GROWTH OF CAPITAL GOODS SECTOR AFTER THE MID-SIXTIES - SOME OBSERVATIONS

GOPINATH PRADHAN

No. 7/88 October 1988

NATIONAL INSTITUTE OF PUBLIC FINANCE AND POLICY
18/2 SATSANG VIHAR MARG
SPECIAL INSTITUTIONAL AREA
NEW DELHI - 110 067

This paper is based on an ongoing project undertaken at the National Institute of Public Finance and Policy. An earlier draft of the work was discussed in a NIPFP staff seminar on 22.4.1988. I have benefited from the comments of the participants at the seminar. I am thankful to Amaresh Bagchi, Arun Kashyap, B. Goldar, D.U. Sastry, M. Govinda Rao, J.V.M. Sarma, Shovan Ray and Sudipto Mundle for their suggestions and comments on earlier drafts.

ABSTRACT

The present paper attempts to trace the growth path followed by the capital goods sector in the post-1965 period in the context of a widely prevalent view that the industrial sector in India has been facing decelerated growth. Search for a pattern of growth of capital goods does not confirm the deceleration hypothesis. On the contrary, results often indicate impressive growth rates registered by the sector.

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INTRODUCTION

One of the current debates on the performance of the capital goods sector in India is centred around deceleration of output after the mid-sixties (See, for example, Ahluwalia, 1985; Bhagavan, 1985; Bardhan, 1984; Rangarajan, 1982; Patnaik, 1981; Nayyar, 1978 and Shetty, 1978). Although the economy as a whole was undergoing a phase of low growth during that period, it is observed that compared to other sectors, the capital goods sector was adversely affected to a greater degree (Ahluwalia, 1985). A number of explanations, mostly related to demand- and supply-constrained growth process of the economy, have been advanced in this context. However, there has appeared another set of findings which do not agree with the deceleration presumptions (Raj, 1984; Alagh, 1987). These studies take a broader view of the development of the economy and contend that it is growing with fluctuations. Highlighting the performance of capital goods in particular, these studies conclude that the sector is following a cyclical pattern of growth (United Nations 1985; Subrahmanian, 1985). These differences in perception of the character of the growth path followed by the manufacturing sector in general and capital goods in particular, persists. However, the deceleration hypothesis continues to draw the attention of both policy makers and academicians.

The present paper basically addresses itself to the question of the possible growth path followed by the capital goods industries in India after the mid-sixties. Keeping in view the existing differences of opinion, first it tries to identify the areas of agreement in their conclusions on the growth of the capital goods sector. For this purpose the method of analysis of some selected studies are applied to

the capital goods industries in Section 2. Subsequently, Section 3 formulates a new periodisation scheme to assess the growth path of the sector. The last section summarises the main findings of the paper.

2. DATA SOURCES AND TIME PERIOD

Differences in results of studies on the growth path can be attributed to several factors. We will take up for examination two crucial factors, namely, data sources used and the time period covered, both of which differ from one study to another. So long as the anomalies associated with these factors continue, a consensus on the probable growth path followed by the capital goods sector would be elusive.

Choice of Data Source

The two main sources of data available at the desired level of disaggregation and also over a period of time are Annual Survey of Industry (ASI) and Index of Industrial Production (IIP). The limitations of these sources for an evaluation of the performance of industrial sector are well known by now (See, for example, Alagh, 1985; Ahluwalia, 1985). Keeping in view the estimation of the growth of output, which remained a major focus of all studies on the deceleration phenomenon, we will recapitulate, briefly, some of the problems associated with the sources of data to determine if one source has a relative advantage over the other.

It may be noted that the IIP data originate from the production data received largely from the Director General of Technical Development (DGTD).The DGTD has a limited coverage of even large-scale units. It not only excludes from its purview some items of capital goods units like textile and jute machinery but also leaves out the entire small-scale sector. As a result, the growth rates derived from the IIP data may fail to represent the prevailing

scenario of capital goods. Such an apprehension is supported by the findings of the Economy Survey (Government of India, 1987), which observes that for the period 1974-75 to 1982-83, the compound annual growth rate of manufacturing sector was 8.00 per cent according to ASI data while it was much lower (4.4 per cent) according to IIP data. This significant difference warrants caution in the use of IIP data.

Another problem associated with the IIP data is with respect to the choice of base associated with an index. The base and coverage of any index requires updating from time to time to ensure that the data represent the actual growth. Apparently the IIP source has not kept pace with the changing industrial structure since the seventies. After revising the base from 1970-71 to 1980-81,it was noticed by the Economic Survey that industrial growth during 1984-85 and 1985-86 was significantly higher than the growth observed with the earlier base of 1970.

The other source of data, viz., that of the ASI, has a wider coverage of manufacturing sector as compared to the IIP. The survey includes all items of capital goods that are registered under the Factory Act, 1948. Also, data provided by this source are available at detailed levels of disaggregation over time, making them useful for evaluating the performance of manufacturing industries. The National Accounts Statistics Division of the Central Statistical Organisation (CSO) prepares the output as well as the value-added series for the registered manufacturing units from the ASI data after making appropriate adjustments for non-responding and non-covered units. This source, as documented in the National Accounts Statistics (NAS), appears to have an advantage in overcoming some of the limitations noticed in the case of the IIP data. It will, therefore, contribute more to our understanding of the growth path followed by the capital goods sector than the IIP source. It may however be worth while to note that Ahluwalia (1985) has pointed out

that the NAS series has been constructed by using two different methodologies which make the data non-comparable over time. She uses a modified version of the series.

Data provided by the ASI do not cover the unregistered manufacturing sector. One has to account for the contribution of this sector while evaluating the performance of capital goods. The non-availability of data on small-scale unregistered units, however, remains a major problem.We have to depend largely on the estimated series of unregistered manufacturing sector made available by the NAS, despite our expressed doubts on the reliability of this series.

Of the secondary sources, the two-digit industry level output/value-added series of the NAS, as given under the disaggregate tables seems to have advantage over that of the IIP. Many of the recent studies, therefore, have used these data for the purpose of evaluating the performance of manufacturing sector. The following will evaluate the growth path followed by the capital goods sector as seen on the basis of value-added documented in NAS data.

Decomposition of Time Period and Results on Growth Path

From the recent studies on deceleration hypothesis which have largely relied on the NAS data source, we find an absence of consensus on inferences drawn. For example, while the study by Ahluwalia (1985) supports the deceleration in the growth of industrial sector after the mid-sixties, Raj (1984) and Alagh (1987) do not agree with such a conclusion. Ceteris paribus, division of the time span covered by studies into different sub-periods plays a crucial role in determining the outcome, either supporting or contesting the deceleration phenomenon. When the post-independent period is divided into two sub-periods, pre-1965 and post-1965, in order to assess the behaviour of output growth, the latter sub-period registers a lower rate than the former. For a

better appreciation, we give the growth rates of pre- and post-1965 periods adopting the methodology as well as data source used by Raj (1984) and for the purpose of evaluating the performance of the capital goods sector, in particular, the growth rates for the two sub-periods are examined from Subrahmanian (1985).

