

Output and Employment Growth in Registered Manufacturing Industries in India: Testing Kaldor's Hypothesis

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- **The basic object of this paper is to examine how output growth has contributed to employment growth in the registered manufacturing sector in India.**

By applying GMM estimation in the frame of dynamic panel with one-digit level data of the industrial sector for 17 major states as recorded in the Annual Survey of Industries over 1970 to 2002.

- **This study is motivated by the need to analyse the unequal incidence of manufacturing growth across different regions of the country. Increasing returns as persists in manufacturing leads to polarisation of economic growth between regions in India.**
- **In terms of new industrial investment, the western and southern states have gained, and the eastern states are in decline.**
- **What is more concerning in our exercise is the fall in the rate of employment growth and in many states the rate became negative in the post-deregulation phase.**

Kaldor's Hypothesis

Manufacturing has a greater contribution to economic growth of a country

Main driving force: the existence of increasing returns in the manufacturing activities

The higher rate of growth of manufacturing output leads to higher rate of productivity growth, but not a faster rate of growth of manufacturing employment. (Verdoorn's Law)

- **The faster the rate of productivity growth in manufacturing, the faster will be the rate of labour transference from outside the manufacturing sector, particularly from land-based activities, leading to higher growth in rest of the economy.**
- **The induced growth of labour productivity achieved by means of industrial growth can lead to a process of cumulative growth through improved competitiveness of industrial activities.**
- **Verdoorn's Law is, thus, an underlying force that leads to polarisation of economic activities between regions of a country**

Existing Study

- **Kaldor himself estimated the relationship between employment growth and output growth in manufacturing using data for twelve OECD countries over the period 1953-54 to 1963-64 by applying cross country regression.**
- **Most of the studies on Kaldor's hypotheses used OLS model with the data from the developed world (Bairam 1991, Atesoglu 1993 and Scott 1999).**
- **There are some conceptual and methodological problems of using simple regression→ Simple regression analysis captures the presence of statistical correlation between the variables, but have no bearing on the causal relationship between them.**
- **But there exists bi-directional causality between employment growth and output growth and they are determined endogenously.**
- **There have been hardly any studies of testing Kaldor-type hypotheses for a developing country like India. Testing this type of hypothesis with Indian data may illuminate the nature of the growth process in the Indian economy.**

Regional disparities in industrialisation

Two western region states (Maharashtra and Gujarat) together contributed roughly one-third of total output , with one-fourth of total factory units generating one-fourth employment.

Gujarat, along with some relatively less industrial states grew at more than 9 percent per year during the phase of deregulation.

But Maharashtra, the leading contributor of industrial output, registered significantly lower rate of output growth during this period.

West Bengal lagged behind all major states in terms of trend growth rate of real output.

Growth rate of output in the registered manufacturing sector declined almost everywhere in the country during the post-reform period.

The prevalence of job destroying growth in the registered industries in many states of the country during the post-reform period.

EVOLUTION OF INDUSTRIALISATION: PERCENTAGE TO ALL INDIA LEVEL

STATES	NUMBER OF FACTORIES		GROSS VALUE OF OUTPUT		EMPLOYMENT	
	1971	2001	1971	2001	1971	2001
ANDHRA PRADESH	7.1	11.1	4.9	6.6	6.3	11.6
ASSAM	2.4	1.1	1.5	0.8	1.8	1.4
BIHAR	4.5	2.3	5.6	4.0	5.1	2.8
GUJARAT	10.7	10.9	10.1	15.3	8.9	9.2
HARYANA	1.7	3.5	2.5	4.7	2.0	3.7
HIMACHAL PRADESH	0.3	0.4	0.3	0.6	0.2	0.5
JAMMU & KASHMIR	0.4	0.3	0.1	0.2	0.3	0.3
KARNATAKA	6.2	5.4	4.2	5.7	5.0	6.3
KERALA	3.8	3.7	2.7	2.5	4.1	3.9
MADHYA PRADESH	4.1	3.3	4.3	8.0	3.9	3.9
MAHARASHTRA	18.1	13.9	24.7	18.8	19.0	15.0
ORISSA	1.8	1.3	1.6	1.4	1.7	1.5
PUNJAB	6.6	5.6	2.9	4.0	2.6	4.5
RAJASTHAN	2.0	4.1	2.0	3.2	2.0	3.0
TAMIL NADU	10.1	14.7	9.9	9.8	10.6	14.1
UTTAR PRADESH	6.9	7.7	7.1	11.3	7.5	7.1
WEST BENGAL	9.9	4.8	13.4	4.6	16.2	7.0

