrupt and inefficient in the country, put through a major deregulation of the state electricity board in early 2000, beginning by corporatising the Board into three companies, for generation, distribution and transmission. The state employees went on strike, but the state and central government stood firm, taking out full-page ads in the papers that showed how the reform was to provide the public with a better service.

This listing illustrates the complex picture that always emerges when one studies India. Change has been dramatic in some sectors, where Indian consumers can buy world-class products at internationally comparable prices. In other sectors, though, change has been halting to the point of being difficult to perceive. It also illustrates that the change is dramatic relative to India’s own past. When compared with other countries, India still has a long reform agenda pending. What is clear, though, is that the reforms since 1991 have unleashed change which is

increasingly self-perpetuating. This paper reflects on a few areas of this change: Section II begins by looking at what has changed for Indian firms, and how their own perspectives on reform evolved. How is the structure of Indian industry different in 2000 from 1991, which firms mattered then and now? The next section (section III) looks at foreign firms and their evolving relationship with Indian firms since 1991. Then some points on the way ahead (Section IV) – pending areas of reform that are comparatively neglected in public debate. In context of the long-term success of firms, nothing is more important than Technology: Section V takes a look at how Technology and Innovation have changed in Indian industry since 1991. What has happened to efficiency, to technology import, and to investment in R&D? Finally, Section VI includes a few comments on winners and losers in Indian industry.

II. The Changing Structure of Indian Industry: Becoming Normal

The nine years since liberalisation⁵ began in 1991 is best seen as two periods, the boom of 1991 to 1996 and the slowdown from 1996 to 1999⁶. The five years from 1991 to 1996 saw a boom: the lifting of controls on licensing in particular, but also technology import and foreign investment, led to a big increase in industrial investment.

A major liberalisation of the capital market freed firms to price their own issues, instead of pricing being determined by a government regulator, and this combined with a strong feel-good factor of operating in a new era that could only be good for industry. The result was an investment boom and a major increase in foreign investment, all driven by the private sector. Industrial investment rose dramatically – investment intentions, as indicated by filing of Industrial Entrepreneur’s Memoranda with the government, peaking at 6900 proposals worth \$ 42 Billion in 1995, and then falling by two-thirds by 1998.

As an insightful recent study of Indian Industry by the National Council of Applied Economic Research (NCAER) says, the data “suggests a remarkable boom in industry in the first half of the 1990s, accompanied by a considerable acceleration of growth in both employment and productivity...The growth between 1991-2 and 1995-6 came partly from the growth of old establishments and partly from the emergence of new establishments...[For the old establishments] their average capital-output ratio rose from 0.5 to 0.63. Worker productivity rose by almost a third; wages per worker rose almost as much....Profit margins increased significantly. Thus the older establishments invested heavily, and both worker productivity and

profitability increased.”(NCAER 1999, 9) The slowdown since 1996 has been attributed to many causes. The NCAER study identifies poor investment decisions of the boom years as a major cause. The investment boom of the early 1990s was dominated by Indian firms, mainly operating in commodity industries. Used to operating in a shortage economy where profits were limited by how much one could make, firms invested heavily in sectors like steel, fertilizers, cement, petrochemicals, and aluminum (NCAER 1999, 12). Capacity increased much faster than the market, and by 1996 overcapacity combined with a liquidity crunch combined with a psychological swing from feel-good to feel-bad (driven by the political uncertainty that came from four governments in less than two years) and led to the slowdown. Foreign firms – as the NCAER study shows - stayed out of the commodity businesses that Indian firms dominated, entering fields like pharmaceuticals, banking, and consumer goods where they encountered less competition.

The slowdown has been particularly important as a driver of change in industry. Many industrialists reflect that the period from 1991 to 1996 was one where the sudden burst of freedom meant one could simply do more. In spite of record growth in sales and profits for many firms, change in what firms did, and how they did it, was relatively modest. It was only as growth fell and profit margins were squeezed that firms started to seriously restructure.

The picture that emerges of Indian industry after nine years of liberalisation, then is roughly as follows:

1. The public sector plays a declining role, but it is important to recognise that the role is still major. Public Sector Enterprise (PSE) sales may have declined from 45% to 37% of total sales, but 37% is still a large number. (NCAER 1999,11-2)⁷ Seven of the top 10 firms by sales in 1998, seven years after liberalisation began, are public sector firms, six being oil companies (22 of the top 100 firms are PSEs). The last two years have finally seen talk of privatisation, but progress has been glacial. There was much publicity when the first PSE was privatised in December 1999: Modern Foods, a bread company, was sold to Hindustan Levers (HLL). The deal was important more as symbol – the national bread company being sold to a multi-national – than as reality: the value was \$20 million, well under 0.01% of the total PSE stock. Although privatisation is now being talked of, and the report of the disinvestment commission has been accepted by the government “in principle”, there has been little progress in practice. Take the comments of Madhavrao Scindia of the Congress Party, who one would normally consider to be

a more progressive politician: “If the public sector undertaking is efficient, why should the government be in a hurry to throw away a family jewel?...Secondly, would you dispose of a large source of livelihood? In the case of Modern Foods, its 4500 employees have been told that only 700 will be retained”.⁸

2. Small industry continues to be an area no government has had the courage to tackle. Over 700 products, including for example toilet paper and household utensils, remain reserved for the small-scale sector. Reservations have particularly benefited the few large firms that made the item before reservation: under a grandfather clause, they could continue manufacture and are protected from competition from new large entrants. The lack of political will is best illustrated by the government having agreed with the US to open the market to consumer goods imports by 2001, two years before being required to do so under the WTO. This means that if a large Indian firm or multinational wishes to enter the Indian market for toilet paper or soap, it can set up a factory in Sri Lanka and import the product into India, but cannot set up its own factory in India! This clearly is ridiculous, but the lack of public awareness of this issue is striking. This issue is dealt with in detail in Rakesh Mohan’s paper in this volume.

3. The most striking feature is the growth of competition. In sector after sector, new, often foreign entrants now compete against old, and the choice for the Indian consumer has changed dramatically, as Table 1 on changes in ten industry segments shows.

4. Foreign Investment is today essentially free. Automatic approval for investment upto 74% is permitted in all except four industries, and 100% subsidiaries are permitted by specific approval. Foreign Direct Investment accounted for 2.7 % of all investment in India in 1998, up from 0.1% in 1991. This 2.7% still compares poorly with China’s 12.7% or Malaysia’s 16.5%.

5. Indian firms now compete against imports in several industries; this is particularly true of industrial products like machine tools and instrumentation but imported TV sets, pagers, mobile phones and refrigerators are increasingly common.

6. Exports – as the introductory paper in this volume documented, India’s share in world trade has finally shown an increase in the 90s after four decades of decline. Exports are serious business for a growing number of Indian firms, and account for the major share of sales in software and pharmaceuticals.

7. The emergence of new firms, which have caught the fancy of the stock market, dominated the business press last year. The IT industry is today the single largest industry by

stock market valuations, accounting for over a fourth of total stock market capitalisation. India's most valuable companies are Wipro, Infosys and HLL, where HLL was twice as valuable as the next company for the last five years⁹.

8. Foreign Institutional Investors are now active players on the Indian stock markets. Although they account for under 10% of total market capitalisation, they account for a disproportionate share of daily trading, and their buying preferences have led to a penalty being imposed on stock valuations of firms which have group cross-holdings, inadequate disclosures or which are closely-held. This in turn has fed interest in corporate governance.

9. There has been much restructuring of several industry sectors: the cement industry has seen particular consolidation, with the entry through acquisition of two major foreign groups (Lafarge and Blue Circle), and acquisitions by Indian firms of smaller players to grow market share. In particular, cement firms that were secondary businesses of major industrial houses are being sold off. Given that industrial licensing led to fragmented capacity in many industries with a dozen or more small players, restructuring was inevitable but is only now gathering pace. Reliance has been buying up synthetic fibre competitors (Raymond Synthetics, DCL Polyester, ICI Fibres, JK Corp and India Polyfibres) to the point where it now controls 60% of the market. The criterion for success in more and more industries is increasingly making a product that more people wish to buy more efficiently than others. Through 1991 for many industrial segments, it was much more the licenses that could be captured. In other words, Indian industry is becoming normal.

III. The changing relationship with foreign firms¹⁰

Perhaps the greatest driver of change in the relationship with foreign firms has been the change in perceptions of India as an attractive market. Before 1991, Indian policy saw foreign investment as a necessary evil, the price for desirable technology. Foreign firms saw India as a place that was more trouble than it was worth. They entered India with the lead role being played by an Indian firm, content to establish a presence in a market of future importance, but with management control firmly with the Indian partner. In any case, the Indian partner controlled the key success factor of obtaining an industrial licence. Since 1991, three things changed: first, foreign firms could now much more freely invest in India, including setting up 100% subsidiaries. Second, the change in competition meant that there was a demand for new

technology – to introduce new products, or more efficient processes. The Indian firm often sought this technology from its foreign partner. And third, the foreign firm’s perception of the Indian market had changed dramatically – there was a sudden discovery of a large (and usually grossly over-estimated) middle class, and what was clearly going to be one of the world’s top few markets in a few years.