It may be seen from Table 1 that the growth rates recorded by the gross value-added in the registered and the unregistered manufacturing sectors during the pre-1965 period were higher than during the post-1965 period, while the opposite was observed in the case of gross domestic products as well as agriculture. The capital goods sector in particular (part B of the table) also exhibited a growth rate of 20 per cent during the early sixties, which was higher than the rate of 3 per cent noticed during the post-1965 period. As the results on the capital goods sector are derived from a study which used Index of IIP data, some doubts may be raised by pointing out the inherent limitations of the source. To re-examine the performance of the sector, we present another set of growth rates in Table 2, taking data from the NAS and Bhagavan (1985). The table confirms the observation made earlier in the broader context of the manufacturing sector, that after the early sixties the growth path exhibited a tendency to slow down.

Studies which negate the deceleration hypothesis, therefore, have to be seen in terms of a different scheme of periodisation, other than the pre- and post-1965 division. The alternative strategy adopted by the studies is to increase the number of sub-periods, taking in each a shorter time span and then to compare the inter-sub-period growth rates (See, for example, Raj, 1984; Bhagavan, 1985; and Alagh, 1987). Of these, mention may be made of the study by Raj (1984) which divided the period 1952-53 to 1982-83 into four parts on the basis of nature and length of the cyclical movements in output of agriculture and allied activities as well as manufacturing enterprises. Such a scheme of

periodisation, compared to that of pre- and post-1965 division of industrial growth, reveals that the growth of industrial sector has been fluctuating. While the pre-1965 period seems to have had higher growth rate than that of the post-1965 period, the evidence emerging from the decomposition of the latter period fails to establish that the deceleration of growth was persisting consistently.

When we re-examine the growth rates of manufacturing sector following the periodisation scheme as well as data source of Raj (1984), the results support the conclusion that the period of late seventies has seen some improvement over the immediately preceding period. The average annual growth rate of manufacturing industries during 1976-77 to 1984-85 was 5.22 per cent which is higher than during 1968-69 to 1975-76. While a major component of the manufacturing sector, i.e., registered manufacturing industries, followed a similar path, deceleration was noticed in the case of the unregistered manufacturing sector. As Table 3 indicates, the growth rate of this segment of manufacturing sector stood at 4.90 per cent during 1952-53 to 1959-60 but declined consistently after that to 3.61 per cent during the late seventies. This trend with respect to the unregistered manufacturing sector, however, may not be representative due to limitations associated with the availability of data. The general expectations on this sector also run contrary to the declining growth rates. For example, it is pointed out that "the number and range of activities of such non-household enterprises are known to have increased phenomenally since 1970-71." Furthermore, "there has been serious under-reporting in regard to them and methods used for estimating changes in the gross value added by them preclude to a significant degree their true dimensions being captured," (Raj 1984). In contrast to the declining growth of the unregistered manufacturing sector, the gross domestic product registers a consistently higher growth in the succeeding sub-periods. As can be seen from the table, the GDP has grown at the rate of 3.53 per cent during the

fifties, 3.75 per cent during 1960-61 to 1967-68, 3.83 per cent in the early seventies and 4.23 per cent during the last period.

Thus, when the periodisation scheme of Raj (1984) is followed, continuance of a consistently decreasing growth in the manufacturing sector cannot be substantiated. It is, however, worthwhile to note that the two sub-periods forming largely the pre-1965 period have higher growth rates than that of the two which constitute the post-1965 period. In order to evaluate the persistence of the deceleration phenomenon, therefore, growth rates of post-1965 sub-periods need to be compared. Such a pattern of evaluation indicates that after a period of decreasing rate of growth possibly during the late sixties and the early seventies, the manufacturing sector has shown signs of recovery.

Applying the periodisation scheme adopted for the manufacturing industry to the capital goods sector, evidence on signs of recovery from deceleration can be noticed. The average annual growth rates derived by making use of data presented by Subrahmanian (1985) indicate that the capital goods sector grew at the rate of 3.96 per cent only during 1968 to 1975 but in the next sub-period comprising years 1976 to 1983 registered a higher growth of 4.70 per cent.

The above finding of higher growth, however, seems to be more apparent than real, for, results at the aggregate level seem to have been influenced by the performance of transport equipments which succeeded in registering an impressive growth in the late seventies. Such a feature is more clearly seen when the growth is examined by following the two-digit industry level classification of the capital goods sector. Table 4 summarises the growth rates in each of the three broad industrial groups of capital goods, and indicates that the electrical and the non-electrical machinery groups continued to decline even after the mid-seventies. The rate of growth in the case of non-electrical

machinery which was 18.38 per cent in the fifties, declined consistently in the succeeding sub-periods to reach the lowest level of 7.14 per cent during 1976-77 to 1984-85. A similar picture emerged in the case of electrical machinery group also. Industries of this group after recording the highest growth rate of 16.26 per cent during 1952-53 to 1959-60, declined to a lower level of 14.58 per cent subsequently in the sixties. The post-1975 period was characterised by a further fall to 9.28 per cent.

Contrary to the continued declining growth recorded for the electrical as well as the non-electrical machinery groups, transport equipments had undergone a perceptible change during 1976-77 to 1984-85. As may be seen, the growth rate of this group in the third sub-period was only 1.58 per cent. The fourth sub-period, however, saw a significant jump to 10.88 per cent which was next only to the highest rate of 12.06 per cent during the fifties.

The periodisation scheme adopted above with respect to capital goods industries has thus partially succeeded in highlighting the presumption that the post-1975 period has recovered from the deceleration. To the extent that the above periodisation scheme was formulated on the basis of the movement of value-added in aggregate manufacturing sector, it served the purpose of contesting the deceleration hypothesis centred around it as well as putting forward an alternative view that the sector might be growing with fluctuations. We have extended the same periodisation formulation to the capital goods sector assuming that what is true for the entire manufacturing sector should also hold good for a part of it. The capital goods sector at the aggregate level appears to be in conformity with such a pattern. Discrepancy arose however when the individual groups within the capital goods sector were analysed. As a step towards removing this discrepancy, the periodisation scheme adopted by Alagh (1987) would be worth examining. This scheme divided the post-1965 period into three sub-

periods and found that "the rate of growth of industrial production since 1976 is higher." Apparently the division of the time period into different groups is on the basis of gross investment in the economy. The post-1976 period registered a higher investment which improved the performance of growth in the industrial sector.It is observed by the paper that,"from the period from which gross investment rates in the Indian economy have been high (above 20 per cent of GDP), and public investment has been rising,industrial growth has been around 7 per cent compound per annum..." As the growth rates in that study were based on the value of output, we worked out the growth of value added following the same methodology as well as periodisation scheme. The average annual growth rates of value added in the three groups of industries coming under the purview of capital goods sector are seen in the following.

With the new scheme of periodisation, it was noticed that there was no consistently declining rate of growth in any group of capital goods. Table 5, summarises the relevant growth rates. The non-electrical machinery group grew at the rate of 7.29 per cent during 1966-67 to 1971-72, followed by a higher rate of 9.40 per cent in the period 1971-72 to 1976-77. During the post-1975 period industries of this group had a lower growth of about 8 per cent. The second group, i.e., electrical machinery, also did not register a consistent decline. Starting with a growth rate of about 13 per cent in the late sixties, it registered a rate of 9 per cent during the first half of the seventies. Then the post-1975 period witnessed a higher growth of 10 per cent.

