

# **Liberalisation and the Behaviour of Indian Industry**

## **(A Corporate-Sector Analysis Based On Capacity Utilisation)**

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### **Abstract**

Using firm level data from the Indian private corporate sector, this paper examines the impact of economic reform on productive capacity creation and utilization across various industries in the nineties. The results suggest that although substantial achievements occurred initially in creation and utilization of capacities in the various industries, there is significant room for further improvement in utilisation. It analyzes the determinants of capacity use such as credit flows, import liberalization, fiscal consolidation and demand conditions, using panel data for 802 firms for the period 1993-98, to suggest an optimum combination of policies that is critical for realizing the unused capacity.

### **I. Introduction**

It is almost eight years since the liberalisation process began in India with an objective to expose its economy progressively to market forces. This process has had maximum impact on the industrial sector, as it has radically changed its business environment and future growth dynamics. Barring the first two years of structural adjustment, these reforms succeeded in reviving industrial growth and making it widespread across a broad spectrum of industries. Though the initial impact of reforms on the industrial sector was positive, the sector witnessed an overall slow down since the second half of 1996-97, raising serious doubts about the sustainability of reform process. Against this backdrop, a comprehensive assessment of industrial performance, using cross sectional data assumes critical importance for policy makers.

Using firm level data from the Indian private corporate sector, the present paper examines the impact of economic reform on productive capacity creation and utilization across various industries in the nineties. It also analyses the determinants of capacity utilisation rates in various product groups, using panel data for 35 product groups for the period 1993-98. The

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primary purpose of this analysis is to suggest the optimum combination of future policies that is critical for the sustainability of future growth. The study is unique in its use of the database that is in physical terms and, hence, is free of any distortions introduced by inflation.

The rest of the paper is organised as follows. Section II explains various industrial reform measures introduced since 1991 and their relevance for the capacity utilisation performance. While section III briefly reviews the theoretical foundations of the concept of capacity utilisation, section IV discusses the impact of reform measures on the actual and potential output (i.e., capacity output) of the manufacturing sector. The purpose of this analysis is to understand the movement of output gap (i.e., the difference between the actual and potential output) in the manufacturing sector before and after industrial reforms. This analysis is based on the aggregate level data provided by the Central Statistical Organisation - a standard source of data on Indian economy, which is being used by the multilateral organisations like IMF to assess the cyclical position of the Indian economy. Section V is the section on major empirical work which examines in detail the trends in capacity utilisation, capacity built-up and actual production across the various industries (such as the basic, capital, intermediate, and consumer durable and non-durable goods industries) from the private corporate sector. This analysis is based on the data on 802 firms for the period 1993-98. In this section, an attempt is made to identify the crucial determinants of capacity utilisation rates for various product groups, using econometric analysis based on cross-sectional data for 35 product groups for the period 1993-98. Section VI presents the key conclusions, while section VII discusses policy implications.

## **II. Industrial Reforms and Capacity Utilisation**

A common thread running through various measures relating to the industrial sector has been to improve the productivity and efficiency of the system. This has been partly achieved by dismantling the barriers to entry and growth and thus imparting a greater element of competition. In broad terms, the industrial reform measures include the abolition of industrial licensing and restrictions on size of firms, liberalisation of direct and portfolio inflows of foreign investment and free imports of capital goods, raw materials and intermediates based on a declining level of tariffs. Another important ingredient of the industrial reform policy has been to reduce the public sector's role in the industry and make the industry more outward-oriented. This policy approach has been adopted to reduce the size of public deficit and at the same time release more investible funds for the private corporate sector to enhance its

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views of the organisation to which they belong. The authors are grateful to Ms. Tejashree Apte and Mr. Deepak Sakpal for their competent assistance in data compilation.

investment spending. Furthermore, increased privatisation of the industrial sector is expected to improve efficiency in resource use and quicker building up of technological capabilities in the industrial sector.

In theoretical literature, the growth in industrial output is primarily associated with new investment in plant and machinery. However, new investment alone does not ensure economic growth. It must also be matched by efficiency of investments. Empirical studies confirm that less than half the growth in output can be attributed to increases in factors of production and higher productivity explains the rest. One of the critical determinants of productivity is the rate at which installed capacity has been utilised. An increase in the utilisation of existing capacity increases the output without any need to undertake additional investment in capital stock. Capacity utilisation is one of the major indicators of the efficiency of the industrialisation process as it influences the cost of production, profitability and the generation of internal resources. The subject of "capacity utilisation" assumes special significance especially in 'capital-scarce' developing economies. It is generally expected that market oriented reforms in developing countries will sufficiently increase competition to eliminate or at least significantly reduce the unutilised productive capacity.

Kim and Kwon (1977) had analysed the rising trend in the level of capacity utilisation for Korean economy in terms of the standard "sources -of-growth" approach. In this study, the magnitude of residual (i.e., total factor productivity)<sup>2</sup> was reduced by about 28 percentage points, with only 8 per cent of the output growth left to the residual, when the influence of improved capacity utilisation was subtracted from the conventionally measured residual. The evidence that improvements in the capacity utilisation rate had actually played a vital role in the expansion of the Korean manufacturing industry points to the significance of this indicator of efficiency. Bruton (1967) and Williamson (1969) had also suggested that the bulk of productivity growth in Latin America and the Philippines must be viewed as a reflection of increased utilisation of resources.

### **III. Theoretical Foundations**

The measures of capacity utilisation (CU) have a longstanding tradition in empirical economic analysis. The CU measures are generally employed in order to understand investment

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<sup>2</sup> Total Factor Productivity (TFP) growth is defined as the difference between the rates of growth of output and the rates of growth of inputs appropriately weighted.

behaviour, productivity movements, inventory behaviour, and also to measure the strength of aggregate demand (Berndt and Hesse, 1986). Unfortunately, these measures are beset with many complex problems and their calculation and derivation is in large part *ad hoc*, rather than based on an explicit theoretical foundation.