The first few years after 1991 were a honeymoon: the sudden freedom to enter new fields, license new technologies, and expand capacity meant that everyone was happy, Indians and foreigners. But as competition increased and foreign firms began to put together more active India strategies, tensions emerged. At just the time that Indian firms began to look for more technology, and had the freedom to license it, foreign firms began to seek more control over the technology they provided and over their Indian operations. The result has been an ambivalent attitude to foreign investment by Indian firms. There has been much public talk by Indian industrialists of “level playing fields” as an argument for continued protection. The ambivalence is between foreign firms which have the freedom to invest in India with whom one will have to compete and having the freedom to sell ones own firm to foreigners. This ambivalence is reflected in statements by the leading industry group Confederation of Indian Industry (CII) ¹¹, which has changed stance from being unqualified liberalisers in 1991 to qualifying their welcome to foreign firms today.

In December 1998, the BJP-led government passed a notification requiring that foreign firms, which wished to set up a new Indian operation, get a No Objection Certificate from any existing Indian partners or licensees. Industry associations have since argued against any attempt to relax this regulation.

It seemed like this ambivalent attitude from some sections of industry to foreign investment struck a chord with the BJP government, with its dominant nationalist rhetoric of Swadeshi when it first formed the government in 1998. In its second incarnation, though, the word Swadeshi has been striking by its absence in the BJP platform: even the rhetoric was quietly dropped from every public statement, whether the national budget or policy announcements. The reality is that decisions by the BJP have not been hostile to foreign firms – witness the sale of Modern Foods to Levers, or the telecom reform, which mainly met the representations of foreign firms, or indeed the opening up of the insurance sector to limited foreign investment¹².

Again, the changing relationship between Indian and foreign firms should be seen as a part of Indian industry getting to be more normal. The old reasons why foreign firms needed Indian firms – obtaining licenses, dealing with the bureaucracy – have not completely gone, but are dramatically reduced. The old reason why Indian firms needed foreign firms – as a source of technology – has not changed. That is why tensions have emerged, as foreign firms have become more assertive, seeing less that their Indian partners can do for them. The key to a new relationship built around true partnership lies in technology, which is discussed in Section V. A true partnership requires proprietary competencies on the Indian side, and the success in international alliances of Indian software and pharmaceutical firms points the way for the rest of industry. Next, though, let us look at some of the pending reform areas which can indeed help Indian firms compete internationally.

IV. The Pending Agenda for Reform

Many others in this volume deal with the need to move on all the bigger pending reforms – of infrastructure, of subsidy reduction and the reform of government finances, of changing the system of centre-state finance, of Public Sector privatisation, and of labour reform. These are all areas where the problems are well known, the solutions are well known, every major political party agrees on the solutions, and no government has had the courage and political will to push anything serious through when in power. So, instead, two relatively neglected areas of pending reform will be dealt with: the need for taking reform to the local level, and the need to build a public lobby for reform.

1. The need for reform at the local level: In 1991, much changed at the central level. A common industry-cocktail-party conversation piece in 1991 was how one no longer needed to catch a weekly flight to Delhi or maintain a liaison office there to get permissions through the government. Previously, any technology licence, foreign investment, major expansion, investment in a new factory, manufacture of a new item, or even expansion of capacity required a visit to Delhi and often months of form filling and pushing, often with bribes having to grease the way. At a stroke in 1991, this need was largely eliminated; the importance of this change is difficult to appreciate for those who have not experienced the old system.

The reforms that took place at a stroke, though, were largely confined to the Finance, Commerce and Industry Ministries. What did not change was the local Inspector Raj, where

several government inspectors could drop in on firms at will, each with absolute powers to cease operations first, and challenge the order later. Table 2 lists the inspectors that one medium sized engineering firm (and an engineering firm experiences far fewer regulations than say a chemical firm) experiences in May 2000, and what has changed since 1991.

What emerges is that with the exception of much simplification and removal of discretion of customs regulations, and some limited simplification of excise regulations, the remaining changes only add up to minor tinkering with the system.

The result is that Indian firms, that now have to compete with firms operating in countries like Singapore, are tied into processes that have not changed. Take exports, claimed by all in government to be a priority and something to be encouraged. If the firm I work for in India wishes to export something from our base in Pune, from the day the item is ready to the day it is on a flight out of Bombay is on average four days (see Table 3). Two years ago a customer in Sri Lanka wanted to buy a Valve we had in stock. We were half the price of our Singapore associate. However, by physically walking the product through every process personally it would take us two days to have it on a flight to Sri Lanka. Singapore had it on a flight that same afternoon and we lost the order.

Or take another example, in April 2000. A start-up in Pune imported a bio-digesting chemical. The invoice mentioned kilogrammes. The bottle mentioned litres. The customs refused to clear the consignment because of this discrepancy in spite of the firm offering to file a bond. The reagent ultimately went dead on the shelf in customs and had to be scrapped. When such stories do the rounds at meetings between industry associations and bureaucrats, there is always complete agreement on the need for change. What is missing is the nitty-gritty of reform, the commitment to drive detailed change through at the local level. This is a considerable missed opportunity for reform, as the changes are far too detailed to be politically contentious.

2. Apart from these specific measures, the key qualitative issue, in my opinion, is an inadequate focus on economic growth per se and too little public articulation of the case for reform, and how reform enhances the well-being of the ordinary citizen. Ashok Desai, Swaminathan Aiyar, and T N Ninan write hard-hitting editorials of insight, but they are mainly read by the converted. The front-page headlines of their own newspapers repeat populist liberalisation bashing by every party when it is in opposition, and often even when they are in government. India's economic performance from 1991 to 1997 was excellent relative to India's

standards and decent even compared with the world's fastest growing economies. One would, however, never know it reading India's very vibrant popular press, which reasonably accurately reflects public opinion. Economic growth is simply not an issue at the top of the public policy agenda in India. After five years of government with unheard of growth for India, the Congress Party did not even run on its growth record in the 1996 election. Where economic reform did come up at all, it came up apologetically in a "we're sorry we had to do this" tone. Economic reform was simply not a mass issue, and no political party chose to make it one. Writing about a poll conducted just before the 1996 election Swaminathan Aiyar had this to say:

- "Only 19 percent of people had heard of the new economic policy, of whom 10 percent approve.
- In rural areas, only 14 percent have heard of the reforms, of whom half approve.
- Among graduates, 66 per cent are aware of the issue and 44 per cent approve.
- Only 7 per cent of the very poor have heard of the reforms, of whom 3 per cent approve.

Some enthusiasts in the finance ministry may interpret this as majority support for the reforms. Left ideologues may interpret this as meaning most poor people are against reform. Both contentions are ludicrous. What the survey really shows is that economic reform is largely a non-issue, especially for the poor."¹³

Reading a description by Ronald Dore of Japan in the fifties and sixties when economic growth and Japan's per capita GDP ranking merited inclusion in a little table on the side of the daily newspaper (rather like the weather report), the contrast with India could not be greater¹⁴. In 1995-96 when the Indian economy grew at 6.5% instead of 5.8% estimated by the Finance Ministry, this merited an article on the inside page of the financial press. When the economy grew at a tiger-like 7.5% in 1996-97, vs the 6.8% that was estimated through January 1998, the story again appeared on an inside page in the financial press (that too in an article titled "Government figures of 7.5% GDP growth in 1996-97 belie advance estimates" – one would never know the economy grew 10% faster than expected without reading the small print!) ¹⁵. It is my estimate that the average Indian college graduate has no idea that India ranks in the world's poorest 20% of countries, or that China, growing at twice India's rate for the past twenty years, is now twice as rich¹⁶.

All of this adds up to the need to build a strong and articulate public lobby for reform. When Sonia Gandhi stands up in parliament and supports a strike against liberalisation as she did

this May, why does everyone accept this as “just politics”? Over the last month, our papers have been full of reports on a recent National Sample Survey which, most headlines claimed, shows that poverty has not fallen significantly in the 90s as growth has taken off as it did in the 80s. The clear message is liberalisation is good for growth but not for poverty reduction. The only concrete response to this has been from the journalist Swaminathan Aiyar, presently sitting in Washington! There have been no pro-reform editorials, no statements by our highly qualified and eloquent present or past finance ministers or senior finance ministry officials. The need for an articulate and public lobby for liberalisation is best seen by this illustration of its absence.

V. Technology and the National Innovation System¹⁷ – pre-and post 1991

The success of liberalisation for Indian industry will ultimately lie in the emergence of internationally competitive firms. Technical capability is at the heart of competing in the long-term¹⁸. Technical capability comes from learning, from technical effort. Four decades of protection and inward-looking policies fostered much technical effort. No developing country had a leader as interested in Science as Nehru¹⁹; or invested as much, as consciously, and as early in science and technology as India²⁰; or protected local technology as much. How much of this technical effort has been useful, though, in building the technical capabilities necessary for internationally competitive firms?

Pre-1991

India’s Industrial Policy through 1991 can best be summed up in a quote from Nehru, speaking in the 1950s: “I believe as a practical proposition that it is better to have a second-rate thing made in ones own country than a first rate thing one has to import”. Policies affecting technology developed hand-in-hand with this inward-looking industrial policy regime with an ideology of Self-reliance prevailing for over four decades. The Indian Patent Act of 1970 was the most conscious attempt among developing countries (together with Brazil) to improve terms for accessing international intellectual property. (Bagchi 1984) A motif of Self-reliance as an end-in-itself was given form through major investments by the state in civilian R&D and by a policy of protecting local technical effort by strictly regulating and restricting the import of technology. The state has dominated R&D in India since independence as both funder and doer (Table 4).