The proposition that rise of the gross investment influenced the pattern of growth of the industrial sector appears to be quite reasonable. The results obtained through the periodisation scheme of Alagh (1987) may therefore be indicative of the genuine growth path followed by the

capital goods sector. Table 5, however, shows that the sub-period 1966-67 to 1971-72 has a higher growth rate than that of the sub-period 1971-72 to 1976-77. If the gross investment as a proportion of GDP during the late sixties was not as high as that of the early seventies, the probable reasons for higher growth rate of the former period needs to ascertained. It is possible that the periodisation scheme on the basis of investment share in GDP alone is not adequate to explain the growth during 1966-67 to 1970-71.

A re-examination of the growth of capital goods industries through three different periodisation schemes adopted in connection with the examination of deceleration hypothesis gives the following picture:

i. In comparison with the pre-1965 period, capital goods grew at a lower rate in the post-1965 phase. The entire manufacturing sector followed such a pattern during the period under consideration. Some studies highlighted the deceleration phenomenon on the basis of this periodisation scheme.

ii. The decomposition of the post-1965 period of industrialisation, following the periodisation scheme of Raj (1984), however, has failed to clearly establish a consistently declining growth of the capital goods sector from one sub-period to another.

iii. Within the capital goods industry, the group under transport equipments has established its position from a lower to higher growth phase during the post-1975 period. The existing schemes of periodisation however have not yet clearly brought out the growth path of the electrical and the non-electrical machinery groups. The evidence gathered by following the periodisation scheme of Alagh (1987) seems to suggest absence of consistent decline in their growth.

Before drawing any inference on the growth path of capital goods, we have to keep in mind the influence of the periodisation scheme in determining the observed results. It is seen above that alteration of the cut-off point of a sub-period is responsible for a change in the growth rate.

While examining the growth path of industries through periodisation therefore, studies specify appropriate reasons for adopting a particular scheme. As indicated above regarding choice of sub-periods, Raj (1984) used an eight-year period according to the observed cycle in the production of output. Alagh (1987) on the other hand relied on the share of investment to arrive at the pre- and post-1976 periodisation scheme. Notwithstanding such justifications, however, the problem of evaluating the performance with such a method is widely acknowledged by now. For example, it is pointed out that fixing of the cut-off point of a particular sub-period leaves enough room for admitting different answers to the same problem (Varshney, 1984).

Given that results vary from one periodisation scheme to another, it will be useful to look for any finding that remains invariant to such changes; when a result like that is identified, one may presume that it has not been influenced to a large extent by the arbitrariness of periodisation.

In view of the finding by a group of studies that the growth of the capital goods sector did not exhibit the tendency to decline consistently, it is necessary to consider its growth path after the mid-sixties and to test the hypothesis in particular after this period.

Sub-periods in existing studies, formulated as they are for examining the growth path of the entire industrial sector, are not likely to display the movement of value-added in capital goods industries adequately. The possibility that different segments of the industrial sector have experienced varied degrees of growth in a particular sub-period cannot be ruled out as there are various socio-economic forces which generate strength or weakness of a particular segment in the process of development. Keeping in view those forces which influence the growth of the capital

goods industries, a periodisation scheme which reflects such a pattern needs to be suggested.

3. A NEW SCHEME OF PERIODISATION

We now attempt to formulate a periodisation scheme for evaluating the growth of value-added in capital goods industries after the mid-sixties. The time period 1965-66 to 1984-85 is divided into four sub-periods, viz., (i) 1965-66 to 1968-69, (ii) 1969-70 to 1973-74, (iii) 1974-75 to 1978-79 and (iv) 1979-80 to 1984-85. The purpose of adopting this scheme is to examine whether capital goods industries registered a higher rate of growth since the beginning of the seventies compared to that of the second half of the sixties and whether there is a consistently declining trend after that period.

This four-part division is arrived at in two stages. At the beginning, periods which saw major deviations from the trend growth path have been identified. Then, the cut-off points of each sub-period are decided keeping in view the three major developments in the economy which seemed to have affected the growth of demand for capital goods, namely, appearance of severe drought conditions in the second half of the sixties, and two successive `oil shocks´ which the economy faced in the seventies. A brief discussion of their possible impact on the growth path of capital goods industries will be in order.

It is useful to emphasise the fact that any study evaluating the growth of value-added in the capital goods sector has to take note of fixed capital investment made in various sectors of the economy. For, it is the investment demand in plant, machinery and components which determines the growth of capital goods industries. As the generation of investment demand for machinery and equipments in the economy is limited by aggregate demand for production, it is reasonable to assume that variation in aggregate demand will

ultimately be reflected in the variation of output produced in capital goods industries. It is not surprising therefore that the impact of various demand constraints on capital goods has received considerable attention in the analyses of the growth of the sector (For a summary of the findings of related studies, see Rangarajan, 1982).

The period from 1965-66 to 1968-69 is kept as a separate group in view of the marked decline in agriculture due to adverse weather conditions in 1964-65 and two successive years of drought thereafter. Given the agrarian character of the Indian economy, the role of agriculture is extremely important, although indirect, in determining the demand for capital goods. Fall in agricultural production led to a decline in agricultural income. The direct impact on the capital goods sector was in terms of the decline in demand for agricultural machinery. Indirectly the demand for industrial products might have come down, leading to a fall in the investment demand for capital goods. While other factors influencing the production of capital goods had their contribution too, the impact of declining agricultural production seems to be the most important variable which might have generated a chain of events leading to a reduction in the demand for capital goods.

Various supply bottlenecks too during this period contributed to retarded growth. In particular, mention may be made of shortage of imported machinery, components and raw materials in capital goods industries due to a decline in foreign exchange reserves during 1965-66. As a consequence of all these factors, the recession which the industrial sector had to face showed signs of overall recovery only during 1968-69.

The second sub-period is kept in the range of 1969-70 to 1973-74 when performance of the capital goods sector was expected to face relatively more buoyant demand conditions as the agricultural sector had improved its performance. We

have kept 1973-74 the last year of this period in order to accommodate the impact of the first `oil shock' which might have influenced the growth of capital goods industries in the succeeding years. The immediate impact of rise in oil prices is to be seen in terms of declining demand for oil-using machinery, particularly in transport equipments. In such a situation the buoyancy of the growth of capital goods industries is likely to be reduced.The subsequent process of readjustment in the economy contains various strategies like greater investment in oil exploration in order to overcome the oil crisis. Setting aside these aspects and their possible impact on the capital goods sector, one would expect an increasing demand for substitutable non-oil-using machinery for the oil-using ones. Thus the third sub-period consists of the years immediately succeeding the first oil shock and is likely to register a different pattern of growth in comparison with the second sub-period. While it is difficult to conclude that the economy completed the readjustment process arising out of the first oil shock by the year 1978-79, we have limited the third sub-period up to that year and opted for a fourth one after that. Basically the attempt is to separate out the growth during the period when the second oil shock appeared in 1979. As the first oil crisis prompted the economy to initiate some long-term measures, the effects of the second oil shock were less severe. The overall growth therefore is expected to be better than that of the third sub-period.

