

TRADE POLICY ORIENTATION AND PRODUCTIVITY GROWTH IN THE
MANUFACTURING SECTOR: A COMPARATIVE STUDY OF THREE STATES

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INTRODUCTION

- India started liberalizing its economy in general and its industrial sector in particular over two decades ago. One of the objectives of liberalization was to make Indian industries more efficient, highly competitive and improve their competitiveness in global market. Toward this end the government of India pursued three sets of reforms broadly: one, disbanding the complex network of industrial licensing and industrial controls and permit system. Two, liberalizing the foreign trade and currency transaction. Third, initiating steps to encourage the FDI inflows (Siddharthan 2003). These measures were taken in 1991 and the process of liberalization is still continuing. Many restrictions like licensing, permits are withdrawn, foreign trade was eased out and list of negative products have been considerably trimmed. It was expected that once the Indian industries were exposed to global competition they will be compelled to produce more in an efficient manner. So based on our expectation we framed one hypothesis that liberalization is contributing to growth and productivity of industrial sector. These measures were taken in 1991 and the process of liberalization is still continuing. It was expected that once the Indian industries were exposed to global competition they will be compelled to produce more in an efficient manner.

TRADE POLICY ORIENTATION AND PRODUCTIVITY GROWTH: A CONTROVERSY

- The role trade policy in determining the growth and productivity in industrial sector has been widely discussed in literature of 'trade theories and growth'. However there is a big controversy between two schools of thought regarding the Impact of trade policy on growth and productivity.
- ❖ Neoclassical School led by Little, Scot and Scitovsky (1970), Bhagwati (1978), Krueger (1978).
- ❖ Revisionist School led by Roderick (1989), Stewart and Ghani (1989) and Pack and Helleiner (1989).

HYPOTHESIS OF THE STUDY

- The present study is designed to verify that hypothesis i.e. whether liberalization does have any impact on growth, efficiency and productivity of industrial sector and have a comparison among three states i.e. Orissa, Andhra Pradesh and Tamil Nadu to test the relevance of two schools of thought.

OBJECTIVES

- To analyze the trends in the growth rates of labor, capital and output in three states both in pre-liberalization and post-liberalization period.
- To analyze the trends in factor productivities and efficiencies in both pre-liberalized and liberalized era in the three states.
- To compare the productivity performance of three states in terms of TFP so as to show the effects of liberalization.
- To show which school of thought is valid.

METHODOLOGY

- This study has taken a time period of twenty five years starting from 1980-81 to 2004-05 and the entire period is divided into two sub-periods like pre liberalization period (1980-81 to 1989-90) and the post liberalization period (1991-92 to 2004-05). In this study, we consider the period up to 2004-05, the maximum feasible at the time when we embarked upon it. To measure the growth performance of variables, the trend growth rates have been calculated by taking the semi-logarithmic equation as

$$\text{Log } Y = a + bt$$

- Where Y- concerned variable, a - constant, b - growth rate and t- time.
- First, the study investigates the growth performance of the industrial sector of two states by estimating the trend growth rates of growth indicating variables like gross value added (GVA), capital stock, labor force, investment level in both periods^[1]. It is likely that all the variables will have a positive growth performance after liberalization. Secondly, the study undertakes the productivity and efficiency aspect. The trend growth rates of labor productivity, capital productivity, factor intensity (K/L), capital output ratio, and profit share. It is anticipated that labor productivity and capital intensity will experience a positive growth while the capital productivity will have just reverse trend because as liberalization is likely to increase both capital stock and value added along with labor force. Thirdly, the study looks into a more comprehensive measure of productivity i.e. total factor productivity (TFP). It is a neo-classical concept and takes into account all factors of production. It is a ratio of output to weighted sum of inputs or it is the residual between growth rate of output and weighted sum of growth rates of inputs. It is a measure of technical progress and efficiency. So finally the study uses the translog index method of TFP estimation to show the impact of liberalization on industrial productivity of three states and both periods.

METHODOLOGY(CONTD.)