The Indian state invested more in science, and did it earlier, than any other developing country. By 1980, India invested 0.6% of GDP in R&D, about the same level as South Korea and Taiwan (and ahead of any other NIC at that time), two countries whose industrial progress had been much more rapid²¹. As of 1991, India spent \$1.8 billion on R&D, 86% financed by the state, and 74% done in state laboratories. Twelve percent of national R&D was financed by the state but done in the in-house R&D laboratories of public sector firms – this should more properly be combined with private sector in-house R&D. Going with the simultaneous protection of industry, the imperative for Indian firms was to produce everything locally. This technical effort aimed at indigenisation. Productivity and product improvement were not part of the imperative. Much of Indian industry was characterized by widespread inefficiency and product obsolescence. As the nature of competition changed with liberalization, much of this technical effort turned out to be useless.

The Content of R&D through 1991

More important than quantitative indicators is the qualitative issue of just what we mean by R&D: what was the content of Indian R&D? There have been very few serious studies of R&D in India that have examined this question, the best being a pioneering effort by Ashok Desai in 1969 with a follow-on in 1980. In a study done on private industry in India, he concluded that research absorbed approximately 2-3% of corporate R&D, development around 30-40% and operational investigations - problems of raw material supply, manufacturing problems and customer's problems - absorbed the rest of corporate R&D effort. (Desai 1980, 81) It can be expected that the proportion of R&D time spent on “operational investigations” would have dropped by 1991, largely as a result of a more formal separation of the R&D function both functionally and geographically, which insulated them from the demands of day-to-day fire fighting. What can be termed Development would then constitute the great bulk of R&D. Development, though, meant something quite different in India: Indigenisation. If it was imported, do it locally. The content of R&D in industry, then, became primarily one of developing local suppliers of raw materials and components, developing substitutes where the exact item was unavailable, developing a local manufacturing process. The main objective was to get a product that could be made locally almost in its entirety (Desai 1988). Not only was indigenisation almost the only objective of R&D but it was seen as the only *proper* objective of

R&D. One need only observe the awards introduced “to recognize R&D effort” by the government (the Department of Science and Technology (DST)) and by various chambers of commerce (for example, FICCI). All, including those presented at the annual R&D Summit jointly held by the DST and the Chambers, rewarded import substitution²². Whether the product compared with what was internationally available or was sold at a price that reflected international competitiveness was not a *secondary* concern: it was *no* concern at all.

Most private firms were quite happy with this state of affairs, content to make obsolete products in a stable economic environment, deliver them late, and charge a lot for them. The true miracle is that in spite of the incentive structure *some* firms did worry about the development of new products. New product development and R&D in general, though, became something good to do, not an imperative for survival. Largely absent in this picture is the kind of firm that led to the emergence of East Asia as a model of industrial development: the firm that began by importing technology from the developed world and ended up being an internationally competitive technologically independent firm. Firms such as Posco, the four leading Korean chaebols Samsung, Hyundai, Daewoo and LG, the Taiwanese firms Acer, Taiwan Semiconductor Manufacturing Corporation (TSMC), and others²³ are the source of industrial growth in their countries. The contrast with India is striking, and reflects the difference with which the government pursued a policy of self-reliance. The difference was not deep and wide infant-industry protection or the objective of self-reliance, common features in both Korea and India. In India, infant-industry protection combined with an inward-looking trade regime to protect permanent infants. In Korea and Taiwan, the infants had to grow up and compete internationally. The government intervened directly to ensure that firms that did grow up got more subsidies, while those that did not were merged with the more successful firms²⁴.

To conclude this section, R&D in Indian industry meant one word: Indigenisation. If the finished product, intermediate or raw material was imported, source it locally. Indigenisation took place at any cost and with compromises in quality. A general lack of access to imports forced much technical effort through indigenisation. This technical effort involved much Learning. There is no question that Indian industry built substantial technical capability by learning to make almost everything locally. The key question is how much of this technical effort was worthwhile and would turn out to be useful in building internationally competitive products. Waste was rife: indigenisation resulted, for example, in locally manufactured Printed Circuit

Boards (PCBs) (imports banned through 1991 - *no* exceptions) with runs of 20 boards *per year* and a PC industry which ten years ago was shown to have added *negative* value locally²⁵. But indigenisation also resulted in forcing the local development of a range of intermediate components of some sophistication. India in 1991 had a large and fairly competitive casting, forging and PCB industry²⁶. While many suppliers produced what could charitably be called sub-standard products, there were also several who made products of a high enough quality to be exported to Germany. The same applied for many other industries. Indeed, even *profitable* firms in technology-intensive industries in India were characterized by contrasts - bad quality manufacturers coexisted with decent quality ones, and firms that imported everything in knocked down form thrived alongside those who added significant value locally. In the process of indigenisation as Job # 1, # 2 and # 3, capabilities that were useful and useless developed simultaneously.

Overall one can sum up India's technological achievements by 1991 by recalling Nehru's "practical proposition" of making second-rate goods in the country instead of importing first-rate ones. That is exactly what India achieved.

What has Changed for Technology after Nine Years of Liberalization?

Competition from new firms and new products

The change in the last nine years in the availability of products that are at or close to the international frontier is striking. The visibility of foreign brands has increased dramatically: small towns boast Coca Cola and Akai signs, while in the larger cities cellular phone services from international players vie for bill-board space with signs proclaiming Citibank's sleep disorders²⁷. More importantly, there has been a dramatic increase in competition across the economy. Anyone who doubts the impact of competition on service levels and innovation (This point returns later while discussing specifically the effect of the changes on technology), has not been a frequent – and recent – visitor to India. The quality of air-service improved dramatically (it used to be said that Indian Airlines published a timetable for the sole purpose of allowing passengers to calculate how late they were) with the entry of private airlines, and the improvement has continued even as most private carriers subsequently disappeared²⁸. The sudden availability of a range of international quality consumer goods has led to a boom in demand for consumer durables like refrigerators, two-wheelers, and television sets – all

advertised on Star TV, and all growing in volume at 20-30% annually. Samsung and GE refrigerators and Sony and Akai (and even Konka of China) TV sets compete head on with those from Godrej, Philips (seen as an “Indian” firm, since it has been in India so long), Voltas, BPL and Videocon. The change in industrial products has been even more dramatic – essentially all capital goods can be imported at a nominal tariff of 20% (and an effective tariff that is negative in some sectors) and every major international player now competes alongside Indian firms. It is this increase in competition, both foreign and domestic, that is driving changes in technology.

It is important to recognise that it is the *nature* of competition that changed, not just the quantum. Most Indian markets have always been competitive, in terms of the number of firms that make up the market. However, each firm did much the same thing. As the operating head of India’s largest two-wheeler manufacturer, Bajaj Auto, Madhur Bajaj, puts it: With a waiting list of five to eight years for a scooter (or car, for that matter, all involving twenty-year old technology) and capacity expansion prevented, “the job of Marketing was one of Allocation not Selling”. Since 1991, most markets have seen several new players enter, primarily foreign firms, but also Indian firms that were earlier prevented from entering a particular market. They have entered the market by doing different things, by providing new products or using more efficient processes. Coupled with freer imports, today’s Indian consumer has the choice of an internationally available product at a price, which is internationally comparable. With this change, firms that manufacture locally have had to become efficient and to introduce new products, both involving much technological change. This in turn has driven the import of more technology, and in some cases, greater attention to in-house R&D. The overall impression is one of significantly greater technological dynamism, driven by the demand for innovation.

The Macro-View of Technology in Industry since 1991

A macro-view of technology in India after nine years of liberalization shows some if undramatic change. The percentage of total spending on R&D by the state (including PSEs) is slightly lower (78% in 1996-97 vs 86% in 1991²⁹), more from the inertia in-built in state R&D budgets than from explicit policy. A very similar pattern continues of the number of private firms doing R&D (about 1200) and their concentration in industrial sectors (Transportation, Pharmaceuticals, Chemicals, and Electricals and Electronics account for about 60% of the total for private industry). Technology imports continue to provide the bulk of new manufacturing

processes and new product technologies, and have significantly increased. Coupled with the major increase in Direct Foreign Investment we discussed earlier, it would seem that total investment in technology by Indian industry has increased, with a rise in spending on both Technology Import and in-house Development³⁰.

The Micro-View

The level of the individual firm points, however, to more radical change of technology in Indian industry. This evidence is based on a small pilot study of the changes which liberalization has brought to technology in Indian industry which we did at the Asia Pacific Research Center (A/PARC) at Stanford University in 1998. What evidence I can piece together from a combination of newspaper and magazine reports, personal visits to firms, and direct management of a firm in India, shows much more technological change than the macro-statistics would indicate.