While evaluating the growth of capital goods industries we will utilise the value-added data published by the NAS and cover the period 1961-62 to 1984-85. The choice of the final year is due to the availability of data in the NAS at the desired level of disaggregation in terms of 1970-71 prices. The beginning year of the analysis, on the other hand, is kept at 1961-62, as conversion from current to constant 1970-71 prices of the value-added for years 1961-62 to 1969-70 in the three groups of industries considered in this study was easily done by utilising the industry-wise

wholesale price index published by Chandhok (1978). As the major purpose is to examine the growth of value-added in capital goods industries during the post-1965 period, we have concentrated on the periodisation scheme from 1965-66. The growth recorded during 1961-62 to 1964-65 (termed as period 0) will be presented to indicate a higher growth period of the pre-1965 era. Thus the growth of value-added will be examined in five sub-periods - one for pre-1965 and four for post-1965 years.

Methodology

With a view to analyse the trends in value-added of the three groups of capital goods industries, we have estimated semi-logarithmic time trends. As the entire period 1961-62 to 1984-85 is decomposed into five parts in our periodisation scheme, the equation used for estimating the semi-logarithmic time trend has been modified to include four slope as well as four intercept dummies and the growth rates of five sub-periods are obtained from the estimated equation. The typical regression equation in our scheme takes the following form:

$$\log Y = \phi + \sum_{i=1}^{4} \alpha_i D_i + \beta t + \sum_{i=1}^{4} \delta_i z_i + \varepsilon_i$$

where Y = value added
t = time

$$D_i \begin{cases} = 1 \text{ for sub-period } i \\ = 0 \text{ otherwise} \end{cases}$$

$$z_i = D_i t$$

α_i and δ_i are coefficients of intercept and slope dummies respectively.

The annual compound growth rate for the sub-periods is obtained from the estimated coefficients, i.e., anti-log $(\beta_i + \delta_i) - 1$. Such a growth rate when significantly

different from zero, indicates the existence of a trend within the sub-period.

As we move forward from one sub-period to another and compare the inter-period growth rates, the acceleration of the growth will be known. In the framework of the regression equation specified above , the existence of significant difference between two sub-periods can be tested. Thus when assigned values equal zero for the years 1965-66 to 1968-69 and one to other sub-periods, the estimation of the above regression equation will indicate if each growth rate of second to fourth sub-periods is significantly different from that of the first. Only when the coefficients of multiplicative dummies are negative and statistically significant, the deceleration of growth in subsequent sub-periods compared with that of the first will be established.

For the purpose of examining the deceleration of growth in the capital goods sector, we will consider the following propositions:

i. In dividing the post-1965 period into four parts, it is expected that the first sub-period will have the lowest growth. In terms of the above equation, slope dummies associated with second to fourth sub-periods will not have statistically significant negative coefficients.

ii. Some of the studies referred to, have pointed out the possibility of accelerated growth in the industrial sectors after the mid-seventies. It will be examined whether the capital goods sector has a similar experience at any point of time. Particularly an examination of consistently non-declining growth from first to fourth sub-periods will be attempted. In other words, it will be shown that the difference of growth between second and first, third and second as well as fourth and third sub-periods is not negative.

Growth after the Mid-sixties

We now present the trend recorded by the three groups of capital goods industries, namely, non-electrical machinery, electrical machinery and transport equipment in different sub-periods. The rate of growth is estimated by introducing slope and intercept dummies to four out of five sub-periods in the semi-logarithmic trend equation. It may be seen that the three groups of industries have grown at different rates during 1961-62 to 1984-85. Table 6, which summarises the growth of value-added, indicates that the three groups taken together have grown at the rate of 7 per cent per annum from 1961-62 to 1984-85. The growth registered by electrical machinery however turns out to be the highest (10 per cent) among the capital goods industries considered by the study. While the non-electrical machinery group registers a growth rate of 7.44 per cent per annum, the lowest rate is exhibited by transport equipment. Ceteris paribus, differences noticed in the inter-industry rate of growth may be due to differences in investment demand that was forthcoming from the economy. The demand for a particular group of industry may also be varying from one sub-period to another. An examination of the growth of industrial groups according to the proposed sub-periods will throw some interesting light on this aspect.

Looking at each industrial group of the capital goods sector, it may be said that of the four sub-periods in the post-1965 period, the growth was the lowest during the first. Subsequent years have seen marked improvement over that sub-period, though in varying degrees. While the fourth sub-period registered the highest growth rate in non-electrical machinery and transport equipment, the same position goes to the second sub-period in the case of electrical machinery group. A notable feature which is revealed by the decomposition of the post-1965 period is that of the consistently higher rates of growth as we move from sub-period to sub-period in the case of non-electrical

machinery and transport equipment. In order to appreciate these features more clearly, it will be useful to return to Table 6.

It might be seen from the table that the value-added of the three groups of capital goods taken together grew at the rate of 2.9 per cent per annum in the first sub-period. The growth rate improved substantially (to 7.43 per cent) in the second sub-period. After coming out of the lowest growth phase in the latter half of the sixties, the capital goods sector again underwent a marginal decline in its growth rate during 1974-75 to 1978-79 compared to the preceding sub-period. The sub-period 1979-80 to 1984-85, however, pushed up the growth to a new peak at 12.10 per cent per annum. Thus the sector might not have experienced a consistently declining growth during the four sub-periods under our consideration. This finding therefore confirms the observations made by studies which questioned the persistence of deceleration in the post-'75 period. The decline of growth in the subsequent periods, therefore, has to be seen in the context of individual industrial groups.

Of the three groups of capital goods industries, non-electrical machinery and transport equipment have shown consistent improvement in the growth of value-added from the lowest rate of the first sub-period to the highest during the fourth. The non-electrical machinery group, for example, had a growth rate of 4 per cent during 1965-66 to 1968-69. In the next sub-period there was an improvement of two percentage points. The rate continued to increase to a level of 8 per cent during 1979-80 to 1984-85. In the case of transport equipment, the growth rate was only 0.57 per cent per annum during the second half of the sixties. As this rate is not significantly different from zero, one may presume that there was no clear trend for transport equipment in the late sixties. In the succeeding sub-period of 1969-70 to 1973-74, the growth was higher by 1.62 percentage points in comparison with that of the first sub-

period. However, again it is not statistically significant. These fluctuations in the growth of value-added in transport equipment may be largely due to demand constraints which surfaced during the late sixties and early seventies. The demand for equipment generated by the railways during these years is stated to have slackened. As the Economic Survey points out, "The production of transport equipment continued to shrink because of the declining fortunes of the railway equipment industry due to lack of demand from the railways. The latter are experiencing difficulties with regard to traffic and therefore reluctant to order additions to equipment" (Government of India, 1971). The distressing situation for transport equipment changed during the third sub-period, with an increase in growth rate to about 6 per cent per annum. During 1979-80 to 1984-85 the group succeeded in registering the highest rate of approximately 17 per cent, which was far better than that of the other two groups. The perceptible change in the growth of transport equipment may not be surprising if we take into account, among other things, the spurt in activities of the automobile industry. The production of total number of vehicles in India went up from 471,243 in 1978 to 1022,072 in 1983 (Table 1 in Das Gupta, 1986).