The economic theory of cost and production defines capacity output as the output at which the short and long-run average total cost curves are tangent to one another, and CU as the ratio of actual to capacity output. Under conditions of long-run constant returns to scale, capacity output corresponds to that output at the minimum point of the short-run average total cost curve.

Johansen (1968) defines capacity output as "... The maximum amount that can be produced per unit of time with existing plant and equipment, provided that the availability of variable factors of production is not restricted." Since capacity output is inherently a short-run notion, it is necessary that the modelling framework incorporates short-run constraints facing the firm (Berndt and Hesse, 1986).

Klein (1960) states that capacity and associated utilisation rates give a combined measure of under-use of all input resources. A purpose of such statistics is to extend the measures of underutilisation of resources beyond such conventional statistics as the number of unemployed persons. In a function designed to show actual operations of the economy, the input variables are measured by amounts actually used in the production process. For instance, in the case of labour inputs, an employment variable reflects the number of man-hours actually used during the period of production. This information tells us more about economic efficiency than the plain statistics of number of employed persons.

The CU measures are a prominent variable in several modern business cycle theories, especially those based on a version of the acceleration principle (The Economist, 1997). The business cycle is the more or less regular pattern of expansion (recovery) and contraction (recession) in economic activity around the path of trend growth. During an expansion (or recovery) the employment of factors of production increases (indicating higher utilisation of existing capacity), which in turn, increases incomes, creates more demand, resulting in further more utilisation of existing capacities, and so the process continues (the multiplier). Before long, producers come up against capacity constraints. If they are confident that

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Therefore, these measures reflect the residual output growth that cannot be attributed to the growth of inputs.

demand will remain buoyant (expectations), they invest more in new plant and machinery (creation of more capacity) which generates even more demand (the accelerator).

The upward momentum cannot continue indefinitely. Eventually, output hits a ceiling owing to bottlenecks and supply constraints. Demand for investment funds may push up interest rates to the point where new investment is no more profitable. This will reduce the investment demand. Despite the steady consumer demand, a fall in investment demand pulls back the level of total output. With investment demand falling, the producers of capital goods start to cut back on labour. The higher unemployment reduces consumer demand. The multiplier, expectations and accelerator principles work in reverse and the economic contraction gathers momentum.

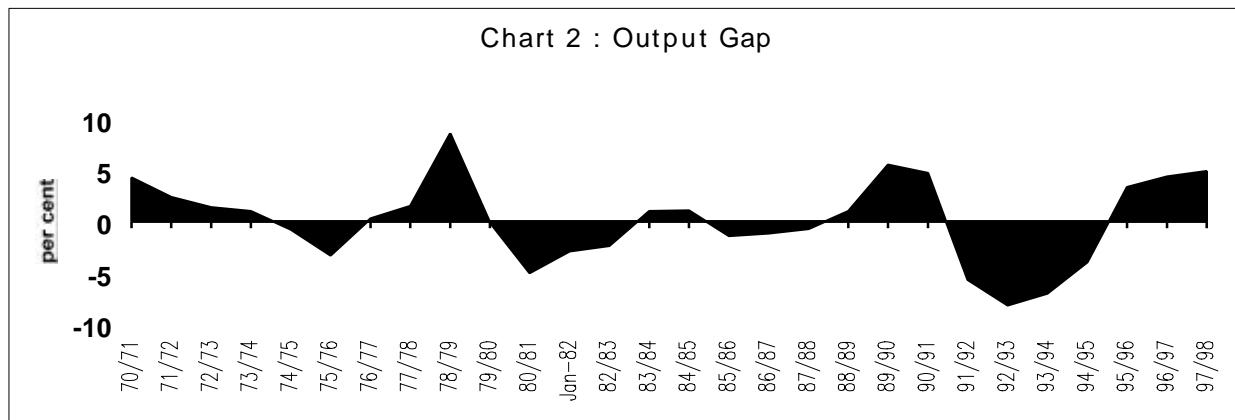
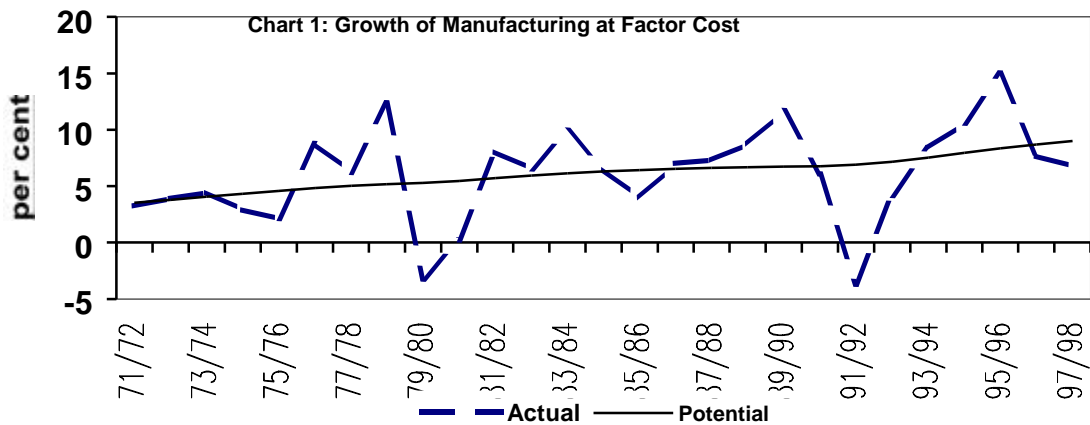
The output will not fall indefinitely. It will stop at some minimum level because employees retain jobs and spending power where they work in secure jobs with government or in industries supplying essentials. The welfare payments, past savings and new borrowings enable other consumers to buy essentials. The slack demand for investment funds may pull back interest rates making new or replacement investment more attractive. And with consumer demand steady, it is the investment demand (capacity creation) that begins to lift the economy again. Though there is no general consensus about what causes fluctuations in CU rates, major influences include fixed investment and inventory cycles, external shocks and macro-economic policies of the government.