Firms have responded to liberalization in three ways: first, many firms have improved manufacturing efficiency. Second, some industries have restructured and the import of technology has shown a significant increase, both in the form of increased foreign investment and technology licensing. Third, it seems as if some (perhaps only a few) firms have chosen to substantially increase investment in in-house R&D. Finally, some firms have not responded to liberalization with any substantive change; they are increasingly having change thrust on them. Two caveats for the analysis that follows: first, these technological responses have indeed come from competition: liberalization has driven competition and competition has driven technical change. But they have not come *only* from competition; the greater freedom of a liberalised environment and the *ambition* of Indian firms are being translated into technological initiatives. Second, these responses are not exclusive; firms have often changed in some combination of these three responses. Indeed, the changes are cumulative: the firms raising spending on in-house R&D are to some degree a subset of those who have invested in higher technology imports, who are in turn to some degree a subset of the firms that have improved manufacturing efficiency.

Industry restructuring

There are several visible examples of industry trying to restructure. Past government policy which parceled out industry capacity to different groups means that India's larger firms have a huge range of business activities. There has been some attempt by some groups to focus on fewer activities – SRF, for example, bought a tyre-cord plant – an industry where it is the leading player – and sold its finance company to its joint venture partner. The Tata group sold its personal products company Tomco to Hindustan Levers, which has emerged as the country's leading personal products and food-processing firm – and the firm with the highest market capitalization on the Bombay Stock Exchange. Tata Tea in turn bought Tetley Tea of the UK, in the largest overseas acquisition by any Indian firm. However, group diversity still remains more similar to the structure one would find with the Korean chaebol than to the Anglo-Saxon model of focused firms. It seems as if every Indian group of any size invested in power, telecom and finance ventures in the 1993–95 period, all sectors where they usually had no background. It is only in the last four years as industrial growth has fallen and industry has come under the dual pressure of competition from imports and falling margins that firms have been forced to look at which activities they really wish to retain.

A ready buyer for the businesses being sold by Indian groups as they restructure are foreign firms (one sees the same thing beginning to happen with the chaebols as a result of the financial crisis in Korea). Foreign firms are increasing their share of or buying out their Joint Venture partners, such as Cummins with Kirloskars or the HLL-Tomco buyout, mentioned earlier. The soft-drink market has seen Coca Cola buy out Parle, owner of the leading Indian brand Thums Up, and now compete head on with Pepsi. The story has by no means only been one of foreign firms buying out or eclipsing Indian firms. The US cosmetics firm Revlon entered the market with a sub-standard product, awoke the Indian firm Lakme into action, which went on to trounce Revlon – which withdrew from the market and re-entered more cautiously³¹. And one sees firms in many industries investing in new process plant – including the previously dormant textile industry where firms have invested in more new plant in the last five years than they did in the previous twenty.

Response 1: Become more efficient

Most firms have seen significant improvements in productivity, reflected in a much-improved capital-output ratio for the economy as a whole. A quick look at the Super 100 index for 1998-9 in Table 5 shows that profits have grown faster than sales.

Profitability is an imperfect indicator of efficiency, but the overall impression is of much efficiency gain when combined with countless stories in the business press of firms reducing employment through Voluntary Retirement Schemes. In the last year (ending March 2000), the first 1036 results declared show Sales rising 15 % and Net Profits 27%³². Some of this rise has come from a fall in interest payments, mainly through retiring debt as working capital has been managed better.

Response 2: Increased Import of Technology

Both the number and value of technology collaborations have risen sharply since 1991. The number of technology collaborations approved averaged 830 from 1986 to 1990, rising to 1630 from 1991 to 1995. (DSIR 1995) Cases involving foreign investment rose even faster – from an average of 240 per year to an average of 840. Approval of payment for technology also rose, from \$ 300 m a year to \$ 1 b a year. Combined with the increase in DFI (from an average of \$ 150 m per year in the 80s to \$ 3 b per year by the mid-90s) that we spoke of earlier, this adds up to a significantly higher level of technology imports.

Qualitative evidence of growing technology imports complements this picture. Six of the nine engineering firms we visited in our Aparc study have significantly increased technology imports. Several firms cited the freedom to license technology as a major factor, but were particularly appreciative of smaller operational changes that greatly eased the ability to acquire foreign technology. For example, pre-1991 if an Indian firm wished to hire a foreign consultant and pay him even \$ 1000 it required a separate application with much chasing with the Reserve Bank (RBI) in Bombay and perhaps even Ministries in Delhi. Approval would almost always eventually be granted, especially from the 80s onwards, but the sheer hassle of following up with several trips to Bombay and Delhi acted as a considerable deterrent even to applying. Since 1991, approval is still required but is “automatic” – one simply needs to register the payment with the RBI.

Three firms we visited, Telco, Bajaj Auto and Mahindra and Mahindra (all in the automotive industry), gave us examples of licensing new product designs or acquiring engine technology. They recounted descriptions of sending teams of engineers to Italy, Japan, the US and Australia to work alongside the foreign design consultants hired and absorb the tacit knowledge that is so essential to building technical competence. All three firms are today spending an order of magnitude more on technology import than they did pre-1991, but all have chosen to unpackage technology. For example, the technology for engines was licensed from firms in Japan and Australia, styling from Italy, and manufacturing and tool-making capability from Japan, with the Indian firm thus retaining proprietary control over the complete product. The descriptions read very much along the lines of descriptions of Korean firms such as Hyundai that, ten or fifteen years earlier, sent teams to the US and Japan to learn similarly from different technology sources.³³

Response 3: Re-think in-house R&D and Invest more in it

The data shows some rise in R&D spending by Indian firms, to around 0.64% of Sales in 1996³⁴ for 990 private firms with R&D units registered with the Department of Science and Technology, still a very small number in international terms. (DST 1999) The aggregate figures conceal, as in every country, major inter-firm differences: even more, the small aggregate change conceals major change in some industry sectors and firms. Table 6 shows R&D spending for the top twenty firms doing R&D in Indian industry in 1998-9 vs 1992-3.

Note the jump in R&D spending for several private sector firms – up two to twenty times in six years. Note also, though, that the absolute quantum of spending is low. The total spending of the top 10 R&D firms in India is under \$ 150 m. Firms argue that R&D is cheap in India, based on an abundance of low-cost skilled labour. Several foreign firms, following the software lead, have now set up R&D labs in India. GE, for instance, has set up its second largest R&D centre in the world (and largest outside the U.S.) in Bangalore, recruiting around 3000 people with research facilities for at least three GE companies- GE Plastics, GE India Technology Center and GE aircraft engines.

A few firms have fundamentally rethought their approach to in-house product development, involving changing the entire role of in-house R&D. The task for R&D has moved from indigenisation to developing products with technology that is distinctive and proprietary to

the firm. Each of the three auto-industry firms mentioned above has sharply increased R&D spending in the last ten years. Each employs from two to four times as many R&D engineers as 10 years ago, with R&D spending as a percent of sales more than doubling. Expatriate managers (for example, Mahindra and Mahindra have hired a head of R&D from GM and a President from Ford) have been hired and key individuals in R&D have been trained at leading firms overseas.

The change in R&D investments is particularly striking in the pharmaceutical sector. Many Indian pharmaceutical firms benefited from the 1969 Indian Patent Act (which made product patents illegal and only permitted process patents for pharmaceuticals), and started by producing a series of reverse-engineered drugs. Change is being driven both by liberalisation in general and more importantly by India's signing of the GATT/WTO agreement, which means pharmaceuticals within the country, will be protected by product patents by 2005³⁵. R&D spending by Indian pharmaceutical firms has doubled (to \$ 70 m) in the last five years as exports have tripled (to \$ 1.5 b)³⁶.

The qualitative picture again complements and accentuates this change: several Indian pharmaceutical firms, in particular Ranbaxy, Dr Reddy's Laboratories (DRL), and Lupin have launched their own drug-discovery programmes, with the objective of patenting their own molecules. Both Ranbaxy and DRL have recently licensed patented molecules to MNCs, and both have bought foreign firms as a way of entering international markets. Most recently, Ranbaxy bought the generics business of Bayer as a way of entering the German market. The Indian firm Nicholas Piramal (NPIL) bought the entire R&D laboratory of Hoechst Marion Roussel as a way of jump-starting its own R&D effort. Each of Wockhardt, Cipla, NPIL, Ranbaxy, DRL and Lupin are today spending an order of magnitude more on R&D than ten years ago. Again, foreign scientists have been hired and Ranbaxy has even started a modest R&D effort in the US as a way of "monitoring" new developments – shades of Japan and South Korea again.

The software sector has attracted the greatest publicity, with an annual growth rate of 50% over the last decade, exports growing even faster, and firm valuations that have skyrocketed to the point where it is cheap for some Indian software firms to acquire American software firms. The success has been built around an abundance of low cost English-speaking programmers and not anything to do with product development skills. The software sector cannot properly be seen as a beneficiary of liberalisation, though, except in the most general

sense of easing the import and cost of computer hardware, making foreign travel easier, and freeing up the capital market. The industry was never subject to licensing, and could essentially bypass import and export controls. The fear now, as the Delhi wits have it, is that the success of the software sector could finally be in jeopardy as the government has finally recognised its importance and created a ministry for it.