OUTPUT AND EMPLOYMENT GROWTH IN TOTAL MANUFACTURING INDUSTRIES IN MAJOR STATES: 1970-71 TO 2002-03

STATES	OUTPUT GROWTH		EMPLOYMENT GROWTH	
	1970-1985	1986-2002	1970-1985	1986-2002
ANDHRA PRADESH	7.91	7.44	5.84	2.05
ASSAM	4.55	4.38	1.72	0.33**
BIHAR	7.34	4.97	2.05	-3.59
GUJARAT	8.23	9.15	3.01	1.06**
HARYANA	9.58	9.07	5.85	2.21
HIMACHAL PRADESH	10.81	9.73	5.35	-1.59*
JAMMU & KASHMIR	12.01	4.01	6.62	1.44*
KARNATAKA	7.02	8.46	2.81	2.02
KERALA	7.01	6.62	1.03*	1.58*
MADHYA PRADESH	7.35	9.83	4.14	-0.55**
MAHARASHTRA	6.16	5.91	1.51	0.17**
ORISSA	6.94	3.75	3.42	-1.49*
PUNJAB	9.63	5.05	5.82	-0.18**
RAJASTHAN	9.68	7.04	5.54	0.36**
TAMIL NADU	7.64	6.30	3.26	1.90
UTTAR PRADESH	7.63	7.98	4.81	-1.71*
WEST BENGAL	3.29	3.02	0.13**	-1.88

- ***significant at 5% level, **insignificant, rest are significant at 1% level.**

Testing Kaldor's hypothesis

Kaldor's specification of the model

$$g_{pt} = a + bg_{yt}$$

Or

$$g_{et} = g_{yt} - g_{pt} = -a + (1-b)g_{yt}$$

Coefficient b is the Verdoorn coefficient and its value more than 0.5 signifies the existence of substantial increasing returns.

b = 1 → no variation of employment growth

**b=0 → no response of productivity growth
due to the change in output growth**

Both specifications are subject to some degree of simultaneity and we solve the problem of simultaneity using GMM estimation.

Panel unit root

- As an initial step we perform panel data unit root tests developed by Levin-Lin and Chu (2002) and Im-Pesaran-Shin (2003) to explore the panel time series properties of the variables.

the basic ADF specification is
$$\Delta y_{it} = \rho y_{i,t-1} + \sum_{j=1}^{p_i} \eta_{ij} \Delta y_{i,t-j} + X'_{it} \delta + \varepsilon_{it}$$

In LLC, all individual AR(1) series have a common autocorrelation coefficient.

$$H_0 : \rho = 0$$

$$H_1 : \rho < 0$$

In IPS test, autocorrelation coefficient ρ is considered to be different for each cross section unit

$$H_0 : \rho_i = 0, \forall i$$

$$H_1 : \begin{array}{l} \rho_i = 0, \rightarrow i = 1, 2, 3, \dots, N_1 \\ \rho_i < 0, \rightarrow i = N_1 + 1, N_1 + 2, \dots, N \end{array}$$

Panel Unit Root Tests

	LLC	IPS
LOG(E)	2.167	0.693
	(0.985)	(0.756)
ΔLOG(E)	-12.007	-14.083
	(0.000)	(0.000)
LOG(Y)	-2.774	-3.875
	(0.003)	(0.000)
ΔLOG(Y)	-17.684	-18.377
	(0.000)	(0.000)

Note: Figures in parentheses give p values

Generalised Method of Moment (GMM)

- to control for endogeneity in the causal relationship between employment growth and output growth in manufacturing we have used GMM approach in a dynamic panel frame developed in Arellano and Bond (1991)

$$y_{it} = \alpha_i + \theta_t + \beta y_{i,t-1} + x'_{it} \eta + \varepsilon_{it}$$

- the fixed effects are first eliminated using first differences
- all lagged levels of the variable, starting with lag two and potentially going back to the beginning of the sample are used as instruments.
- The overall validity of instruments can be checked by a Sargan test of over-identifying restrictions.

GMM estimation

DEPENDENT VARIABLE: G_{ET}

METHOD: PANEL GENERALIZED METHOD OF MOMENTS

TRANSFORMATION: FIRST DIFFERENCES

WHITE PERIOD INSTRUMENT WEIGHTING MATRIX

WHITE PERIOD STANDARD ERRORS & COVARIANCE (D.F. CORRECTED)

INSTRUMENT LIST: @DYN(D(EM),-2) N YEAR

VARIABLE	COEFFICIENT	STD. ERROR	T-STATISTIC	PROB.
D(EM(-1))	-0.1623	0.001738	-93.39995	0.0000
D(Y)	0.3236	0.003414	94.79009	0.0000
YEAR	-0.0027	0.000127	-21.37792	0.0000

EFFECTS SPECIFICATION

CROSS-SECTION FIXED (FIRST DIFFERENCES)

MEAN DEPENDENT VAR	-0.001153	S.D. DEPENDENT VAR	0.166981
S.E. OF REGRESSION	0.141135	SUM SQUARED RESID	10.09905
J-STATISTIC	14.82679	INSTRUMENT RANK	17.00000

Conclusions

- **Manufacturing growth highly concentrated on the western part of the country**
- **The manufacturing sector displays job destroying growth.**
- **The study supports the hypothesis of increasing returns to scale in the manufacturing sector in India.**
- **The existence of increasing returns leads to the polarisation of economic activity between regions in India**