

Service Led Industrial Growth: An Analysis of the Trend in Manufacturing (1961-1999)

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Statement of the Problem

In spite of considerable literature in support of a deceleration in manufacturing growth since the mid-sixties (Shetty, 1978; Raj, 1976; Nayyar, 1978), and an acceleration during the eighties (Ahluwalia, 1988; Kelkar and Kumar, 1990; Nagaraj, 1990), occasional doubts have been expressed over the results.

A.K. Sen is reported to have opined that the choice of 1965 as a break point was arbitrary and that a choice of a break in 1973 would show an acceleration rather than a deceleration in trend (Varshney, 1984). Later, S.Chakrabarti and A.Rudra (1991) also argued that the apparent deceleration in the trend was result of subjectively chosen break points and that "one can produce different results by choosing the dividing points differently".

Thus, there seems to much controversy over the technique of analysing the trend in manufacturing by using break points. Here we propose a simple alternative to the conventional method of estimating the trend. It is proposed here to develop a regression model explaining/predicting manufacturing growth in terms of one supply side and three demand side forces: viz., electricity supplied to industry, Gross domestic capital formation (GDCF), agricultural production, and value of services. The trend in these explanatory variables is then used along with the estimated regression coefficients to construct the trend in manufacturing growth.

This method of estimating trend in manufacturing has two useful byproducts. First, it helps us to ascertain whether the growth in manufacturing has changed over the decades. Second, it also enables us to decompose this computed trend in manufacturing into the individual contributions of the four influences on the trend in manufacturing. This enables us to assess the relative importance of different sectors to the growth in Indian manufacturing.

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Methodology

All the variables are measured in real terms.

Logarithmic differences measuring the exponential growth rates of the variables are used in the regression of manufacturing on electricity supplied to industry, GDCF, Agriculture, and services.

Services are defined as Trade, Transport, Communication, Real Estate, Finance, Insurance, and personal and community services. Electricity supplied to industry is taken as the sum of KWH sold to industry and the output of non-utilities. Lagged value of Agricultural production is taken, since it is now well known that the agricultural production affect manufacturing after a lag of one period (Rangarajan, 1982; Nagaraj, 1990, fn.12). The regression is run without a constant, to avoid collinearity between near stationary variables and the constant term.

After the regression coefficients are estimated, the linear trends in the growth rates of the four variables are estimated. Where the trend is not statistically significant, the simple average of the particular variable is taken. In other cases, the trend value is taken. The averages and the trend values are then multiplied with the respective regression coefficients in order to calculate the trend in manufacturing output, as well as the contributions of the different variables to the trend.

Sources of Data

RBI's Economic Statistics 2001-2, is the chief source of the data. Where the time series is incomplete, it has been extended by splicing with data drawn from CMIE 1990.

The Analysis

A regression is run on the logarithmic differences (or growth values) of electricity supplied to industry, Gross domestic capital formation (GDCF), agricultural production, and value of services. The results of the regression are as follows:

$$\text{Man.gr.} = .175*\text{el.gr.} + .128*\text{ag.gr}_1 + .171*\text{gdcf.gr.} + .548*\text{srv.gr}$$

	(1.327)	(1.742)	(2.946)	(3.131)
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where the t values are reported in parenthesis, and the R² is .817.