VI. Winners and Losers: 1991 to 1999

So far, it has been argued that change in Indian industry since 1991 has been dramatic. This change shows up in the numbers, and it shows up even more in the qualitative picture of change in individual firms. What is clear is that the criteria for success in Indian industry have changed from capturing industrial licenses through knowing Rajiv Gandhi, bribing bureaucrats, or liaison men in Delhi. Today, success increasingly comes from making a better product more efficiently than anyone else, as it does in most of the world. Indian industry is becoming normal. But which firms have succeeded in this new economic environment? Who are the winners and who are the losers? To approach this question somewhat systematically, let us return to the Business India Super 100 indices for 1991 and 1999. What are the changes that one can see? Tables 7A and 7B list the winners, defined as firms which are in the 1999 Super 100 index but were not in 1991(table 7A) and as firms which have increased their profitability by more than four times since 1991(table 7B). Tables 8A and 8B list the losers, firms which were in the Super 100 in 1991 but are either not even in the Super 250 in 1999 (call these the Super-losers) (table 8A), or have dropped more than 50 places since 1991(table 8B).

The Winners: Of the Super 100 firms for 1999, 48 are new entrants from 1991(table 7A). Seventeen firms are in the traditional commodity industries of which six are in fertilizers (where success is built around a government subsidy)³⁷. Seven firms are Consumer product and engineering firms, in consumer electronics, two-wheelers, textiles and ready-made garments, and detergents. Six are software firms and four pharmaceuticals.³⁸ MNCs total upto six, with ABB, Castrol, Hind Lever Chemicals and Smithkline Beecham all representing the liberalised environment in which they can operate.³⁹ Six are in services like hotels and logistics.

The firms, which have shown above average growth in profits (table 7B), are concentrated in the non-commodity industries⁴⁰ – consumer goods, engineering, services (5 of the 23 firms are in Commodities).

Five are Multinationals, operating in a much less restrictive environment – Hindustan Levers, Nestle, ITC, Glaxo and Novartis. Hindustan Levers is a case in point, illustrating how the opening up after 1991 allowed an excellently managed MNC to expand and enter new businesses.

The Losers: Of the 100 firms in the Super 100 of 1991, 17 are not even in the Super 250 in 1999 as shown in table 8A.

These Super-losers see the old predominate – no surprises. Eleven of the 17 firms are in traditional commodity businesses, 2 are in textiles, 2 are in consumer products (Dunlop and Shaw Wallace),⁴¹ 1 in engineering (Premier Automobiles, manufacturer of the 1960 Fiat), and 1 is a multi-national (VST). It is noteworthy that there are as many MNC Losers as there are Winners. Table 8B lists six of them.

One might think that MNCs would be prime beneficiaries of liberalisation. This is simply not true – for every HLL which has thrived, there is a Siemens or Philips that has struggled to restructure just as many Indian firms have.

Finally, a comment on ownership: old business families dominated Indian industry. 37 firms of the Super 100 in 1991 were owned by six business families - all dating from well before independence.⁴² By 1999, Tatas dropped from 10 to 8 firms, Birlas from 12 to 9 (6 of the 9 remaining Birla firms belong to the Aditya Birla group), Thapar from 4 to 1, Singhania from 4 to 2 and Mafatlal and Modi from 4 to zero. Qualitative impressions over the last ten years are entirely consistent with this quantitative picture: the Tatas have long been considerably more professionally managed than any of the other groups and avoided the licence route to success. The Singhania, Modis, Mafatlals and Thapars have been in the public eye more for family feuds than what they have been doing to restructure their firms. The Aditya Birla group has a reputation for being much better managed than the other Birla groups. In other words, as we all know, it is not just a matter of being in the right business. It is even more a matter of management: of taking the right decisions and responding to change as it comes. And if it is good management that determines the success or failure of firms, as everywhere in the world, then that indicates the success of liberalisation.

Conclusions – What Do We Know about How Indian Industry Has Responded to Liberalization?

While the Indian example demonstrates so clearly the dangers of autarchy and import-substitution, these same policies did force much technical effort by industry and built a wide-ranging manufacturing base. Certainly, much of this was wasteful, creating firms, which remained infants for decades until eliminated by competition in the last decade. The Losers in Table 8 show that this process is well underway. But protection did also force effort and learning which is turning out to be useful in building a proprietary technological base. Would Ranbaxy and Dr Reddy's Labs and Mahindra & Mahindra and Tata Tea exist as potential world-beaters without 40 years of protection? Or in a more competitive environment, would they and others have emerged a decade and more ago as firms that made "Made in India" mean something? That some firms used protection to build a technical base while others were quite content to remain technologically inactive behind protectionist barriers is as clear an indication as any of the difficulty of building technical capability. And what is without dispute is that the Indian consumer in particular and the Indian economy in general has paid a heavy price for inward-looking protection, a price that adds up to among the worst development records in Asia. The changes since 1991 have unleashed a new dynamic in Indian industry, a dynamic that is forcing change in every sector as firms finally are forced by new firms and the availability of imported products to provide consumers with products, prices and service that are beginning to approach internationally competent levels. Efficient firms have benefited – even thrived – in the new environment. Inefficient ones have improved, merged, or have finally begun to disappear. Four decades of protection is long enough for any infant to mature. This paper has argued that some Indian firms have built up the technical capabilities that can make a tiger of the Indian economy. It might be a jungle out there, but that is where tigers – not pussy-cats – are found. It is time Indian industry found out which it is.

Endnotes:

1. Nadir Godrej is Managing Director of Godrej Soaps Ltd. He read out this poem at a breakfast meeting of the World Economic Forum/Confederation of Indian Industry's annual India Economic Summit in December 1999.
2. Quoted in Bhagwati (1985)
3. The Economist, May 27 2000, 73
4. Swaminathan Aiyar, "Lack of Growth Trickles Down", The Times of India, April 9, 2000
5. For a comprehensive background, see Ahluwalia et al(1998) and Bhagwati(1993).
6. There are signs the slowdown is ending- business confidence indicators are increasingly positive as of mid-2000.
7. The source quoted is the CMIE (Centre of Monitoring Indian economy) Prowess database, a balanced sample of 1172 publicly listed manufacturing companies.
8. Interview in Business Standard, May 19, 2000
9. It is always rash to write about stock-market valuations. When I began this paper, Wipro was first, Infosys second and HLL third. Today, Wipro and Infosys have fallen below HLL!
10. This section tells a story. It is not based on a statistical sample of how foreign firms and Indian firms have interacted
11. The other leading industry associations are the Federation of Indian Chambers of Commerce and Industry (FICCI), which has always been more parochial, and the Associated Chambers of Commerce (Assocham), where MNCs are strongly represented.
12. This came after the BJP itself successfully voted against the United Front's Insurance Reform Bill on precisely the same grounds two years earlier.
13. Swaminomics, The Sunday Times of India, August 25 1996
14. See Ronald Dore's many wonderful pieces comparing Japan's early development after Meiji with that of developing countries. In particular, Dore (1964) and Dore (1971).
15. Business Standard, February 7, 1998. Never mind that it took ten months after the financial year ended to discover the economy grew 10% faster than thought earlier! And also never mind that two years later the growth rates were revised upwards to an even more tiger-like 7.9% in 1994, 8% in 1995 and 7.5% in 1996.
16. Parochialism is not limited to India of course. I am reminded of the poll of American under-graduates some years back at the height of the Cold War where over half the students thought the Soviet Union was a founder member of NATO.
17. For a conceptual background on this, see Nelson(1993).
18. A distinction is drawn between competitiveness in the short-term and technical capability, which is the ability to compete long-term. Short-term competitiveness can come, for example, from low labor cost. But as labor costs rise, firms need to build the technical capability for productivity and higher-value added activities. See Forbes et al (2000), for more detail.
19. Nehru's interest in Science is well documented. Any collection of his speeches contains several gems on the value of science as a way of thinking and way of life generally and for scientific research particularly. Nehru

made a point of attending every Indian Science Congress and, as Prime Minister, of meeting leading international scientists when they visited India.

20. See Nayar(1983) for a background on India's approach to Science.
21. This continues to be the case: only Korea, Taiwan and Singapore - whose average R&D investment is at the OECD average - today invest proportionately more in R&D than India.
22. These awards for import substitution are still presented today, nine years after liberalisation began. Forty years of import substitution means there is still an automatic, if slowly weakening, association between technical effort and indigenisation.
23. See Kim (1997) for a series of such case studies from Korea. See also Hobday (1995), for cases from Taiwan, Singapore, and Hong Kong in addition to Korea. The criticism that the chaebols have faced in the Korean financial crisis of the late 90s may be well placed, but their problems should not obscure the great technical capability that they have built up in a wide range of industries.
24. This is why the whole States vs Markets debate has focused on the wrong question. The issue was not State **OR** Market, but what mix of State **AND** Market led to what kinds of Learning in firms.
25. Local value-added was negative because the import of complete PCs was not allowed. As a result, firms imported components, boxes, screens, keyboards - all separately. The total cost in foreign exchange of importing such PC components exceeded the cost of buying it whole! See Mahalingam (1989).
26. My estimate is that there are on the order of 10,000 foundries, forgers or PCB manufacturers all over the country, ranging hugely in size and capability.
27. The Citi, as we are told, *never* sleeps.
28. The changes in the airline industry characterise what has and has not changed in India: the change from the Indian Airlines monopoly of ten years ago is dramatic. Today, the one thriving private sector carrier Jet Airways provides excellent service – and competition has led to a dramatic improvement in Indian Airlines, who have discovered 'the passenger'. That shows how much has changed. But the fact that a joint venture between Tatas and Singapore Airlines has not been allowed to go ahead by each of the Congress, United Front, and BJP Governments on the flimsiest of pretexts simultaneously indicates how much still needs to change. The real reason is said to be that Jet Airways has influenced each government to refuse Tatas permission
29. The Department of Science and Technology publishes an annual R&D Statistics and R&D in Industry, the most authoritative source of data on Indian R&D. The most recent volume available is for 1996-7, published in June 1999 – with a two-three year delay. However, less systematic reports indicate that the share of industrial spending (including PSEs) in the total has continued to rise, and for the year ending March 2000 should be around 35% of total national R&D spending, up from 25% in 1991.
30. Although the rise is significant, too much should not be made of it – both Imports and in-house investment has risen over a small base. As of 1991, Technology Imports both in absolute terms and relative to sales were the lowest of all the major NICs - Korea, Taiwan, China, Brazil, and Mexico.
31. In a further indication of industry restructuring, the Tata group has since sold Lakme to Hindustan Levers