#### **IV. Impact of Reforms on the Manufacturing Sector<sup>3</sup>**

The industrial reform process that began in 1991-92 resulted in a severe slowing down of manufacturing sector in the first two years of structural adjustment. It has been pointed out by researchers in the context of transition economies that the process of liberalisation and macro-economic stabilisation involves a large decline in output in virtually every country in its early stages (E. Hernandez-Cata, 1997). Also, there is considerable underutilisation of industrial capacity in the early stages of transition.

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<sup>3</sup> Manufacturing sector is the largest sub-sector of Indian industrial sector. Besides it, the other sub-sectors are electricity, gas & water supply and construction.



Note: Output gap is defined as actual output less potential output as a ratio of potential output.

In India also, from an average growth rate of 7.2 per cent in the latter half of 1980s, the manufacturing output declined by 3.7 per cent in 1991-92 -- the first year of structural adjustment. However, the growth of manufacturing sector, which was moderate during 1991-93 (at 0.2 %), witnessed sustained acceleration thereafter. Even though the growth momentum has somewhat weakened during the last couple of years, a sharp increase in savings, investment<sup>4</sup> and growth during the post-1991 period suggests that the potential growth rate of manufacturing sector has moved upwards in recent years. This is supported by time-series analysis, which estimates the current potential growth rate at 9.0 per cent for this sector, compared to around 6.3 per cent in the mid -1980s.<sup>5</sup> The charts above depict the movement of actual and potential output growth and output gap for the manufacturing sector over the period 1970-98<sup>6</sup>. In the short-term, estimates of the gap between actual and potential output provide a key benchmark against which to assess inflationary pressures.

<sup>4</sup> While the domestic savings rate has increased from 21.5% in 1985-92 to 23.3% in 1992-98, the domestic investment rate has increased from 23.8% to 24.7% between the same sub-periods.

<sup>5</sup> This has been estimated using a Hodrick-Prescott filter.

<sup>6</sup> The concepts of potential output and output gap are central to the International Monetary Fund's (IMF) analytical work in providing policy recommendations to member country governments

The charts above show that the negative output gap for Indian manufacturing sector had widened immediately after liberalisation due to lower levels of actual growth rates vis a vis trend growth rates during the period 1991-93 - the period of structural adjustment. However, the three successive years of above-trend growth rates witnessed by the manufacturing sector during 1993-96, resulted in closing the negative output gap for the subsequent years 1996-98 - a noteworthy achievement of India's liberalisation process. In these three years, the output gap (i.e., actual less potential output) has been plus three to four per cent of potential output. These results may be compared with the performance of some of the emerging markets from Asia, before the currency crisis.

A staff study of IMF (1996) had estimated potential output using the same approach (i.e., the Hodrick- Prescott filter) for a broad sample of 19 emerging market economies to determine the size of current output gaps and thereby gauge the extent of overheating. The results suggested that for most Asian countries, output gaps in the first half of 1990s were about plus or minus three percent of potential output. Among the Latin American countries, output fluctuations have been larger, with the output gap fluctuating in the plus or minus five per cent range. It was observed that in many of these emerging market economies (that had managed to sustain rapid growth and a strong pace of industrialisation over the past decade), buoyancy of demand has often exceeded the underlying expansion in the supply capacity, or potential output of the economy and given rise to periodic bouts of overheating, with rising inflation and widening current account deficit.

To have a precise understanding of the extent of output gap (positive or negative) in the Indian manufacturing sector, it is felt that the methodology should go beyond the simplistic uni-variate time-series analysis. Besides, the reliable estimates of capacity output and the extent of its utilisation alone can provide a useful indicator of the cyclical position of Indian economy and of emerging demand-pull inflationary pressures. The analysis of output gap could be based on the use of aggregate level data provided by the Central Statistical Organisation (CSO) -- an official database agency in India. However, the assessment of reform policies based on this data may not be reflective, as the aggregate level data (at national level) fails to bring about firm-specific, micro-level characteristics that are influenced by various reform measures (Kalirajan and Salim, 1997). This necessitates empirical studies based on appropriate data and methodology to examine whether economic reforms have favourably impacted the capacity growth and its use in the manufacturing sector. In this paper, therefore, the assessment of reforms will be made in terms of the firm-level data from the

private corporate sector - the sector that has been assigned the role of a key driver for future economic growth.

## **V. Reforms & Capacity Utilisation in the Private Corporate Sector**

Data on 802 medium and large-scale companies from the private corporate sector were analysed for five years (from 1993-94 through 1997-98) to arrive at various product-level capacity utilisation rates. The data being used is in physical terms, and, hence, is free of any distortions due to inflation.

In all, information was obtained on 1,390 products manufactured by these companies, which jointly generated Rs. 1,333.07 billion in 1997-98 through the sale of these products. The total sample of 1,390 products was classified into 95 product groups which were further classified into five categories (on the basis of use-based classification), i.e., basic goods, capital goods, intermediate goods, consumer durable and non-durable goods. To arrive at the overall capacity utilisation rates, various product groups were assigned weights on the basis of the proportion of their sales realisation in total sales realisation of the sample. On an average, of the total weight of 100.0, the basic goods industry accounted for 23.1, capital goods industry 16.3, intermediates goods industry 31.0, consumer durable goods industry 13.6, and non-durable goods industry 16.0.