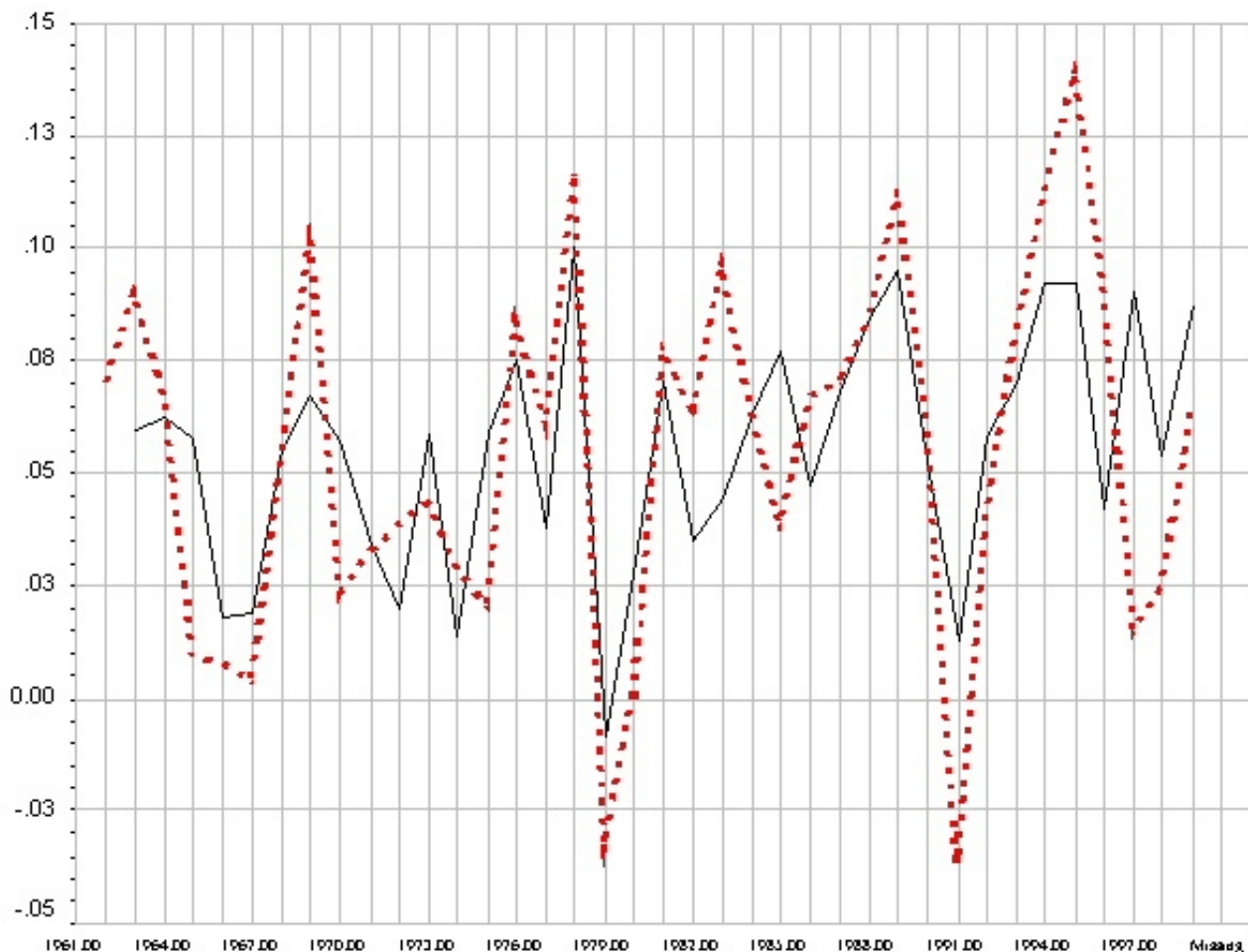
The regression implies that an increase in the exp. growth rates of agriculture by one percentage point will raise industrial growth by 0.13 percentage points. The

increase of GDCF and electricity supply by one point will increase industrial growth by c 0.17 percentage points. In contrast, an increase in services by one point will increase industrial growth by c 0.55 percentage points. Thus, it seems that industrial growth seems to be highly sensitive to the performance of the service sector. Indeed it would seem to be thrice as sensitive to growth of service sector than of the other three sectors of the economy. This result lends strong support to the view that industrial growth in India is led by the growth in the service sector, although agricultural growth, capital formation and electricity supply also contribute.

The predicted values of the regression are shown below in Fig.2, along with the actual manufacturing growth which is shown as a collection of points. The regression estimates do seem to track the actual manufacturing growth adequately.