32. Business Standard, May 22, 2000. It is worth adding that excellent results from Reliance dominate the picture, accounting for 10% of the total net profits of the 1000+ firms and 25% of the profit increase over the previous year.
33. See Kim(1997) for several such descriptions.
34. It is probably higher today, but will still be below 1% of sales.
35. See Smith(2000), for more detail on the impact of the GATT/WTO agreement on Indian pharmaceutical firms
36. Numbers from Business India Intelligence, February 2000
37. In 1991, commodity firms like those in cement, metal products and fertilizer would have dominated any such Indian industry list. In 1991, almost half the Super 100 consisted of firms in traditional commodity industries or textiles
38. There are more pharmaceutical firms as new entrants in the 100 to 250 listing, indicating that many are still relatively small.
39. Two MNCs may seem very small, but remember that this sample is limited to publicly listed firms in India. The new 100% subsidiaries like Hyundai or IBM or the Joint Ventures like DCM Daewoo and Birla AT&T would be left out of such a list.
40. With the major exception of Reliance, which has followed a strategy of building the world's largest capacity plants using the latest licensed technology in world-record construction times – demonstrating that Korea can happen in India.
41. Both were old British firms eventually taken over by Chhabria, an Indian NRI, who spectacularly mismanaged them.
42. There were several other old business families in the 1991 Super 100, and also in 1999 – Bajaj, Mahindra, Sheth, Goenka all accounting for one or two firms.

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World Bank(1999). World Development Indicators

TABLE 1 : IMPRESSIONS OF CHANGE IN 10 INDUSTRIES

Industry Sector	Major Drivers of Change	Leading Players in 1991	Leading Players in 2000
Pharmaceuticals	Signing WTO; changes to Indian Patent Law of 1970	Glaxo, HCG, Ranbaxy	Glaxo, Cipla, Ranbaxy, HMR
Automobiles	Delicensing + new foreign investment permitted. Telco develops own SUV and car, M&M develops new SUV. Hyundai, Daewoo, Ford, GM, Toyota, Honda, Daimler Benz, Mitsubishi enter market.	Maruti Suzuki, Hindustan Motors, Premier Automobiles	Maruti Suzuki, Telco, Hyundai, Daewoo
Two-wheelers	New foreign investment, De-licensing, Removal of maximum capacity restrictions	Bajaj, LML, Kinetic Honda	Bajaj, TVS Suzuki, Hero Honda
Oil	Removal of PSU monopoly	All PSUs	Reliance at 25% of Indian refining capacity, PSUs, MRPL
Synthetic Fibres	Removal of capacity restrictions. Imports and tariff reduction	Reliance, JCT, JK Synthetics, Bombay Dyeing, Raymonds, Indo Rama, Baroda Rayon, Grasim	Reliance, Reliance, Reliance, Indo Rama, SRF in niche, Mitsubishi, Grasim
Colour TVs	Freer component imports, Foreign firm entry	BPL, Videocon, many others	BPL, Videocon, foreign brands
Soaps and Detergents	Fewer limits on HLL and large Indian firms Tomco sold to HLL	HLL, Tomco, Godrej	HLL, Nirma, Godrej
Television	No policy change, but satellite technology bypassed the state!	Doordarshan	Zee, Star, Doordarshan, Other Private
Airlines	Open to private firms	Indian Airlines	IA, Jet
Beverages	Open to foreign investment	Parle, Pepsi, Dukes	Coca Cola, Pepsi

TABLE 2 : THE INSPECTOR RAJ IN MAY 2000

INSPECTOR	POWERS	CHANGE SINCE 1991
Factory	Can stop the working of a particular work area where there is a fault and issue penalties	Licence fee was paid every year - now can be a lump sum for 5 years.
Electrical	Can issue a notice and levy penalties	None
ESIS	Can levy penalties	None
Octroi	In case of default can collect the difference in amount	None
Food	Can close down the canteen	None
Income tax	Levy penalties	None
Sales tax	Levy penalties	None
Excise	Can stop dispatch of material	Excise records are now simplified. Earlier compulsory use of pre-printed serially numbered invoices. Now can have own serial numbers and computerised records. Verification/inspection of documents, which used to be done half yearly, are now done yearly.
Municipal Corporation	Can serve notice and demolish unauthorised construction	None
Lift	Can stop the functioning of the lift	None
Customs*	Does not clear goods - can impose penalties, pay first, argue later	Major reduction in discretionary power by reducing the number of different classifications & different rates. Clearances still take a minimum of 2 days

* Not an inspector but a major regulatory mechanism

Note: These are the inspectors/inspections to which Forbes Marshall, Pune was subject in 1991 and the changes affected by 2000

Table 3: Exports as Priority?

Steps in Exporting goods for a medium-sized engineering firm in Pune

Step 1: Excise Clearance

Exports are exempt from Excise duty. Every export dispatch has to be authorised by the personal visit of an Excise inspector. He used to visit for domestic shipments too, but a change in the procedure for domestic dispatches now permits “self-removal”.

Time: ½ to 1 working days

Step 2: Octroi Clearance

Goods entering Bombay for shipment out are exempt from Octroi. The clearance requires a few hours, but can be done before the goods leave the factory.

Time: ½ working day

Step 3: Customs Clearance

Shipping bill filed in Customs: ½ day
Based on the shipping bill, the Octroi clearance takes place.

The next day the goods are dispatched to the port or airport: 1 day (from Pune to Bombay)

Customs carry out a Valuation and Clarification of every consignment: 1 day, if no query raised, clearance given to bring goods to docks.

At the docks, Customs physically examine the goods. Today, most consignments are not physically checked, but the process has to be followed: ½ day, a “Let Export” issued.

Goods handed over to the airline or shipping line. Airlines need a 24 hour “cooling off” period for security reasons. Ship loading times in India, among the worst in the world, are 2 to 7 days from the time the ship is available in the docks.

Step 4: Get Paid

15 to 30 days for the nationalised bank to pay against a sight Letter of Credit.

Total time for export from goods ready at factory to on aircraft: 5 days, of which 1 day is shipment time to Bombay and 1 day the cooling of period of the airline. 3 days are the minimum procedural times. Walking the goods through can get the total down from 5 days to 2 – 3 days, with 1 person 100% on the job.

TABLE 4 : R&D SPENDING - HOW INDIA COMPARES							
R&D Spending (US \$m)			R&D percent of GDP		Gross domestic expenditure on R&D by source of funds*(in percent)		
	1990	1996	1990	1996	Government	Universities	Business enterprise
India	2,495	2,188	0.9	0.8	75	1	24
South Korea	3,209	13,522	1.8	2.8	16	-	84
United States	150,765	184,665	2.8	2.4	36	5	59
Brazil	899	4,070	0.4	0.6	57	3	40
Mexico	427	886	0.2	0.3	66	8	18
Malaysia	36	226	0.1	0.3	14	-	8
Thailand	104	208	0.2	0.1	61	7	-
Indonesia	154	187	0.2	0.1	16	1	76

* Data for India, South Korea and Indonesia for 1994, for United States and Mexico for 1995 and for Brazil, Malaysia and Thailand for 1996.