- This index assumes geometric progression in variables and it is compound growth formulation in the following form;
- $TFPG = \Delta A_t / A_t = \Delta \ln Y_t - \{w_t \Delta \ln l_t + r_t \Delta \ln k_t\}$
- Where $w_t = 1 - r_t$
- And $Y_t =$ value added in time period 't'
- And $\Delta \ln Y_t = \Delta Y_t / Y_t = \ln Y_{t+1} - \ln Y_t$
- $\Delta \ln l_t = \Delta l_t / l_t = \ln l_{t+1} - \ln l_t$
- $\Delta \ln k_t = \Delta k_t / k_t = \ln k_{t+1} - \ln k_t$
- $W_t = w_{t+1} + w_t / 2$
- And $r_t = r_{t+1} + r_t / 2$
- Where W_t and r_t are being shares of factor input. The Translog index of TFP is obtained by using the following identity (taking A_0 as unity)
- $A_{t+1} = A_t (1 + \Delta A_t / A_t)$.

- Since the study deals with the impact of liberalization, a regression has been carried out by taking some of the liberalization measuring variables along with liberalization dummy. A logarithmic transformation of the C-D production function yields an equation that is linear in the logarithms of output and inputs and in time. It is written as:

CONT.....

- $\ln Y = a + \alpha \ln L + \beta \ln K + \lambda t$
- *Where* Y-Value added
- L-Labor
- K-Capital
- λ - Measure of TFP
- t- Time

DEFLATOR

- The ASI data on value added and wage payments etc. were deflated using the relevant wholesale prices indices as deflators in obtaining the value of output and value added at constant prices. The detailed categories for which the wholesale price data are available are collected and the values are obtained by deflating. Thus the data on value added is obtained by aggregating the data on constant prices to get the data for total manufacturing sector. The capital series is deflated by wholesale price index of capital and machines. Similarly, the consumer price index has been used to deflate the total emoluments.

SPLICING

- It is a statistical tool which is used to shift the base period. In this study since we are taking a long period of 25 years i.e. 1980 to 2005, we have normally 3 base periods under which the values of all industrial indices are available. But to make the series comparable we should have one base period. This is done by method of splicing. The technique is given in any standard statistical text book.

RATIONALE FOR THE METHODOLOGY USED

- Free from restrictive assumptions like perfect competition and constant returns to scale. Thus it is more close to reality.
- The production function approach does not assume the technological progress to be Hick's neutral.
- Degree of homogeneity or the returns to scale can be estimated by using the production function approach.
- Econometric problems can be taken care of effectively by running different tests.
- The production function is relatively easy to calculate and it is more approximation of reality.

DATA BASE AND CONSTRUCTION OF VARIABLES

This study uses secondary data relating to all inputs and output at aggregate level of organized sectors from ASI.

Output - Value Added

Labor- No. of employees

Capital- PIA Method is used to get capital index. The detail procedure is given as follows:

- (a) The initial (base) year's capital stock has been obtained by doubling the fixed capital figures as provided in the ASI. This is denoted by K_0 .
- (b) For each year, the addition to gross capital stock has been computed by subtracting the fixed capital of preceding year from the fixed capital of current year. Each year's depreciation has been added to it to arrive at an estimate of net addition to capital stock. After that, it is deflated by wholesale price index of machinery and capital goods.

Now net addition to capital stock in year 't' is given by I_t .

$$I_t = (F_{Ct} - F_{Ct-1} + D_t) \frac{100}{WPI_{Ct}}$$

Where F_{Ct} –fixed capital in year t (ASI)

F_{Ct-1} –fixed capital in year t-1 (ASI)

D_t – depreciation in year t (ASI)

WPI_{Ct} - wholesale price index of capital and machinery in year t.

Then for year't' the estimate of capital stock (K_t) is obtained by using the following equation:

$$K_t = K_{t-1} - 0.02K_{t-1} + I_t$$

This means that $K_1 = K_0 + I_1 - 0.02K_0$

$K_2 = K_1 + I_2 - 0.02K_1$ and so on.

EMPIRICAL INVESTIGATION OF THE STUDY

- Stationary test of the Variables
- Growth Rate of Labour, Capital and Value Added
- Growth Rate of Partial Factor Productivities
And Factor Intensity
- Growth Rate of Total Factor Productivity (TFPG)