In contrast to the consistently higher rates of growth noticed in the non-electrical and the transport equipment machinery groups, the electrical machinery group followed a different growth path, characterised by ups and downs. From the lowest growth of 3.14 per cent per annum during 1965-66 to 1968-69, these industries registered their highest rate of 16.03 per cent in the succeeding sub-period. While we have no substantial evidence to identify the reasons for this spurt in growth rate during 1969-70 to 1973-74, the emphasis on rural electrification and increasing demand in the agricultural sector for electrical machinery due to the green revolution during this period might have pushed up the demand for electrical machinery. The next sub-period, 1974-75 to 1979-80, was found to have had a lower rate of

7.45 per cent, which was only half the growth registered during 1969-70 to 1973-74. The substantial decline in the growth of value-added of the electrical machinery group during the third sub-period, however, was seen to have been removed soon thereafter. The growth during 1979-80 to 1984-85 recorded 11.00 per cent, a marked improvement over the third sub-period.

A comparison of the growth registered during 1961-62 to 1964-65 with that of post-1965 sub-periods reveals that the former had a higher rate only in the case of non-electrical machinery and electrical machinery. Transport equipment, on the other hand, succeeded in achieving a growth rate of 17 per cent during 1979-80 to 1984-85 which was higher than that of the period 1961-62 to 1964-65. The adoption of a new periodisation scheme in the present study seems to have captured this interesting development of a segment of the capital goods sector.

The above analysis clearly indicates that of the four sub-periods of post-1965 years, the growth of capital goods was at the lowest level during the first. Subsequently, the sector showed a tendency to pick up momentum. If the growth experienced a marginal decline during 1974-75 to 1978-79, it overcame the shortfall by picking up at a substantially higher rate in the subsequent sub-period. Looking at the individual groups of the sector, we did not notice a consistent decline in growth rates. On the other hand, the non-electrical machinery and the transport equipment groups indicated persistently increasing growth.

Test for Non-declining Growth Rate

On the basis of these results, one may present a working hypothesis that the growth of the capital goods sector has been accelerating after experiencing a growth "trough" for a short while during the second half of the sixties. In terms of our periodisation scheme, it has

therefore to be tested that the growth rates of the successive sub-periods have been not only higher but the difference between the two successive growth rates is statistically significant.

We do not propose a test of acceleration hypothesis presently because our periodisation scheme has been evolved on the basis of appearance of exogenous factors like `oil shocks' which may have had an adverse impact on the demand for capital goods. So a possibility of the declining growth rate in the successive sub-periods is expected in our formulation. It will therefore be interesting to see how far the capital goods sector was successful in resisting the declining trend. We will therefore proceed with the objective of testing for consistently non-declining growth of the capital goods sector in the successive sub-periods. In terms of our periodisation scheme, it has to be ascertained that:

i. In comparison with the first sub-period, the growth in second, third and fourth are not significantly lower.

ii. In comparison with the second sub-period, the growth in third and fourth are not significantly lower.

iii. In comparison with the third sub-period, the growth in fourth is not significantly lower. Alternatively, in terms of the regression equation discussed earlier, the coefficients associated with slope dummies will not be negative and statistically significant.

Results of Statistical Test

A consistently declining rate of growth was not found in any of the three groups of capital goods industries examined by us. Table 7, which summarises the results of the statistical test, shows that deceleration was not widely prevalent in the capital goods sector; it was confined to electrical machinery only in one sub-period.

Going by indications of the test, however, one may read more than the fact that the capital goods sector as a whole has not seen any significant decline of growth after the mid-sixties. There are indications of accelerated growth during 1969-70 to 1973-74 as well as 1979-80 to 1984-85. It may be recalled that the value-added of the three groups of capital goods combined grew at the rate of 7.43 per cent and 12.10 per cent during 1979-70 to 1973-74 and 1979-80 to 1984-85 respectively. These rates are found to be significantly higher than in their corresponding preceding sub-periods. Statistically, however, it will be difficult to substantiate that there was acceleration in all the three groups of capital goods industries. Looking at the performance of individual groups it may be possible to identify that the growth of electrical machinery group went up significantly during 1969-70 to 1973-74, which might have contributed to the significant acceleration in the aggregate level of capital goods industries during that period. Similarly, the acceleration noticed during 1979-80 to 1984-85 may be attributed to the remarkable performance of transport equipment.

Emerging Prominence of Electrical Machinery

A comparison of inter-industry trends in growth would indicate that the performance of the capital goods sector is likely to be influenced increasingly by the group electrical machinery. This industry grew at a rate of 10.12 per cent per annum during 1961-62 to 1984-85, which turns out to be the highest in the three groups of capital goods. Looking at the pre-1965 period, it may be seen that its position was only second to that of the non-electrical machinery group. After the mid-sixties however a clear lead by these industries in most of the sub-periods is established.

In terms of the share in group total also the emerging prominence of elecrical machinery was clearly visible. Table 8 shows that this group had a share of about

20 per cent in the total during 1961-62. It increased steadily and reached the level of over 35 per cent during the early eighties. In contrast, transport equipment had a declining share in the capital goods industry. The group under non-electrical machinery also exhibited a declining share after the late seventies.As can be seen from the table, the share of this group went up from a lower level of about 20 per cent in the early sixties to 36 per cent by 1977-78. Thereafter, a consistent decline was observed.

The transport equipment group also had the lowest growth rate during 1961-62 to 1984-85. The demand for this group, until now, is heavily dependent on public sector enterprises like railways, which until recently has shown a highly uncertain pattern of growth. The remaining industrial group of capital goods, i.e., non-electrical machinery, seems to be stabilising at about 7 per cent growth rate in the different sub-periods considered by us. If this scenario is a reflection of the emerging pattern of demand for the capital goods in the economy, electrical machinery seems to be at an advantage and acceleration of growth in this group may not be an unreasonable proposition.

Growth Rates in Capital Goods Manufacturing Sector (Unregistered)

Data presented in Tables 6 and 7 pertain to the registered manufacturing sector only. To check whether inclusion of capital goods produced in the unregistered sector alters the picture, we have examined the growth rate of capital goods produced in this sector. As data for the three groups of capital goods are available from 1970-71 in the case of the unregistered sector, we present the growth rates from the second to fourth sub-periods. In the case of the second sub-period, growth of value-added is given for the years 1970-71 to 1973-74 whereas the time span for the third and the fourth sub-periods are kept the same with periodisation scheme adopted for the registered manufacturing sector.

The pattern of growth in the three groups of unregistered capital goods industries taken together confirms the earlier finding that there is no consistently declining trend in the growth of value-added. As may be seen from Table 9, the sector grew at the rate of 7.58 per cent during 1970-71 to 1973-74 and subsequently declined to 6.63 per cent. However, during 1979-80 to 1984-85, the declining trend seems to have been arrested and the growth rate was higher, although only marginally, in comparison with that in the preceding period. From among the individual groups, only transport equipment exhibits the same pattern as that observed in the case of its counterpart in the registered manufacturing sector. The non-electrical machinery in the unregistered sector indicates a consistently declining growth whereas a completely opposite picture had been revealed by this group in the registered sector. The electrical machinery group of the unregistered sector records a sharp decline during 1979-80 to 1984-85 compared to the growth rate of its preceding sub-period. This pattern also differs from our observation in the case of the registered sector.