Source: <http://unesco.org/en/stats/stats0.htm>, Lall (1996), NSF (1993)

TABLE 5: Top 100 Private Firms from Business India Super 100 (1998-99)

COMPANY	INDUSTRY	OWNERSHIP	1999		1995		1991		Sales	Profit
			SALES	PROFITS	SALES	PROFITS	SALES	PROFITS	Growth	Growth
									Multiple	Multiple
			Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	(1999/1991)	(1999/1991)
Reliance Industries	Commodity	Ambani	132310	17036	56491	10649	21382	1256	6	14
Larsen & Toubro	Engineering	Professional	69930	3896	31150	2774	14335	913	5	4
TISCO	Commodity	Tata	57420	3976	42091	2811	23308	1601	2	2
Hindustan Lever		Multinational	97270	8374	28869	1900	12071	659	8	13
Hindalco Industries	Commodity	Birla	19120	5668	10830	2920	6965	648	3	9
ITC		Multinational	36370	6234	25397	2616	23164	775	2	8
Grasim Industries	Commodity	Birla	38670	1638	21739	3086	13234	1005	3	2
BSES	Utilities	Professional	23490	2702	12144	1467	4668	332	5	8
Bajaj Auto	Engineering	Bajaj	33420	5405	19300	3052	12146	510	3	11
Mahindra & Mahindra	Engineering	Mahindra	35710	2286	18075	1170	10379	123	3	19
Sterlite Industries India	Commodity	New	18480	1608	5307	847				
ACC	Commodity	Tata	23990	568	18323	1443	11697	1213	2	0
Indo Gulf Corp	Commodity	Birla	14900	1640	5162	1686				
Gujarat Ambuja Cement	Commodity	New	10890	1505	4095	1005				
Ranbaxy Laboratories	Pharma	New	14310	1560	6869	1104	2603	121	5	13
Wipro	IT	New	18040	1702	7633	322				
Nirma	Consumer	New	12750	1709	3488	416				
Tata Chemicals	Engineering	Tata	13950	1898	8315	2867	3447	445	4	4
Tata Power Co.	Utilities	Tata	12690	1658	10892	1182	4765	346	3	5
Videocon International	Consumer	New	22840	1509	10917	881	5173	262	4	6
Nestle		Multinational	15450	862	6704	405	3148	151	5	6
Nagarjuna Fertilizers	Commodity		12410	1437	8630	1929				
Hero Honda Motors	Engineering	Munjal	15500	1213	4822	194	2155	158	7	8
Great Eastern Shipping	Services	Sheth	9810	1264	8247	1716	2891	371	3	3
MRF	Consumer	New	17860	1022	8758	208	6866	191	3	5
Indian Rayon	Commodity	Birla	13930	1060	9956	1329	5085	150	3	7
BPL	Engineering		17860	1025	7826	484				
COMPANY	INDUSTRY	OWNERSHIP	1999	1995	1991	Sales	Profit			

			SALES	PROFITS	SALES	PROFITS	SALES	PROFITS	Growth	Growth
									Multiple	Multiple
			Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	(1999/1991)	(1999/1991)
TELCO	Engineering	Tata	57180	-49	50442	3190	25960	1421	2	0
Raymond	Consumer-Tex	Singhania	12970	866	8026	705	4377	299	3	3
Chambal Fertilizers	Commodity		8020	1455	6646	1329				
TVS Suzuki	Engineering	Iyengar	13290	821	4119	320				
Indian Aluminum		Multinational	10340	788	9097	918	5842	517	2	2
Motor Industries		Multinational	12250	529			3324	149	4	4
MRPL	Commodity	Birla	26060	141						
Castrol India		Multinational	9480	1784	5224	730				
Tata Tea	Consumer	Tata	8740	1288	4527	593	3071	516	3	2
Ashok Leyland	Engineering		18540	204	13611	706	9274	263	2	1
SPIC	Commodity	Chidambaram	24330	508	12612	675	8536	63	3	8
Indian Hotels	Services	Tata	6230	1197	3820	821				
ISPAT Industries	Commodity	New	13010	251	8120	790	3560	110	4	2
Asian Paints	Consumer	New	9100	698	5220	435	2635	158	3	4
Escorts	Engineering	Nanda	11370	321	12693	509	9759	334	1	1
EIH	Services	Oberoi	4760	964	2878	581				
Dabur	Pharma	Burman	9010	497	4050	239				
Jaiprakash Industries	Other		9370	327	6805	955	5070	331	2	1
Pentafour Software	IT	New	5310	1191						
Colgate Palmolive		Multinational	9720	457	6540	712	3285	345	3	1
CIPLA	Pharma	New	6160	1150	2839	248				
Ahmedabad Electricity	Utilities	Professional	8820	451	5387	139	2699	79	3	6
Oswal Chemicals	Commodity	Oswal	7330	291	3070	170	3010	420	2	1
Usha Beltron	Other		7810	426						
Adani Export	Other		21890	673						
Asea Brown Boveri		Multinational	8930	377	6435	508				
Apollo Tyres	Consumer	Raunaq Singh	9030	400	5791	259	2013	144	4	3
Jindal Strips	Commodity	Jindal	10370	374	7162	727	3434	205	3	2
Exide Industries	Commodity	Shroff	6460	412						
COMPANY	INDUSTRY	OWNERSHIP	1999	1995	1991	Sales	Profit			
			SALES	PROFITS	SALES	PROFITS	SALES	PROFITS	Growth	Growth

									Multiple	Multiple
			Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	(1999/1991)	(1999/1991)
Brittania Industries	Consumer	Wadia	10150	396	5143	184	3680	101	3	4
Cummins India		Multinational	6620	748	5510	510	2780	190	2	4
Duncans Industries	Commodity	Goenka	10560	769						
Essar Steel	Commodity	New	21340	-4965						
Global Telesystems	Services	New	5400	632						
Infosys Technologies	IT	New	5130	1372						
Philips India		Multinational	16410	427	11191	442	5693	292	3	1
Century Textiles	Consumer-Tex	Birla	19770	-913			8839	824	2	-1
Novartis India		Multinational	7340	747	4690	200	3020	140	2	5
Glaxo		Multinational	7610	671	5652	190	3703	106	2	6
Madras Cements	Commodity		5240	399	2989	534				
Arvind Mills	Consumer-Tex	Lalbhai	9830	145	6389	1059				
South India Corp	Services	New	17110	239						
NIIT	IT	New	4590	1084						
Satyam Computer	IT	New	3780	728						
Finolex Industries	Commodity	New	5250	480	3256	333				
Crompton Greaves	Engineering	Thapar	15580	231	4755	190	6244	212	2	1
Eveready Industries	Engineering	New	7360	348	3070	245				
ICI India		Multinational	7690	349	5186	331.5	7568.2	211.3	1	2
EID Parry India	Consumer & Commodity		9310	399	5263	232.1	2618	64.6	4	6
Smithkline Beecham		Multinational	5740	808	2506	271.9				
Usha (India)	Engineering	New	13900	441	3695.6	311.8				
HCL Infosystems	IT	New	8970	585	5877	407.8		61.4		10
Lupin Laboratories	Pharma	New	6710	253	3942	351.5				
JK Industries	Commodity	Singhania	10670	221	5335	180.6	3368	166.3	3	1
CESC	Utilities	Birla	17010	-1281	9685.5	685	5429.7	93.8	3	-14
HFCL	Services	New	4080	374						
Essar Shipping	Services	New	4400	480	4856	906.7				
Bata India		Multinational	7120	383	4841.3	10				
COMPANY	INDUSTRY	OWNERSHIP	1999	1995	1991	Sales	Profit			
			SALES	PROFITS	SALES	PROFITS	SALES	PROFITS	Growth	Growth
									Multiple	Multiple

			Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	(1999/1991)	(1999/1991)
Hind Lever Chemicals		Multinational	9130	424						
Tata Hydro-electric	Utilities	Tata	5110	696	4317.5	451.8				
Siemens		Multinational	10480	-227	8981.2	351.2				
Dr Reddys Laboratories	Pharma	New	3850	518						
Proctor & Gamble India		Multinational	4090	559	2524	139.9				
Bharat Forge	Engineering	New	4400	373	3171.1	258.1	2471	144.3	2	3
Coats Viyella India		Multinational	9900	263	7579	420				
Century Enka	Commodity	Birla	6060	313	2865	83.4	5233.6	325.3	1	1
Zuari Industries	Commodity	Birla	8750	130	6917	575.8	2871.9	110.2	3	1
Malavika Steel	Commodity	New	7740	115						
Jindal Vijayanagar Steel	Commodity	New	5380	-290						
Deepak Fertilisers	Commodity	New	5220	727						
Bhushan Steel	Commodity	New	6770	405	2647	291.5				
Ceat	Consumer	Goenka	10100	173	8062	211.5	5153	224.4	2	1
Indo Rama Synthetics	Commodity	New	11660	-1571						
TOTAL			1598540	108405	787940	77078	393820	19850	4	5

Source: Business India, Nov. 29 1999

TABLE 6 : R&D EXPENDITURE			
NAME OF THE FIRM	1998-9 (Rs Million)	1992-3 (Rs Million)	Growth Multiple
Reliance Industries Ltd.	751	24	31
Mahindra & Mahindra Ltd.	414	33	12
Ranbaxy Laboratories Ltd.	523	84	6
Eicher Ltd.	222	40	5
Wockhardt Ltd.	156	33	5
Indian Oil Corporation Ltd.	772	185	4
Crompton Greaves Ltd	217	54	4
Hindustan Lever Ltd.	373	113	3
TELCO	1000	308	3
Ashok Leyland Ltd.	217	94	2
Bajaj Auto	315	144	2
Indian Telephone Industries Ltd.	338	212	2
Bharat Heavy Electricals Ltd.	527	430	1
Steel Authority of India Ltd.	483	395	1
Oil & Natural Gas Corporation Ltd.	250	221	1