To compute capacity utilisation rate for a particular product group, the concepts of installed capacity, actual production and capacity utilisation are interrelated as under :

$$\text{Capacity Utilisation (\%)} = \frac{\text{Actual Production}}{\text{Installed Capacity}} \times 100$$

In order to compute capacity utilisation rate for a particular product, information on installed capacity and actual production was obtained from all companies of the sample that were engaged in manufacturing that specific product. The primary source of the data has been the Annual Reports of companies.

The estimation of true capacity in manufacturing industries is beset with many complex problems. The estimates of installed capacity used in this study are given by the companies themselves. This has a major advantage as explained below. Since, all manufacturing plants are subject to certain operating interruptions, it is practically impossible to produce from

them the maximum possible output defined at a point of time. These interruptions include reasonable time lost due to delays, repairs, maintenance, removal of unwanted materials, power breakdowns, machine failures, absenteeism, etc. In any given circumstances, manufacturing firms themselves have the best understanding of the short-term constraints facing their operations. So, their own estimates of installed capacity (or potential output) may be considered as reasonable, as they are arrived at after considering the impact of such constraints.

The past ICICI studies on capacity utilisation had highlighted significantly lower levels of capacity utilisation rates for the private corporate sector during the years 1991-92 and 1992-93<sup>7</sup> -- the early period of transition. Production had slowed down in this period, due to a variety of factors such as import compression, rise in the cost of imports on account of substantial devaluation of Indian rupee, tight monetary policy and the cash margin requirements. From the demand side, there was a noticeable fall in effective demand due to mounting inflation and the reduction in public expenditure as a result of newly imposed fiscal discipline. This downturn in the economic activity was the essential fall-out of stabilisation measures initiated by the government for the macro-economic adjustment of the economy.

Gradually, the economy started responding favourably to liberalisation measures in the form of faster growth, better export performance and greater self-reliance (i.e., larger financing of imports through export earnings) (Ahluwalia and Little, 1998). The private corporate sector staged a smart recovery from the year 1993-94, from the 1991 crisis and the consequent stabilisation efforts. This recovery was aided by several policy initiatives taken by the government since July 1991, which primarily included a significant deregulation and delicensing of the industrial sector, rationalisation and reduction of customs duties, reduction of corporate taxes and deregulation of imports.

Table 1 below depicts the trends in capacity utilisation rates for private corporate sector during the period 1993-1998. The main facts emerging from this table are --

1. At the aggregate level, capacity utilisation rate had steadily increased since 1993-94 through 1996-97, but declined in 1997-98.
2. The capacity utilisation rates of basic and capital goods industries also increased steadily during 1993-97, and registered a sharp decline in 1997-98. In the case of consumer non-durable goods industry, the decline has begun a year earlier.

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<sup>7</sup> Capacity Utilisation in the Private Corporate Sector, 1991-92 and 1992-93, ICICI Limited.

3. The capacity utilisation rates have remained somewhat volatile for the industries producing intermediate and consumer durable goods during 1993-98.
4. Consumer durable goods industry is the only exception, whose capacity utilisation rate has registered a sharp increase in 1997-98, when the utilisation performance of all other industries has deteriorated.

A detailed analysis of capacity utilisation performance classifies the following sectors as better performers, as they have recorded consistently more than 80.0 per cent capacity utilisation rates during the five-year period: 1993-94 to 1997-98.

- ✎ Basic goods industry: Urea, soda ash (sodium carbonate), caustic soda (sodium hydroxide) and cement.
- ✎ Capital goods industry: Elevators, electric components and agricultural machinery.
- ✎ Intermediate goods industry: Cotton and cotton yarn, fats and oils (used as animal and bird feeds), petroleum products, and man-made fibres like nylon filament yarn & polyester filament yarn.
- ✎ Consumer durable goods industry: Diamonds and passenger cars.
- ✎ Consumer non-durable goods industry: Tea, lamp filaments and soaps & detergents

**Table 1**  
**Capacity Utilisation: Private Corporate Sector**

Industry	Weight	1993-94	1994-95	1995-96	1996-97	1997-98
Basic goods	23.1	76.73	77.30	84.53	87.50	83.60
Capital goods	16.3	60.05	71.16	74.01	74.52	66.88
Intermediate goods	31.0	77.26	75.00	78.70	72.51	67.65
Consumer durables	13.6	85.90	81.73	88.59	99.55	103.65
Consumer non-durables	16.0	74.43	77.49	78.29	76.75	75.99
All industries	100.0	75.03	76.19	80.57	80.94	78.09

Source: ICICI Limited.

The consistent under-performers (i.e., the sectors for which capacity utilisation rates were consistently below 50.0 per cent for all the years between 1993-98) are identified as follows. These are the sectors where the negative output gap has remained more than 50.0 per cent during the period 1993-98.

- ✎ Basic goods industry: Steel castings and industrial gases like oxygen and nitrogen.

- ✍ Capital goods industry: Wires & cables, pressure vessels, machine & machine tools, cut tools, computers & peripherals, construction and mining machinery, and dairy equipment.
- ✍ Intermediate goods industry: Polypropylene yarn, paints & varnishes, and batteries.
- ✍ Consumer durable goods industry: Consumer entertainment electronics.
- ✍ Consumer non-durable goods industry: Dairy products, liquid pharmaceuticals and fats & oils that are directly consumed.