Thus, while the unregistered sector of capital goods at the aggregate level shows the same pattern of growth as the registered sector, some differences emerged at the level of individual groups. Particularly, the non-electrical machinery industries do not seem to be following a non-declining path after 1973-74. It may be possible that the demand for non-electrical machinery produced in the unregistered sector is declining. But such a presumption does not corroborate the general impression of these industries. Possibly one has to agree with the view expressed by the Raj Committee (1982) that existing data on the unregistered sector may not be adequate to judge its performance.

Growth of Fixed Capital Formation

The growth path followed by the capital goods sector during the post-1965 period should be reflected in the movement of fixed capital formation (FCF) as the direct demand for these goods comes from the investment made in different sectors of the economy. Of course, factors like variation in prices and structural changes in the industrial sector may not allow us to capture the real correspondence between the growth of investment demand and production of capital goods.Notwithstanding such a possibility, it will be useful to examine the support provided by the FCF on the findings of the growth of capital goods earlier. We have therefore, incorporated the fixed capital formation, in 1970-71 prices, in different industries as well as in the public and the private sectors in our periodisation scheme to examine the behaviour of its growth. It is expected that the fixed investment has not declined consistently in the successive sub-periods.

For the purpose of analysing the sub-period-wise growth rates we have considered the capital formation in the important sectors like primary, secondary, transport, storage and communication, agriculture, manufacturing and railways. The FCF according to ownership of assets, on the other hand, considers investment on machinery and equipment in the private sector as well as the public sector.

Growth of Fixed Investment in Different Industries

Looking at the growth of the different industries considered by us, it becomes clear that there was no consistent decline in the growth of fixed investment. While FCF was at the lowest level during the first sub-period compared to that of the early sixties, improvement came about during 1969-70 to 1973-74. The peak period of growth in the gross domestic fixed capital formation (GDFCF) can be

seen during 1974-75 to 1979-80 when the rate exceeded that for the corresponding period 1960-61 to 1964-65.

Table 10 presents the growth of investment in the selected industries on the basis of FCF at 1970-71 prices. It may be seen that after registering a growth rate of 2.51 per cent, which is significantly not different from zero, during the first sub-period, the GDFCF grew at the rate of 4 per cent during the second and 9 per cent during the third. The fourth sub-period indicates a decline, though insignificant.

The slowdown in fixed investment which occurred during the second half of the sixties, continued until 1973-74 in some important sectors. The growth of capital formation, in the primary as well as the secondary sector, for example, could be seen to have no significant trend until that period and an accelerated rate during 1974-75 to 1978-79. Industries like transport and storage overcame the slowdown phenomenon during the early seventies. While the growth of fixed investment in transport and storage came down again to 2.14 per cent during 1974-75 to 1978-79, the succeeding sub-period saw a significantly accelerated growth of 9.37 per cent.

Examining the growth of FCF in different sectors according to our periodisation scheme, it may be said that there was neither consistent acceleration nor consistent deceleration. The demand for investment after the lowest growth phase of the mid-sixties varies from one industry to another. This may be attributed to the difference in the ownership pattern of industrial activities. The assessment of the growth of fixed investment according to public and private sector will be helpful for a better understanding of the problem.

Growth of GDFCF in Public and Private Sectors

There is evidence to support the contention that GDFCF in the public sector has not declined consistently during the post-1965 period. Particularly, if we go by the FCF on machinery and equipment in the public sector, the slowdown of public investment appears to be an exception rather than the rule after the mid-sixties. Table 11 summarises the growth rates of FCF as well as FCF on machinery and equipment in private and public sectors according to our periodisation scheme. The data on FCF in both these sectors are in 1970-71 prices as published by the NAS. The FCF on machinery and equipment in private and public sectors in 1970-71 prices are derived by utilising the series of FCF on machinery and equipment at current prices. It may be seen from the table that after registering a negative growth of -6.18 per cent per annum during 1965-66 to 1968-69, public sector investment in fixed capital has recorded a remarkable recovery in the succeeding sub-period. The growth rate during 1969-70 to 1973-74 is found to be 9.10 per cent which is significantly higher than in the previous period. After that, the third sub-period witnessed a growth of 12.84 per cent, an improved rate over the second period. Also, it is pertinent to note that the higher growth phase of the early sixties had not achieved this rate. This finding is important in view of the widely prevalent notion that public investment slowed down substantially after the mid-sixties. The empirical results indicate that the sector is growing at about 8 per cent per annum during the fourth sub-period, which is lower than that of the second and the third. But the deceleration is not significant statistically.

In contrast to the public sector, the private sector has been facing greater fluctuations in the growth of FCF. The negative rate of growth which showed up in this sector during the latter half of the sixties is found to have continued until 1973-74. There has been a marginal recovery since then but the growth is at a significantly

lower level than that of the public sector.

The growth seen in terms of FCF on machinery and equipment in the public sector indicates the highest rate of 16 per cent during 1979-80 to 1984-85. As the corresponding growth rate was only 5 per cent during 1960-61 to 1964-65, the evidence of the early eighties indicates a substantial improvement. Looking at the growth of other sub-periods also, it is found that the overwhelming slowdown did not affect the public sector FCF on machinery and equipment. The private sector, however, presents a contrary picture. Although the negative growth rate during 1965-66 to 1968-69 in FCF on machinery and equipment was reversed subsequently, there was no visible trend in growth. The growth rates are not significantly different from zero and there is a consistently declining tendency as we move from sub-periods second to third and then to fourth. Thus the FCF on machinery and equipments in the private sector has not seen any perceptible improvement since the latter half of the sixties.

The FCF in different sub-periods on the whole can be said to have shown a rate of growth which is not declining consistently. As the demand for fixed investment is not seen to be forthcoming uniformly in various industries, the capital goods sector may not show a consistently accelerating rate of growth. Public sector investment, which is often pointed out to be a major factor in creating demand for capital goods, has shown signs of improved growth since the early seventies, although the rate may not be accelerating. The absence of a consistent decline in the growth rate of value-added in the capital goods sector noticed earlier may, therefore, be attributed to the demand generated through public investment. The demand for investment in the private sector, on the other hand, remains highly fluctuating and the possibility of a deceleration of growth cannot be altogether ruled out in this sector. The growth of capital goods industries is likely to be

constrained by the situation prevailing in FCF on machinery and components in the private sector.

4. SUMMARY OF CONCLUSIONS

The foregoing discussion attempts to trace the growth path followed by the capital goods sector in recent years. It is seen that the period of high growth rate in the early sixties was followed by a sharp decline in the second half of the same decade. Although industries of the sector showed signs of recovery from the abysmally low level of growth within three to four years, the rate in general is found to be lower than that of the pre-1965 era. Search for the pattern of growth emerging in the post-1965 years, however, indicates that the sector has been able to pull itself out from possibly the lowest growth "trough". From the year 1969-70 onwards the rate of growth has never been lower than that of the second half of the sixties. On the contrary, there are indications of periodically higher growth rates in value-added.

