

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

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- **This paper carries out GMM estimation in the frame of dynamic panel to examine how output growth has contributed to employment growth in the registered manufacturing sector in India.**
- **We utilise 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.**
- **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 RATES 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 overall growth and manufacturing growth 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).**
- **But there are some conceptual and methodological problems→ 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.**

## **Methodology**

- **We have employed the Generalized Method of Moment (GMM) approach in a dynamic panel frame developed in Arellano and Bond (1991) to control for endogeneity in the causal relationship between employment growth and output growth in manufacturing.**
- **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.**

## 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

# 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 Tests

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	LLC	IPS
<b>LOG(E)</b>	<b>2.167</b>	<b>0.693</b>
	<b>(0.985)</b>	<b>(0.756)</b>
<b><math>\Delta</math>LOG(E)</b>	<b>-12.007</b>	<b>-14.083</b>
	<b>(0.000)</b>	<b>(0.000)</b>
<b>LOG(Y)</b>	<b>-2.774</b>	<b>-3.875</b>
	<b>(0.003)</b>	<b>(0.000)</b>
<b><math>\Delta</math>LOG(Y)</b>	<b>-17.684</b>	<b>-18.377</b>
	<b>(0.000)</b>	<b>(0.000)</b>

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**Note: Figures in parentheses give p values**

# GMM estimation

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**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**

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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

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## 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

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# Conclusions

- **Manufacturing growth in India over three decades considered in this study was characterised by substantial increasing returns to scale. There is overwhelming support for the hypothesis of increasing returns to scale in the manufacturing sector across the major states in India.**
- **The induced growth of labour productivity achieved by means of industrial growth as observed in India can lead to a process of cumulative growth through improved competitiveness of industrial activities. The existence of increasing returns leads to the polarisation of economic activity between regions in India**