### *Capacity Build-up in the Private Corporate Sector*

The trends in real investment of the private corporate sector since 1993-94 are analysed below. The sector appears to have invested heavily in new capacity from 1994-95. This effort was largely aided by the policy package introduced in the Finance Bill for 1994-95, to stimulate investment. It broadly covered measures such as greater tariff reduction on imports of capital goods, reduction in corporate income taxation, extension of India's partial value-added tax to capital goods, thus enabling firms to credit (against tax liabilities) taxes paid on the purchase of equipment.

**Table 2**  
**Growth in Installed Capacity: Private Corporate Sector**

Industry	Weight	1994-95	1995-96	1996-97	1997-98
Basic goods	23.1	12.32	5.87	3.29	7.43
Capital goods	16.3	19.08	23.14	17.57	7.91
Intermediate goods	31.0	21.91	4.59	18.10	28.20
Consumer durables	13.6	31.88	12.82	6.85	2.47
Consumer non-durables	16.0	1.42	6.88	8.89	0.95
All industries	100.0	17.16	9.41	11.56	11.68

Source : ICI Limited.

The corporate sector responded to this package favourably by increasing its installed capacity by 17.2 per cent in 1994-95. Though the growth in installed capacity decelerated to 9.4 per cent in 1995-96, it recovered again in 1996-97 and hovered around 11.6 per cent in 1996-97 and 1997-98. Though for the economy as a whole, gross investment rate had slowed down in 1997-98, its buoyancy from the earlier years was retained in the "medium & large scale" segment of the private corporate sector (Table 2).

The use-based classification reveals that within the private corporate sector, the installed capacity growth was very high during 1994-95 for all industries except the consumer non-

durables. The capital goods industry witnessed sustained growth in installed capacity during 1994-97. The corporate sector's overall growth in installed capacity was primarily supported by the capital and intermediate goods industries in 1996-97 and by the intermediate goods industry alone in 1997-98 (Table 2).

The analysis at the disaggregated level reveals that during the period 1994-98, the average growth in installed capacity was substantially higher (i.e., the average annual growth of more than 15 %) in the product groups aluminium billets/ingots, aluminium sheets/plates, other non-ferrous rolled products, steel forgings and organic chemicals (from the basic goods industry); transformers, air-conditioning machines, electric components, agricultural machinery, diesel engines, jeeps, relays, wires & cables and transmission towers (from the capital goods industry); fats and oils based products, polyester filament yarn, polypropylene yarn, polyester staple fibre, plastic products, dyes and pigments, plastics in primary forms, telecommunication equipment (from the intermediate goods industry); diamonds, washing machines, televisions, VCRs/VCPs (from the consumer durable goods industry); and GLS lamps, ceramic tiles, injectables and dairy products (from the consumer non-durable goods industry).

### *Production Growth in the Private Corporate Sector*

Viewed from the angle of production growth also, the performance of 'medium and large scale segment' of the private corporate sector was highly impressive during the three-year period 1994-97. Except the consumer non-durable goods industry, the production growth was reasonably broad-based. It was the capital goods industry that spearheaded the growth during these three years (Table 3). Interestingly, the slow-down in industrial growth that was witnessed since the second half of 1996-97, was also led by the capital goods industry and partially by the consumer durables industry. This type of business cycle -- a boom followed by a recession -- was noticed during the post-reform period in many Latin American countries<sup>8</sup>.

In India, the slow-down in industrial growth since the second half of 1996-97 is attributed to various factors. On domestic front, the factors include weak demand, infrastructural bottlenecks and inadequate credit availability. On the external side, it is mainly the slow-down in Indian exports on account of the slow down in world exports (Annual Report 1998-99, Ministry of Industry). The disaggregated analysis shows that the demand has been slackening

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<sup>8</sup> Many of the Latin American countries had adopted an exchange rate based stabilisation programme, in which exchange rate was used as a nominal anchor. Wherever the programmes failed, the main reasons were observed to be the lack of supporting fiscal policy and associated lack of credibility (Shome and Mukhopadhyay, 1998).

for basic goods like steel, organic and inorganic chemicals, caustic soda; and capital goods like transformers, electronic components, commercial vehicles, automobile ancillaries as well as many consumer durables. This has resulted in cut back of production by these industries and build up of inventories.

**Table 3**  
**Growth in Production: Private Corporate Sector**

Industry	Weight	1994-95	1995-96	1996-97	1997-98
Basic Goods	23.1	16.69	15.35	6.95	3.80
Capital Goods	16.3	60.42	25.70	18.08	-1.88
Intermediate Goods	31.0	46.45	15.03	9.44	16.50
Consumer Durables	13.6	32.05	21.92	13.20	5.24
Consumer Non-durables	16.0	0.64	0.68	3.73	0.92
<b>All Industries</b>	<b>100.0</b>	<b>32.42</b>	<b>15.64</b>	<b>10.13</b>	<b>6.31</b>

Source: ICICI Limited.

### *The Determinants of Capacity Utilisation Performance*

The various aspects of policy framework of the 1990s would guide us in assessing the impact of economic liberalisation on capacity utilisation performance of the private corporate sector. Of relevance here are the issues such as whether the share of imported capital goods in total fixed assets has increased significantly over the reform years due to the liberalised import policy; whether credit flows from financial intermediaries (both banks and financial institutions) to corporate sector have been stable given the accent of monetary policy on price stability; whether exports of manufactured products have taken a significant upturn reflecting an expanding and open economy; whether effective demand for manufactured products has shown steady growth reflecting the rising levels of incomes over the reform years; whether the size of the government has declined monotonically implying less crowding out and pruning of large bureaucracies; whether the uncertainty that is associated with political instability has adversely affected the investment sentiments of corporates.