The fluctuating growth path followed by the industrial sector is also pointed out by a few scholars who do not agree with the persistence of decelerated growth after the mid-seventies. The crucial factor in some of the recent studies that take into account the emerging trends is the decomposition of the post-1965 period into different sub-periods. Thus the periodisation scheme, in spite of the limitations due to the arbitrary division of the time period, is utilised by many studies in analysing the growth path of the industrial sector.

Applying the periodisation scheme of some selected studies to the three groups of capital goods industries, namely, non-electrical machinery, electrical machinery and transport equipment, the growth rates of value-added was examined by the present study. It was noted that in different sub-periods of post-1965 years, these industries

taken together had not experienced a consistently declining growth rate. This finding was subjected to further test with the help of a new periodisation scheme that was thought to be appropriate for assessing the growth path of capital goods.

The choice of cut-off points of a particular sub-period clearly influences the conclusion drawn. The present study however has selected for examination the proposition that the capital goods sector has followed a consistently non-declining growth rate during the post-1965 period. Although the other conclusions drawn by studies which adopt different periodisation schemes differ, the above view is shared by them. The new periodisation scheme has been used to provide support to such a claim.

In order to substantiate the results obtained on the basis of growth rate of value-added, the investment demand for capital goods generated in other sectors of the economy is examined. The empirical evidence suggests that fixed capital formation during the post-1965 period is growing without consistent decline in the successive sub-periods.

The industry-wise fixed capital formation reveals that the demand for investment is not growing uniformly in different industries. This may be reflected in restricted overall buoyancy of the demand for capital goods.

The fixed capital formation on machinery and equipment by the public sector indicates an increasing trend of growth, which may be helpful for the growth of demand for capital goods. The same observation however does not hold for the private sector. The investment demand in this sector does not appear to be picking up after the sharp decline in the late sixties.

TABLE 1

Average Annual Growth Rates* in Manufacturing Sector

(per cent)

A[1]	(Period I: 1951-52 to 1965-66	Period II: 1966-67 to 1983-84)	
	Growth rate in		
Items	Period I	Period II	1951-52 to 1983-89
1. Gross Domestic Product	3.48	4.13	3 .84
2. Agriculture and allied activities	1.77	3.27	2.61
3. Registered manufacturing enterprises[2]	8.07	4.36	5.93
4. Unregistered manufacturing enterprises	4.73	3.63	4.11
5. Manufacturing (registered and unregistered)	6.73	4.10	5.22

B[3]	(Period I: 1961 to 65	Period II: 66 to 83)	1961-83
	Period I	Period II	
1. Manufacturing	8.79	3.65	4.77
2. Capital Goods Sector	19.87	2.95	6.63

Notes: '*' Growth rates are derived by averaging the rate of annual change.

1. Uses the data as well as follows the procedure adopted by Raj (1984) for computing the growth rates.

2. Growth rates for period I are for 1952-53 to 1965-66.

3. Uses the data presented by Subrahmanian (1985) in Table 1.

TABLE 2

Average Annual Growth Rates* of Value-Added in Capital Goods Sector

(per cent)

A[1]	(Period I: 1952-53 to 1965-66	Period II: 1966-67 to 1984-85)	
	Rate of growth in		
Broad industrial groups in capital goods sector	Period I	Period II	1952-53 to 1984-85
1. Non-electrical machinery**	19.55	6.98	12.31
2. Electrical machinery	16.66	9.80	12.71
3. Transport equipment	11.84	5.89	8.41
Total (1+2+3)	13.82	7.15	9.98

B[2]	(Period I: 1961-65 and Period II: 1966-78)		
Selected items of capital goods	Period I	Period II	1961-78
1. All machinery & equipments	13.12	5.21	7.41
2. Machine tools	30.34	4.84	11.92
3. All other mechanical machinery	20.32	8.71	11.93
4. Heavy electricals	26.29	6.95@	13.40
5. All other electrical machinery	15.55	14.43	14.74
6. Transport equipment	10.21	1.59	3.99
7. Professional and scientific instruments	25.79	21.38	22.61
Capital goods sector	23.40	5.99	10.83

Notes: * The growth rates are averaged from annual rate of change in value-added.

** The term `non-electrical machinery' used in this paper refers to manufacture of machinery except electrical machinery.

1. Data on value added are taken from National Accounts Statistics' disaggregated tables and related to 1960-61 prices for years 1951-52 to 1960-61. For the remaining years data are in 1970 prices.

2. Data are taken from Bhagavan (1985) and relate to value-added at 1960 constant prices.

@ Relates to years 1966-1975.

TABLE 3

Average Annual Growth Rates* in Gross Domestic Product and in Gross Value-Added in Agriculture (and Allied Activities) and in Manufacturing Sector

(per cent)

SI. No	Growth rate in the period				
	1952-53 to 1959-60 I	1960-61 to 1967-68 II	1968-69 to 1975-76 III	1976-77 to 1984-85 IV	1952-53 to 1984-85
1. GDP	3.53	3.75	3.83	4.23	3.84
2. Agriculture	2.73	2.17	3.25	2.31	2.61
3. Registered manufacturing@	6.92	7.69	3.01	6.08	5.93
4. Unregistered manufacturing	4.90	4.25	3.64	3.61	4.11
5. Manufacturing@	6.09	6.33	3.23	5.22	5.21

Notes: * As described in Table 1.
@ In the first period, growth rate is for years 1953-54 to 1959-60.

Source: Central Statistical Organisation, "National Accounts Statistics" - While GDP data are in 1970-71 prices for the entire periods, others (Sl. Nos. 2,3,4 & 5 in the table above) are in 1960-61 prices upto the year 1970-71 and in 1970-71 prices for the remaining years.

TABLE 4

Average Annual Growth Rates* of Value-Added in Capital Goods Sector

(per cent)

Broad industrial groups in capital goods sector	Growth rate in the period I (1952-53 to 1959-60)	II (1960-61 to 1967-68)	III (1968-69 to 1975-76	IV (1976-77 to 1984-85)	(1952-53 to 1984-85)
1. Non-electrical machinery	18.38	16.70	7.66	7.14 (7.52)	12.31 (12.57)
2. Electrical machinery	16.26	14.58	11.15	9.28 (9.92)	12.71 (12.98)
3. Transport equipment	12.06	8.83	1.58 (11.39)	10.88 (8.46)	8.41
Total (1+2+3)	13.29	11.62	6.15	8.98 (9.47)	9.98 (10.14)

Note: Figures in parentheses give growth rates for 1976-77 to 1983-84 in the case of period IV and 1952 to 83 in the case of last column.

Source: As part-A of Table 2.

* As described in Table 1.

TABLE 5

Average Annual Growth Rates* of Value-Added in Capital Goods Sector (in 1970-71 Prices)

(per cent)

Broad industrial groups in capital goods sector	Growth rate in the period			
	Period: I. 1966-67 to 1971-72 II. 1971-72 to 1976-77: III. 1976-77 to 1983-84			
	I	II	III	1966-67 to 1983-84
1. Non-electrical machinery	7.29	9.40	7.52	7.14
2. Electrical machinery	12.56	8.62	9.92	10.11
3. Transport equipment	4.65	3.04	11.39	5.84
Total (1+2+3)	7.39	6.68	9.47	7.27

Note: * As described in Table 1.