STATIONARY TEST OF THE VARIABLES

Table-1: The estimated ' τ ' statistics values from Unit Root test (Level)

variables	Intercept alone			Intercept+ trend		
	DF	ADF	PP	DF	ADF	PP
Tamil Nadu						
GVA	2.5991	1.5808	2.0816	-0.0024	-0.7668	-0.6373
Labour Force	-0.3278	-0.4802	-0.4950	-1.6077	-1.9639	-1.9110
K Stock	2.3865	1.7127	2.1275	-1.3571	-1.5272	-1.5220
Orissa						
GVA	1.7333	0.6756	1.1890	-0.1097	-1.7323	-0.9308
Labour Force	-1.4444	-1.7854	-1.7598	-1.4403	-1.7402	-1.7456
K Stock	-0.8090	-1.0040	-0.8261	-1.3760	-1.7389	-1.6790
Andhra Pradesh						
GVA	0.9587	0.9587	0.8447	-1.59109	-2.59349	-1.78858
Labour Force	-0.0366	-0.0366	-0.1218	-1.66627	-1.66627	-1.92927
K Stock	-2.0995	-1.3442	-1.9801	-2.56146	-1.29429	-2.56544

Note: Critical values for Unit Root test (DF, ADF, and PP) are -3.7204, -2.9850 and -2.6318 for intercept. In addition, -4.3738,-3.6038 and -3.2367 for intercept + trend respectively at 1%, 5% and 10% level of significance.

Table-2: The estimated ' τ ' statistics values from Unit Root test (First difference)

Variables	Intercept			Intercept + Trend		
	DF	ADF	PP	DF	ADF	PP
Tamil Nadu						
GVA	-5.1389*	-4.5456*	-5.1826*	-5.2016*	-4.7851*	-5.3123*
Labour	-3.8875*	-4.8892*	-3.9168**	-3.8212**	-4.8295*	-3.8575**
Capital	-3.0431**	-5.3217*	-2.9722**	-3.7259**	-5.2030*	-3.7490**
Orissa						
GVA	-2.9129***	-4.2889*	-2.9251**	-3.3047***	-4.4441*	-3.3202
Labour	-3.3742**	-4.1740*	-3.4610**	-9.3120*	-4.2715**	-3.3264***
Capital	-3.9061*	-2.7248***	-3.9195*	-3.8691**	-2.7317	-3.8747**
Andhra Pradesh						
GVA	-4.3211**	-4.3211**	-4.3997*	-4.6641*	-4.6641*	-4.7083*
Labour	-4.0466**	-4.0466**	-4.0761**	-3.9365**	-3.9365**	-3.9701**
Capital	-7.9087*	-7.9087*	-7.7178*	-7.8023*	-7.8023*	-7.7904*

Note: All values are statistically significant at 1%, 5% and 10% level of significance

GROWTH RATE OF LABOUR, CAPITAL AND VALUE ADDED

VALUE-ADDED

STATES	FULL PERIOD	PRE-REFORM PERIOD	POST-REFORM PERIOD
ORISSA	14.21	20.77	7.21
ANDHRA PRADESH	7.61	7.98	4.42
TAMILNADU	6.23	8.90	6.37

LABOUR FORCE

STATES	FULL PERIOD	PRE-REFORM PERIOD	POST-REFORM PERIOD
ORISSA	-0.27	1.73	-3.70
ANDHRA PRADESH	0.57	1.02	-0.54
TAMILNADU	1.9	0.75	1.74

CAPITAL STOCK

STATES	FULL PERIOD	PRE-REFORM PERIOD	POST-REFORM PERIOD
ORISSA	8.83	15.63	3.11
ANDHRA PRADESH	9.08	12.45	3.69
TAMILNADU	9.2	12.72	6.24

GROWTH RATE OF PARTIAL FACTOR PRODUCTIVITIES AND FACTOR INTENSITY

LABOUR PRODUCTIVITY

STATES	FULL PERIOD	PRE-REFORM PERIOD	POST-REFORM PERIOD
ORISSA	7.25	11.33	6.34
ANDHRA PRADESH	13.12	12.98	9.97
TAMILNADU	4.38	7.03	3.21

CAPITAL PRODUCTIVITY

STATES	FULL PERIOD	PRE-REFORM PERIOD	POST-REFORM PERIOD
ORISSA	-0.68	-1.72	-2.05
ANDHRA PRADESH	5.53	2.39	5.48
TAMILNADU	2.58	2.11	3.39

CAPITAL-LABOUR RATIO

STATES	FULL PERIOD	PRE-REFORM PERIOD	POST-REFORM PERIOD
ORISSA	9.13	13.66	7.08
ANDHRA PRADESH	7.39	11.32	4.25
TAMILNADU	7.15	10.79	5.44