These factors have possible implications for capacity utilisation performance of the private corporate sector. Easy imports of capital goods and buoyant investment mood during the boom phase of the economy can lead to over-investment (excessive capacity build-up) resulting in lower utilisation of capacity. Similarly, strict monetary targeting on the part of the Reserve Bank of India to maintain price stability and improved prudential regulations

could constrain bank lending to the corporate sector, giving rise to lower utilisation of existing capacity.

The capacity utilisation rates bear a direct and positive relationship with the state of demand from domestic and international markets (exports). After the first two years of structural adjustment, there had been a spurt in export growth of 18-21 per cent per annum during 1993-96 (from an average of 1.2 % during 1991-93) - which was cited as one of the major achievements of economic liberalisation of 1990s. However, the export growth declined sharply to 5.3 per cent in 1996-97 and 1.5 per cent in 1997-98 reflecting a host of factors of foreign and domestic origin. The two most important factors were probably the sharp decline in the growth of world trade in 1996 and 1997, and the appreciation of the rupee vis a vis the currencies of major trading partners and competitors. The real effective exchange rate of the rupee has shown a gradually appreciating trend over the last few years, because of the appreciation of dollar against other major currencies and the low international inflation rates relative to Indian inflation rates (Modi, 1998).

On the domestic demand front also, the growth of private final consumption expenditure (in real terms) has decelerated from 7.1 per cent to 3.9 per cent during 1994-98, while that in capital formation decelerated from 23.0 per cent to 3.0 per cent during the same period. Thus, the two major contributory factors to growth in the initial reform years (i.e. exports and domestic expenditures) suffered a set back in the later years.

The economic liberalisation of the 1990s has sharply brought into focus the issues such as the role of the Government and fiscal profligacy reflecting a sharp growth in the government's current expenditures. In the 1990s, the Central Government did pass down some current expenditure responsibilities (mainly in the social sector), to the States. Also, many structural measures were announced but failed to be implemented and much of expenditure policy continued to reflect quick responses to the exigency of the moment (Shome and Mukhopadhyay, 1998). There was not much improvement in curtailing the size of fiscal deficit over the reform years but at the same time, Government's capital expenditure in infrastructure building kept declining. Given the fact that now there is an increasing tendency to finance fiscal deficit by way of borrowings (to avoid monetisation), this leads to crowding out of private investment. If private investment is crowded out by unproductive public consumption, the growth rate of output is directly reduced. The enhanced cost of finance resulting from larger government borrowings and tight monetary policy could have an adverse impact on the capacity utilisation performance of the private corporate sector.

It has been seen that the investment expenditure is adversely affected during the times of uncertainty due to the incidence of sunk-cost; and under these circumstances, producers prefer to adopt a 'wait and watch' approach. For instance, during the 1980s, in both Argentina and Mexico there had been a pause in investment (reflecting this 'wait and watch' approach) to test whether trade reforms would be continued or reversed (Shome and Mukhopadhyay, 1998). In India also a broad atmosphere of political uncertainty took over by the end of 1995, and the policy related uncertainty got aggravated by the installations of coalition governments. These developments are expected to have affected adversely the incremental investment expenditures as also the utilisation of existing capacities.

### *Model Specification*

In this section, an attempt has been made to determine the relative importance of the factors described above in explaining variations in the capacity utilisation rates of different product groups. This has been achieved by using the pooled estimation technique<sup>9</sup>. At the outset, it must be remembered that capacity utilisation is a complex phenomenon having many possible determinants, and the state of the art does not provide a clear consensus on the "correct" model specification. As suggested by Harberger (1998), regression analysis does not explain a phenomenon, but at best illustrates its nature by organising stylised facts. The present paper also takes this approach and concentrates on those factors that may be considered as the stylised determinants of capacity utilisation in a newly liberalised economy like India.<sup>10</sup>

For the purpose of regression analysis, we have picked up 36 out of 95 product groups with larger sample size, and thus having better representation of respective industries. These product groups also represent the major segments of the private corporate sector. To be precise, they include sponge iron, fertilisers, soda ash, caustic soda, cement, sulphuric acid, steel forgings/castings, pig iron and non-ferrous rolled products (from the basic goods industry); engines & turbines, transformers, medical electronic equipment, commercial vehicles, printed circuit boards and computers & peripherals (from the capital goods industry); cotton & cotton yarn, petroleum products, man-made fibres, automobile tubes, automobile tyres, plastic products, dyes & pigments, auto ancillaries, plastic in primary forms and paints & varnishes (from the intermediate goods industry); diamonds, two wheelers, electric fans and consumer entertainment electronics (from the consumer durable goods

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<sup>9</sup> For the econometric estimation, an use has been made of the software E-views, version 3.1, Quantitative Micro Software, 1998.

<sup>10</sup> For a thorough discussion on "stylised regression analysis" see Havrylyshyn, Izvorski and Rooden (1998).

industry); and tea, sugar, soaps & detergents, lamps, paper & paper products, vanaspati and ceramic tiles (from the consumer non-durable goods industry).

A number of panel regression equations were estimated to arrive at the best fit in terms of explanatory power and statistical diagnostics. To ensure a certain degree of robustness of the results, we started out by testing a specification including current and one or two lagged values of all independent variables. This was done estimating product-group specific constants (known as fixed effects), assuming that these constants capture the effect of relevant initial conditions for different product groups. These equations were estimated with panel data for the 36 product groups for the years 1994-98. All the estimated equations had the "capacity utilisation rate" (CU) as the dependent variable. As independent variables, we included variables that represented those factors that were believed to be important in explaining utilisation performance in India, as discussed in the previous section. We could not, however, explicitly capture the impact of political uncertainty on capacity utilisation in the absence of finding a relevant proxy variable to do so.