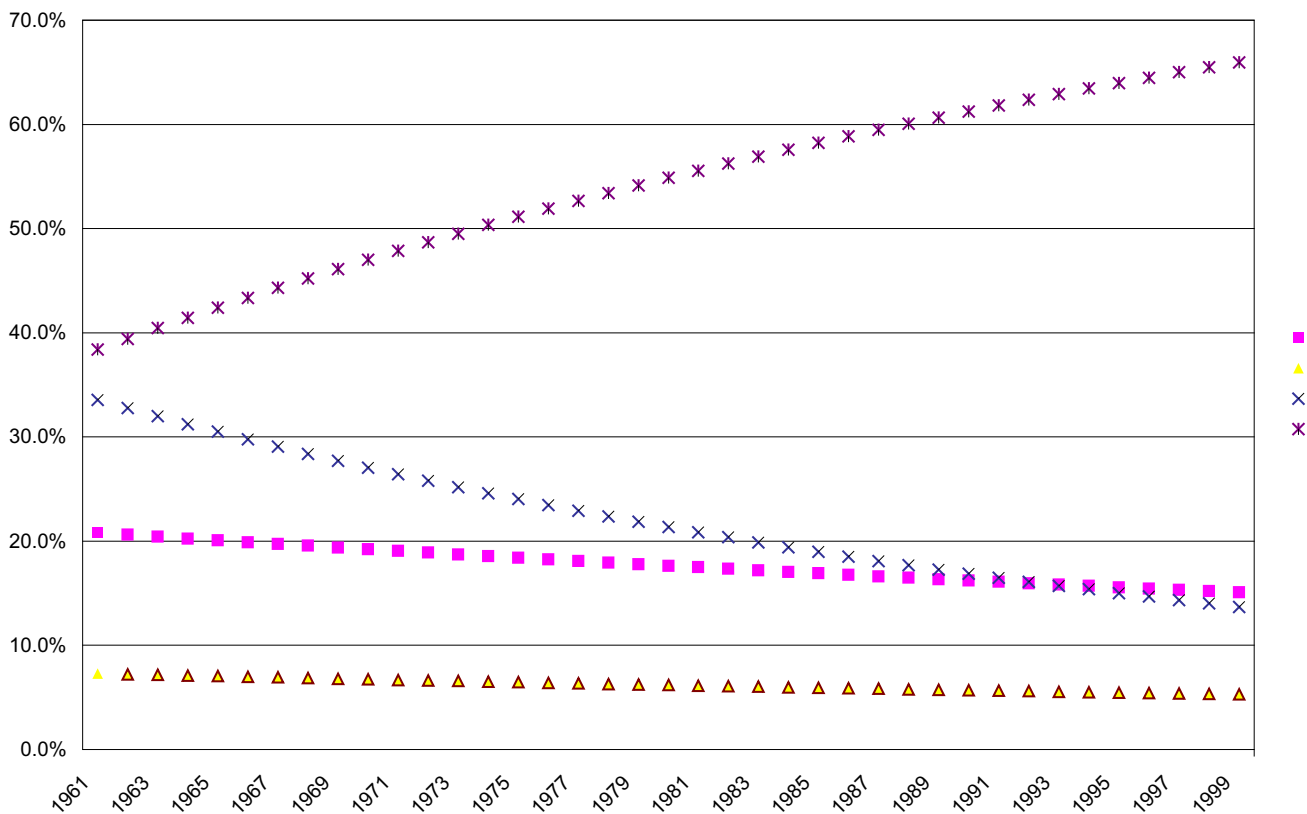
Fig. 2

Actual and predicted Manufacturing Growth



It would be useful to decompose the contribution of the different variables to the trend in industrial production. For this purpose, linear trends are fitted to the four explanatory variables. Agricultural growth and GCF growth do not show a statistically significant trend, and their averages are 2.707% and 5.78%. Electricity growth has a log linear trend, while a linear trend is fitted to the output of services. The averages and the trend values are then multiplied with the respective regression coefficients in order to calculate the trend in manufacturing growth. This estimated trend in manufacturing reveals that there is a definite upward trend in manufacturing growth from c 4.8% to 6.6%, increasing at the rate of .05% p.a.

Fig. 4 **Contributions to the trend in Manufacturing growth rate**



Finally, the trend in manufacturing output is decomposed into its four contributing elements. The first interesting result is that the contribution of Agriculture to the trend in industry has generally been low at 7%, and declined marginally to c 5% towards the end of the period. The contribution of gross capital formation also declined from about 20% in 1960s to about 15% towards the end of the period of analysis. The contribution of electricity supply and services to the industrial trend were nearly even in 1961, at 33% and 38%

respectively. Since then their paths have diverged, and the contribution of electricity supply has fallen to 14% of the trend, while the contribution of services to the industrial trend amounts to 66%. These figures are illustrated by Fig. 4 above.

By the end of the period of the study, the contributions of the four influences on industrial output were as follows: Services alone contributed 2/3 of the trend. Hence the title of the paper, "Service-led Industrial Growth". Capital formation and electricity supply accounted for 15% and 14% of the industrial trend. Agriculture accounted for a meagre 5.3%. This result may throw some light on the fact of a buoyant industrial output in spite of a disastrous monsoon this year.

Conclusions

This study shows an upward trend in manufacturing growth. The trend growth rate seems to increase from c 4.8% to c 6.6. %.

Manufacturing growth seems to be thrice as sensitive to a percentage point increase in service growth, as to a percentage point increase in growth of capital formation, electricity supply, or agricultural growth.

In 1960s, the contribution of the service sector to the trend was highest at c38%, followed by electricity supply c33%, GDCF - 20%, and Agricultural production c10%. Since then, the contributions of the last three influences to the industrial trend have fallen to c14%, c15% and 5% respectively.

Year	GCF	Agricult.	Electricity	Services
1961	20.8%	7.3%	33.6%	38.4%
1999	15.1%	5.3%	13.7%	66.0%

In contrast, the contribution of services to the industrial trend has nearly doubled to about 66% (See Table above). Thus, 2/3 of the industrial trend is due to the growth of the services sector. In this study, services have been defined as including Trade, Transport, Communication, Real Estate, Finance, Insurance, and personal and community services. It would seem that the growth of this sector is critical to the industry trend. In this sense, industrial trend is led by the trend in the service sector.

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