Chart-1

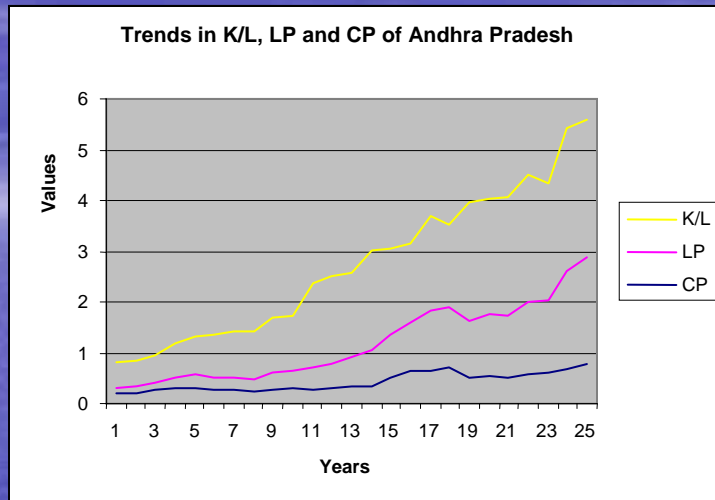


Chart-2

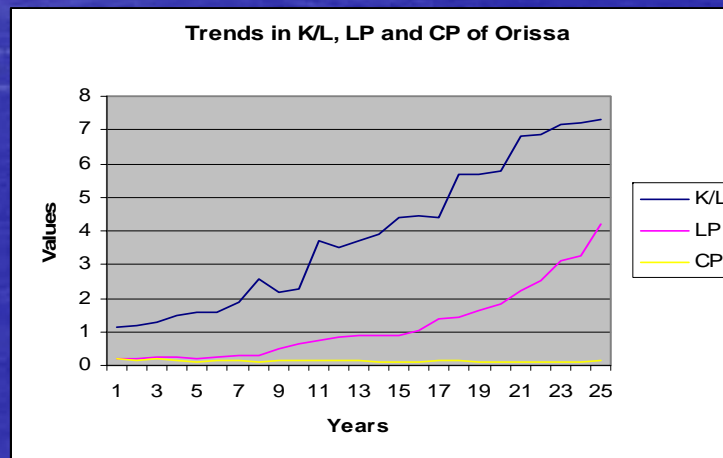
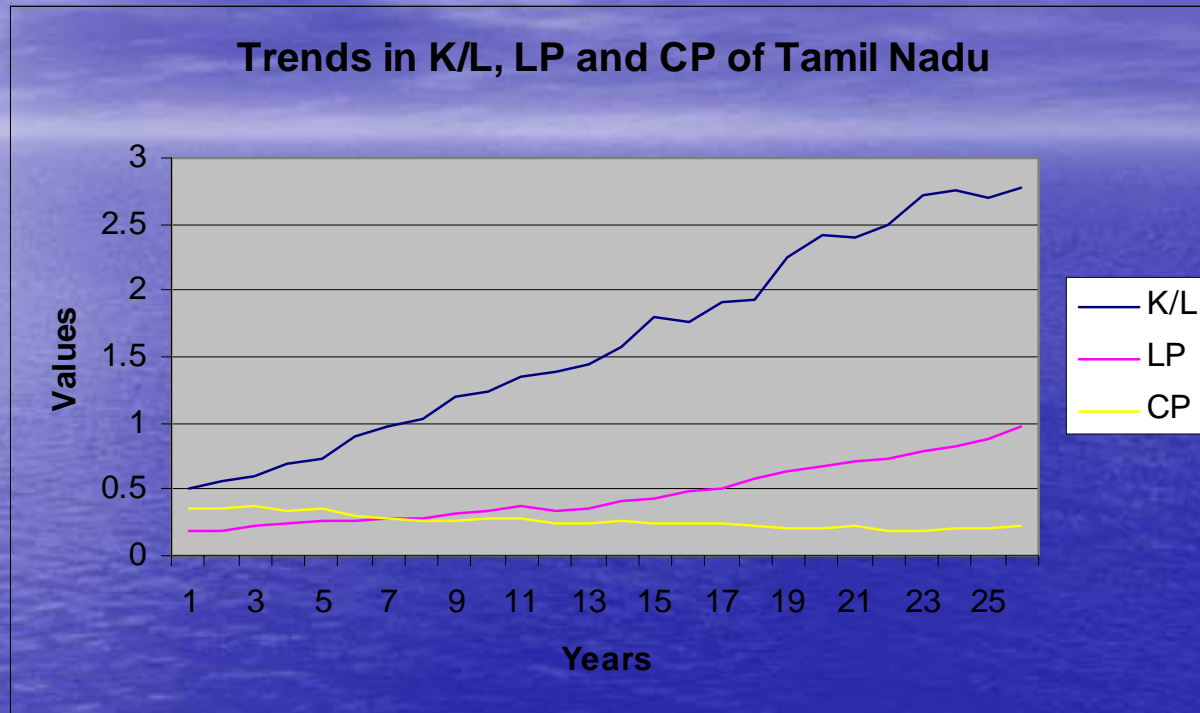