We used the actual imports of capital goods by different product groups to represent the impact of liberal policy of capital goods imports; credit flows from commercial banks and disbursements of financial institutions (FIs) to various product groups to represent the stance of Reserve Bank of India (RBI) policy; the real sales (sales in quantity) by product groups to represent the strength of domestic demand, the export intensity in various product groups (exports to net sales ratio) to represent the strength of external demand, and the share of government's current expenditure in total GDP to represent the impact of factors such as crowding out, distortions through high taxation, and large bureaucracies on capacity utilisation performance in various product groups of private corporate sector.

### *Empirical Results*

Table 4 presents the econometric results for panel estimates for the entire sample period, 1994-98, with individual constants estimated for each product group (fixed effects). The equation representing the most robust results had the following form:

$$CU_{it} = a_0 + b_0 \text{IMPKG} (-1)_{it} + b_1 \text{CREDIT}_{it} + b_2 \text{SALES}_{it} + b_3 \text{EXPORT}_{it} + b_4 \text{CURR}_{it}$$

Where CU stands for capacity utilisation rates, IMPKG for capital goods imports, CREDIT for banks' credit and FIs' disbursements, SALES for sales in quantity of various products, EXPORT for export intensity of various products and CURR for the share of government's current expenditure in total GDP. The subscripts i and t index the product group and the time period.

It was seen that higher imports of capital goods reflecting liberal import policy tend to affect (negatively) the capacity utilisation rates with a lag of one year. This is quite expected, as some time is necessarily lost before the imported machinery is made operational. All other variables such as credit flows from banks and FIs; sales in the domestic markets, export intensity and the size of government's current expenditure were observed to affect the utilisation rates during the same year. All coefficient signs were as hypothesised in the earlier section, and all of them were statistically significant. The goodness of fit, measured by the adjusted R<sup>2</sup> statistic was also very high<sup>11</sup>.

Table 4

Determinants of Capacity Utilisation : Fixed Effects Panel Estimates for 1994-98

**Dependent variable: CU**  
**Method: GLS ( Cross Section Weights)**  
**Total panel (balanced) observations 144**

Variable	Coefficient	Std. Error	t- Statistic	Probability
IMPKG (-1)	-0.005912	0.001863	-3.173762	0.0020
CREDIT	0.002256	0.000542	4.162768	0.0001
SALES	5.26E - 07	1.15 E -07	4.580521	0.0000
EXPORT	1.095824	0.502328	2.181490	0.0314
CURR	-2.148988	0.422980	-5.080595	0.0000

**Weighted Statistics**

Adjusted R- squared	: 0.9937
S.E. of regression	: 12.0820
F-statistic	: 5661.968
Durbin-Watson stat	: 2.0435

<sup>11</sup> Appendix A shows the product group specific constants of the fixed effects panel estimates. The dispersion of these constants is quite large as indicated by the range from the highest to the lowest value and by their standard deviation. It appears that the product group specific constants act much like product group specific dummies, increasing the goodness of fit, but based on them it is very difficult to give objective interpretation of the factors explaining the variation in performance among product groups.

The results for individual variables in the model clearly show that both the policy variables (such as the credit availability, import liberalisation and the size of government's current expenditure) as well as the non-policy variables (like domestic and external demand for the finished produce of various product groups) have emerged as statistically significant in explaining the variation in capacity utilisation rates. However, the relative impact of export demand and the size of government's expenditure (capturing the effect of crowding out and higher interest rates) had been significantly larger (than that of the other variables) on the percentage point variation in the capacity utilisation rates of various product groups during the period 1994-98. These have emerged as the key variables influencing the efficiency with which the capacity could be utilised in the private corporate sector.

## **VI. Summary and Conclusions**

The paper has examined the impact of economic reforms on productive capacity creation and utilization across various industries in the nineties by focusing on the private corporate segment of the Indian manufacturing sector. This analysis is particularly important, as the liberalisation process has radically changed the operational environment of the industrial sector by dismantling the barriers to entry and growth and by promoting competition. The aggregate analysis for the manufacturing sector as a whole reveals that though a severe slow-down was witnessed by this sector immediately after the reform process began in 1991-92, a sustained acceleration in growth was experienced during the period 1993-96. A time-series analysis based on the Hodrick-Prescott filter estimates the current potential growth rate for the manufacturing sector at 9.0 per cent as against 6.3 per cent in the 1980s. This is facilitated by the high growth of savings, investment and actual output in the post-1991 period. The Hodrick-Prescott filtering (a standard approach followed by the IMF in estimating the output gap for the developing countries) leads us to conclude that the three consecutive years of above-trend growth experienced by the manufacturing sector during 1993-96 has resulted in closing the negative output gap for the manufacturing sector in the subsequent years. This means there was no underutilised capacity in this sector during 1996-98. This conclusion gets considerably modified when the reforms are assessed on the basis of more appropriate database for the private corporate sector that captures the firm-specific, micro-level characteristics.

The data on 802 medium and large scale companies from the private corporate sector when analysed for five years (from 1993-94 through 1997-98) reveals that after the first two years of structural adjustment, the private corporate sector staged a smart recovery from 1993-94,

reflected in rising levels of capacity build-up, physical production and capacity utilisation rate until 1996-97 and up to 1997-98 in capacity built up. The liberal import policy for capital goods contributed to the strong growth of installed capacity. Despite this policy measure, the growth in installed capacity was spearheaded by the growth in domestic capital goods sector reflecting the buoyant investment sentiments. A broad-based growth of production implying rising incomes levels and the newly acquired outward orientation (giving boost to the exports) resulted in a steady increase in the capacity utilisation rate of the private corporate sector till 1996-97 indicating the multiplier-accelerator reaction. Within the private corporate sector, the same trends were shown more sharply by the basic and capital goods industries. The capacity utilisation rates remained somewhat volatile for the industries producing intermediate and consumer durable goods during 1993-98. However, the recovery phase for the private corporate sector was reversed in 1997-98 owing to a variety of factors. This phase of contraction was also led by the capital goods, followed by the consumer goods industries.