Bharat Electronics Ltd.	661	705	1
DRL	212*	31	7

* Figure for 1996-97

Source: Research and Development in Industry 1992-93 and 1998-99

TABLE 7 A: WINNERS - NEW ENTRANTS TO THE SUPER 100

COMPANY	INDUSTRY	OWNERSHIP	1999		1995		1991	
			SALES	PROFITS	SALES	PROFITS	SALES	PROFITS
			Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	Rs.m
Asea Brown Boveri		Multinational	8930	377	6435	508		
Castrol India		Multinational	9480	1784	5224	730		
Chambal Fertilizers	Commodity		8020	1455	6646	1329		
Duncans Industries	Commodity	Goenka	10560	769				
Essar Steel	Commodity	New-Ruia	21340	-4965				
Exide Industries	Commodity	Shroff	6460	412				
Finolex Industries	Commodity	New-Chhabria	5250	480	3256	333		
Gujarat Ambuja Cement	Commodity	New	10890	1505	4095	1005		
Indo Gulf Corp	Commodity	Birla	14900	1640	5162	1686		
Madras Cements	Commodity		5240	399	2989	534		
MRPL	Commodity	Birla	26060	141				
Nagarjuna Fertilizers	Commodity		12410	1437	8630	1929		
Sterlite Industries India	Commodity	New-Agarwal	18480	1608	5307	847		
Nirma	Consumer	New	12750	1709	3488	416		
BPL	Consumer	New	17860	1025	7826	484		
Adani Export	Consumer		21890	673				
Arvind Mills	Consumer-Tex	Lalbhai	9830	145	6389	1059		
TVS Suzuki	Engineering	Iyengar	13290	821	4119	320		
Infosys Technologies	IT	New	5130	1372				
NIIT	IT	New	4590	1084				
Pentafour Software	IT	New	5310	1191				
Satyam Computer	IT	New	3780	728				
Wipro	IT	New-Premji	18040	1702	7633	322		
Usha Beltron	Other	Rai	7810	426				
CIPLA	Pharma	New	6160	1150	2839	248		
Dabur	Pharma	Burman	9010	497	4050	239		
COMPANY	INDUSTRY	OWNERSHIP	1999	1995	1991			

			SALES	PROFITS	SALES	PROFITS	SALES	PROFITS
			Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	Rs.m
Indian Hotels	Services	Tata	6230	1197	3820	821		
EIH	Services	Oberoi	4760	964	2878	581		
Global Telesystems	Services	New	5400	632				
South India Corp	Services	New	17110	239				
Eveready Industries	Engineering	New	7360	348	3070	245		
EID Parry India	Commodity		9310	399	5263	232.1	2618	64.6
Smithkline Beecham		Multinational	5740	808	2506	271.9		
Usha (India)	Engineering	New	13900	441	3695.6	311.8		
HCL Infosystems	IT	New	8970	585	5877	407.8		61.4
Lupin Laboratories	Pharma	New	6710	253	3942	351.5		
HFCL	Services	New	4080	374				
Essar Shipping	Services	New	4400	480	4856	906.7		
Hind Lever Chemicals		Multinational	9130	424				
Tata Hydro-electric	Utilities	Tata	5110	696	4317.5	451.8		
Dr Reddys Laboratories	Pharma	New	3850	518				
Proctor and Gamble India		Multinational	4090	559	2524	139.9		
Coats Viyella India		Multinational	9900	263	7579	420		
Malavika Steel	Commodity	New	7740	115				
Jindal Vijayanagar Steel	Commodity	New	5380	-290				
Deepak Fertilisers	Commodity	New	5220	727				
Bhushan Steel	Commodity	New	6770	405	2647	291.5		
Indo Rama Synthetics India	Commodity	New	11660	-1571				

Author's analysis drawn from Business India, Sep. 30 1991 and Nov. 29 1999

TABLE 7 B : WINNERS - SUPER 100 FIRMS WHICH INCREASED PROFITS > 4X FROM 1991

COMPANY	INDUSTRY	OWNERSHIP	1999		1995		1991		Sales growth multiple (1999/1991)	Profit growth Multiple (1999/1991)
			Sales	Profits	Sales	Profits	Sales	Profits		
			Rs.m	Rs.m	Rs.m	Rs.m	Rs.m	Rs.m		
Hindustan Lever		Multinational	97270	8374	28869	1900	12071	659	8.1	12.7
ITC		Multinational	36370	6234	25397	2616	23164	775	1.6	8.0
Glaxo		Multinational	7610	671	5652	190	3703	106	2.1	6.3
Nestle		Multinational	15450	862	6704	405	3148	151	4.9	5.7
Novartis India		Multinational	7340	747	4690	200	3020	140	2.4	5.3
Reliance Industries	Commodity	Ambani	132310	17036	56491	10649	21382	1256	6.2	13.6
Hindalco Industries	Commodity	Birla	19120	5668	10830	2920	6965	648	2.7	8.7
SPIC	Commodity	Chidambaram	24330	508	12612	675	8536	63	2.9	8.1
Indian Rayon	Commodity	Birla	13930	1060	9956	1329	5085	150	2.7	7.0
Videocon International	Consumer	New-Dhoot	22840	1509	10917	881	5173	262	4.4	5.8
MRF	Consumer	New-Mapillai	17860	1022	8758	208	6866	191	2.6	5.4
Asian Paints	Consumer	New-Choksey	9100	698	5220	435	2635	158	3.5	4.4
Mahindra & Mahindra	Engineering	Mahindra	35710	2286	18075	1170	10379	123	3.4	18.6
Bajaj Auto	Engineering	Bajaj	33420	5405	19300	3052	12146	510	2.8	10.6
Hero Honda Motors	Engineering	Munjal	15500	1213	4822	194	2155	158	7.2	7.7
Tata Chemicals	Engineering	Tata	13950	1898	8315	2867	3447	445	4.0	4.3
Larsen & Toubro	Engineering	Professional	69930	3896	31150	2774	14335	913	4.9	4.3
Ranbaxy Laboratories	Pharma	New-Singh	14310	1560	6869	1104	2603	121	5.5	12.9
BSES	Utilities	Professional	23490	2702	12144	1467	4668	332	5.0	8.1
Ahmedabad Electricity	Utilities	Professional	8820	451	5387	139	2699	79	3.3	5.7
Tata Power Co.	Utilities	Tata	12690	1658	10892	1182	4765	346	2.7	4.8
EID Parry India	Commodity		9310	399	5263	232.1	2618	64.6	3.6	6.2
HCL Infosystems	IT	New	8970	585	5877	407.8		61.4		9.5

Author's analysis drawn from Business India, Sep. 30 1991 and Nov. 29 1999

TABLE 8 A : SUPER LOSERS: 1991 SUPER 100 FIRMS**NOT IN THE 1999 SUPER 250**

COMPANY	INDUSTRY	OWNERSHIP	1991	
			SALES TURNOVER (Rs. Million)	PROFIT- ABILITY (Rs. Million)
Ballarpur	Commodity	Thapar	7135	423
Baroda Rayon	Commodity	Gaekwad	2574	37
Birla Jute	Commodity	Birla	5489	392
India Cements	Commodity	Sanmar	2594	191
Indian Dyestuff	Commodity	Mafatlal	2645	89
Indian Org Chem	Commodity	Ghai	2510	47
J K Synthetics	Commodity	Singhania	8392	70
Modipon	Commodity	Modi	2408	220
Mysore Cements	Commodity	Birla	2427	173
National Organic	Commodity	Mafatlal	5159	358
Special Steels	Commodity	Tata	2267	127
Shaw Wallace	Consumer	Chhabria	4024	91

Dunlop	Consumer	Chhabria	6090	118
Bombay Dyeing	Consumer-Textiles	Wadia	4572	359
JCT	Consumer-Textiles	Thapar	3646	231
Premier Auto	Engineering	Walchand	5591	145
VST		Multinational	4461	234

Author's analysis drawn from Business India, Sep. 30 1991 and Nov. 29 1999

**TABLE 8 B : LOSERS - 1991 SUPER 100 FIRMS WHO
DROPPED > 50 PLACES BY 1999**

COMPANY	INDUSTRY	OWNERSHIP	1991	
			SALES TURNOVER (Rs. Million)	PROFITABILITY (Rs. Million)
Century Enka	Commodity	Birla	5234	325
Coromandel Fert	Commodity	Professional	2607	316
Mukand	Commodity	Shah	5817	117
Orient Paper	Commodity	Birla	3215	192
T N Petro	Commodity	Chidambaram	2294	203
Ceat	Consumer	Goenka	5154	224
Godfrey Phillips	Consumer	Modi	5359	118
McDowell	Consumer	Mallya	3013	65
Modi Rubber	Consumer	Modi	5256	71
Voltas	Consumer	Tata	5496	183
Century Text	Consumer- Textiles	Birla	8839	824
Kesoram	Consumer-	Birla	3017	97

	Textiles			
Standard	Consumer- Textiles	Mafatlal	2667	160
Bharat Forge	Engineering	New-Kalyani	2471	144
Hindustan Motors	Engineering	Birla	6444	3
Lakshmi Mach	Engineering	Lakshmi	2695	108
Hindustan Develop	Services	Modi	2776	162
CESC	Utilities	Goenka	5430	94
Hoechst		Multinational	2807	67
ICI India		Multinational	7568	211
Coats Viyella India		Multinational	4039	327
Phillips India		Multinational	5693	292
SKF Bearings		Multinational	2017	177
Siemens		Multinational	3906	113

Author's analysis drawn from Business India, Sep. 30 1991 and Nov. 29 1999