TABLE 6

Growth of Value-added in Capital Goods Industries (Regd. Sector)

(Per cent per annum)

Periods	0. 61-62 to 64-65	I 65-66 to 68-69	II 69-70 to 73-74	III 74-75 to 78-79	IV 79-80 to 84-85	
Broad industrial groups in capital goods sector	Growth rate in Period					
	0	I	II	III	IV	1961-62 to 1984-85
1. Non-electrical machinery	20.62	3.81	6.09	7.43	7.85	7.44
2. Electrical machinery	17.76	3.14@	16.03	7.45	11.00	10.12
3. Transport equipment	14.58	0.57@	2.19@	5.60	16.89	4.53
Total (1+2+3)	17.03	2.19@	7.43	6.25	12.10	7.02

Notes: i. Growth rates for period 1961-62 to 1984-85 show the antilogarithm of the relevant slope coefficient minus 1, of the regression equation $\log y = \phi + \beta t$. For sub-periods, growth rates are estimated from the equation $\log y = \phi + \Sigma_{\alpha_i} D_i + \beta t + \Sigma \delta_i Z_i$. Where $Z_i = (t \times D_i)$. In this format, D in one sub-period is assigned value zero while other sub-periods are given '1'

ii. All references to statistical significance of a coefficient in the regression equation throughout this paper relate to 5 per cent confidence level.

@ Growth rates are not significantly different from zero.

Source: NAS and Chandhok (1978).

TABLE 7

Results of Statistical Test

		Growth rate is accelerated/decelerated in			
		Non-electrical	Electrical (1)	Transport (2)	Total (1+2+3) (3)
A.					
(i)	Sub-period second with that of first	-	Accel	-	Accel
(ii)	Sub-period third with that of first	-	-	-	Accel
(iii)	Sub-period fourth with that of first	Accel	Accel	Accel	Accel
B.					
(i)	Sub-period third with that of second	-	Decel	-	-
(ii)	Sub-period fourth with that of second	-	Decel	Accel	Accel
C.					
	Sub-period fourth with that of third	-	-	Accel	Accel

Notes: (i) `-´indicates acceleration in growth but coefficient is statisticall not significant.
(ii) Results given in the table are derived from the slope dummies of the regression equation given in Table 6.
(iii) Accel = Acceleration and
Decel = Deceleration.

TABLE 8

Share of Non-electrical, Electrical and Transport Equipment in the Value-Added of Group Total

(per cent)

Year	Share of			Total
	Non-electrical machinery	Electrical machinery	Transport equipment	
1961-62	28.24123	21.03387	50.72488	100
1962-63	29.26782	20.41746	50.31470	100
1963-64	28.93789	20.31316	50.74893	100
1964-65	31.35608	21.51204	47.13187	100
1965-66	30.89848	23.07991	46.02159	100
1966-67	30.86406	23.18088	45.95504	100
1967-68	31.22183	24.77726	44.00089	100
1968-69	32.44051	23.27964	44.27981	100
1969-70	33.47056	24.69251	41.83692	100
1970-71	31.27026	29.37817	39.35156	100
1971-72	30.58634	29.93959	39.47405	100
1972-73	31.07755	31.44824	37.47420	100
1973-74	31.53373	35.07462	33.39163	100
1974-75	35.24436	31.42864	33.32699	100
1975-76	34.72592	34.55655	30.71751	100
1976-77	36.19493	32.43604	31.36901	100
1977-78	36.02620	33.42557	30.54821	100
1978-79	34.84383	33.39620	31.75996	100
1979-80	34.04380	34.50284	31.45334	100
1980-81	33.19556	36.93545	29.86898	100
1981-82	32.87963	35.19696	31.92339	100
1982-83	29.92585	38.82873	31.24541	100
1983-84	29.90756	35.37832	34.71411	100
1984-85	29.64050	35.06248	35.29700	100

Source: NAS

TABLE 9

Growth of Value-Added in Capital Goods Industries (Unregistered Sector) (in 1970-71 prices)

(Per cent per annum)

Broad industrial groups in capital goods sector	(Periods II: 1970-71 to 1973-74; III: 1974-75 to 1978-79 and IV: 1979-80 to 1984-85) Growth rate in the period			
	II	III	IV	1970-71 to 1984-85
1. Non-electrical machinery	10.36	7.67	6.82	5.46
2. Electrical machinery	7.73	8.13	2.75	4.87
3. Transport equipment	3.91@	4.19	9.45	5.23
Total (1+2+3)	7.58	6.63	6.73	5.25

Notes: (i) The method of estimating the growth rate is same as that in Table 6.
(ii) @ indicates growth rate is not significantly different from zero.

Source: NAS

TABLE 10

Growth of Fixed Capital Formation in Different Industries (at 1970-71 Prices)

(Periods: 0: 1960-61 to 1964-65,
I: 1965-66 to 1968-69,
II: 1969-70 to 1973-74
III: 1974-75 to 1978-79,
IV: 1979-80 to 1984-85)

(per cent per annum)

Industry	Growth rate in period					
	0	I	II	III	IV	1960-61 to 1984-85
Primary sector	7.02	2.40@	3.10@	13.38	8.74	5.94
Agriculture	5.35	2.92@	1.34@	12.18	2.68	4.92
Secondary sector	10.31	0.71@	1.23@	10.77	5.50	5.79
Manufacturing	7.36@	-1.21@	0.82@	8.01	6.29	5.32
Transport, storage & comn.	9.35	-13.40	9.41	2.14@	9.37	3.54
Railways	11.54	-18.11	7.52	3.03@	5.82	-0.20@
GDFCF	7.01	2.51@	3.88	8.71	6.27	4.94

Notes: 1. The method of estimating the growth rates is the same as that described in Table 6.
2. @ Indicates that the growth rate is significantly not different from zero.
3. Data are from the series unadjusted for errors and omissions.

Source: NAS

TABLE 11

Growth of Fixed Capital Formation on Machinery and Equipments according to Ownership (in 1970-71 Prices)

(Periods: 0: 1960-61 to 1964-65,
I: 1965-66 to 1968-69, II: 1969-70 to 1973-74
III: 1974-75 to 1978-79, IV: 1979-80 to 1984-85)

(Per cent per annum)

	Growth rate in the period					
	0	I	II	III	IV	1951-84
FCF on Public Sector	10.65	-6.18@	9.10	12.84	7.99@	6.25
FCF on Pvt Sector	8.66	-1.35@	-0.22	6.02	3.19@	4.36
GDFCF	9.41	1.77@	3.52	8.85	5.54	5.11
FCF on Mach. & Eqp	12.93	-4.11@	9.83	8.27	9.36	6.29
FCF on Mach. & Eqp (Public)	4.90	-2.58@	12.11@	11.46@	15.66@	8.59
FCF on Mach. & Eqp (Private)	18.38	-5.06@	8.74@	6.38@	4.64@	5.17

Notes: 1. The method of estimating the growth rate is the same as that described in Table 6. The growth in sub-periods prior to 1960-61 is not given in the table to save space.
2. @ Indicates that the growth rate is significantly not different from zero.
3. The data are from the series adjusted for errors and ommissions.

Source: NAS

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