The capacity utilisation analysis for the private corporate sector shows that the recovery phase (1993-97) has resulted in the creation of large build up of capacity in this sector and almost 22 per cent of its installed capacity was in the unutilised state in 1997-98. Despite the strong recovery, the negative output gap was not closed for the private corporate sector in the later years of 1990s. The extent of unutilised capacity (or negative output gap) is widest for the capital goods industry followed by the intermediate goods industry. The larger extent of unutilised capacity clearly shows that the cyclical down turn was witnessed by this sector long before the producers had actually come up against capacity constraints. This implies that there is considerable scope to achieve further growth (with the appropriate policy package) without subjecting the private corporate sector to demand-pull inflationary pressures.

The fixed effects panel regression analysis (to identify the primary determinants of capacity utilisation rates across various product groups from the private corporate sector) shows that both the policy variables (such as the credit availability, import liberalisation and the size of government's current expenditure) as well as the non-policy variables (like domestic and external demand for the finished produce of various product groups) have significantly affected the variation in capacity utilisation rates during 1994-98. However, the relative impact of export demand and the size of government's expenditure (capturing the effect of crowding out and higher interest rates) has been significantly larger (than that of the other variables) on the percentage point variation in the capacity utilisation rates of various product groups during the period 1994-98. While the higher imports of capital goods negatively

affected the capacity utilisation rates (by excessively contributing to the capacity build up) with a lag of one year, the other factors such as credit availability, domestic and external demand, and the size of government's current expenditure tended to affect significantly the capacity utilisation rates during the same year.

## **VII. Policy Implications**

The forgoing analysis broadly confirms the conjecture that sustainability of reforms is a key to future growth. The setback received on the 'exports' as well as the 'fiscal consolidation' fronts in the last couple of years must have significantly contributed to the slowing down of capacity utilisation rates in 1997-98, as the regression analysis has clearly shown the higher responsiveness of utilisation rates to these factors in the post-reform period.

Some of the domestic factors responsible for the slowdown of exports in the years 1996-97 and 1997-98 were the infrastructural bottlenecks (e.g., congestion at various ports or poor accessibility to ports due to inadequate road or rail network, etc.) and the overvalued Indian currency. This calls for: (1) new policy initiatives for infrastructure development that would significantly reduce the delays in the implementation of projects due to paucity of funds and procedural constraints that have negatively affected the private sector incentives, and (2) a more firm stance by the Central Bank in the foreign exchange market to check the real appreciation of the rupee. New policy initiatives for infrastructure development must also involve undertaking wide ranging reforms in the social security and insurance sectors to remove the constraints on the availability of long term funds for infrastructure investment.

The failure to reduce the growth of current expenditure by the government (which is unproductive and hence not complementary to private investment) has put upward pressure on the interest rates and crowded out the private investment in the second half of 1990s.. A renewed commitment to fiscal consolidation efforts (from both the Central and the State Governments) is needed to ease these pressures.

The 'credit flows from the intermediaries' have also emerged as important policy variable that exerts a positive influence on the capacity utilisation rates. It is felt that more co-ordination is required between the monetary policy of the Central Bank and the industrial policy of the Ministry of Industry, Government of India. The policies designed to restrain inflation by constricting the supply of credit could depress the capacity utilisation rates. Furthermore, a slowdown in the process of financial sector reforms in the second half of 1990s has also

affected adversely the credit flows to the private corporate sector. In India, a plethora of regulatory constraints have prevented the intermediaries from acquiring organisational forms based on market considerations. Also, the existing resource pre-emption levels are still very high and act as a tax on intermediation.

Currently, the industrial sector, after going through a long slowdown phase, appears to be on the recovery path. This recovery is largely attributed to the revival of domestic demand due to improved rural incomes and improvement of commodity prices in the international markets. However, the real issue again is the long time sustainability of this recovery process. The Indian policy makers are required to come to grips with the need to sustain structural reforms in the financial and infrastructure sectors that would remove the constraints on capacity use. In its current phase, India cannot afford to maintain the significant unrealised productive capacity that has been created during the first round of reforms.

#### Appendix A

Fixed-Effects Panel Estimates : Product Group Specific Constants

Product Group	Value of the Constant
Sponge Iron	135.1326
Fertilisers	149.4113
Soda Ash	148.4416
Caustic Soda	150.6405
Cement	112.2486
Sulphuric Acid	133.27
Steel forgings / castings	104.0216
Pig Iron	109.6642
Non-ferrous Rolled Products	120.9417
Engines & Turbines	136.3051
Transformers	142.7812
Medical Electronic Equipment	109.0807
Commercial Vehicles	127.7924
Printed Circuit Boards	99.96875
Computers & Peripherals	80.20857
Diamonds	274.0552
Two wheelers	135.3246
Electric Fans	123.0748
Consumer Entertainment Electronics	100.3463
Cotton & Cotton Yarn	145.6114
Petroleum Products	160.2952
Man made Fibres	153.0894
Automobile Tubes	119.4499

Automobile Tyres	114.0711
Plastic Products	117.7365
Dyes & Pigments	94.47473
Auto Ancillaries	113.031
Plastics in Primary Forms	141.6574
Paints & Varnishes	92.96845
Tea	152.9915
Sugar	173.2473
Soaps & Detergents	141.3217
Lamps	161.1505
Paper & Paper products	138.2375
Vanaspati	120.9351
Ceramic Tiles	132.847

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