Chart-3



TRANSLOG INDEX OF TFP

TGR	ANDHRA PRADESH	ORISSA	TAMILNADU
1980-81 to 2004-05	-0.87	1.01	0.69
1980-81 to 1990-91	-1.53	1.32	0.26
1991-92 to 2004-05	-0.53	0.67	1.06

NOTE: TGR- Trend Growth Rate

C-D production Function Estimation

	Andhra Pradesh		Orissa		Tamil Nadu	
Variables	Model-I	Model-II	Model-I	Model-II	Model-I	Model-II
Intercept	-4.85** (-1.75)	-5.77*** (-1.61)	-9.66* (-3.42)	-10.74* (-3.10)	-6.29* (3.10)	-9.06* (-3.93)
Log L _t	1.01* (3.94)	1.06* (3.74)	1.00** (2.33)	1.13** (2.28)	0.78* (4.10)	0.97* (4.87)
Log K _t	0.19 (1.20)	0.22 (1.25)	0.64** (2.38)	0.60** (2.09)	0.59* (5.80)	0.60* (6.31)
Time	0.04* (3.17)	0.04* (3.13)	0.08* (3.31)	0.08* (3.02)	0.01 (0.69)	0.004 (0.63)
Dum.Lib	—	0.05 (0.42)	—	-0.08 (-0.05)	—	0.09** (2.09)
R ²	0.84	0.92	0.81	0.87	0.92	0.91
D.F.	25	24	25	24	25	24
D.W.	1.72	1.68	1.84	1.84	1.82	1.89

- Note: 1) * implies significant at 1 % level
 2) ** implies significant at 5% level
 3) *** implies significant at 10% level.
 4) Figures in bracket are t-values.

MAJOR FINDINGS

- Whether we look at the total factor productivity (TFP) i.e. the overall efficiency with which labour and capital are combined to generate value added or the partial factor productivities like labour productivity and capital productivity and other growth indicating industrial indices, the story told by all is more or less same for Orissa. It looks very poor in the post reform period.
- The growth rate of value added falls so sharply in the post reform period that it comes as three times less than that of pre reform period. The similar trend is noticed for other variables. Only the capital productivity shows a positive trend. Therefore, it is stuck to the 'Revisionist School of thought'.
- However, in case of Andhra Pradesh the situation is somewhat different. It looks poor in the analysis growth profile during post reform period, but it experiences an improvement in terms of TFPG in the post reform period though the magnitude is negative throughout the entire study period.
- However, Tamil Nadu shows a better performance in line with the theoretical prediction of neoclassical school of thought as far as the technological progress in manufacturing is concerned. Nevertheless, the study concludes that neither the 'Neo-Classical School' of thought nor the 'Revisionist School' of thought are valid. Because both theories are irrelevant unless we consider their respective premises, i.e. the Neo-classical school of thought is valid if the region is having a strong industrial base earlier. Then it can take the advantage of reform and performs better. However, if the region is industrially backward then reforms could not bestow desirable results.

CONCLUSION AND POLICY SUGGESTION

- Thus, the study concludes that both theories are valid but they should appear one after another in the sense that one economy should become fit for liberalisation before adhering to it. An economy could not become industrialised following liberalisation rather it should become industrialised following its own set of efforts i.e. learning by doing, setting up different industries based on the local resources. It might be agro based or forest based or mines based or else. Development of higher infrastructural facilities in the form of power, roads, and telecommunication facilities has to be a top priority for the policy makers to raise the efficiency of factor use and capacity use. state economies should develop indigenous technological capabilities of their own and technical education to workers etc. is important steps to be taken care of. For this, it is suggested that firms should be encouraged to invest more in research and development. Further policy measures are needed to encourage the firms to provide the technical training programmes to not only workers but also the managers so that they could learn computer aided designs and decision-making processes. Then it can become efficient on both cost and production fronts following reforms. However, it is very bold to have a conclusion like this as we do not have data measuring the openness of state economy exactly.



THANK YOU