

# **Does openness affect inequality?**

## **A case study of Manufacturing Sector of India**

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### **Abstract:**

This paper examines the trends of regional income inequality in India during the pre and post WTO reforms period in India. It finds that income inequality is steadily increasing. However, non-linear time trends in both income inequality and manufacturing inequality show downturns in both during the post-reform period. Further, regression results show that both manufacturing inequality and income inequality are systematically related. The structural change model confirms that as income increases the share of manufacturing in GDP also rises.

We observe that greater openness enhances the increase in the share of manufacturing in GDP. This is an expected result since trade liberalization leads to specialization in labour-intensive manufactures in developing countries. Given the empirical finding of a systematic relationship between income and manufacturing inequalities, liberalized trading environment thus plays income-equalizing role.

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## I. Introduction

Lobbying groups in both developed as well as the developing countries since the WTO reforms often raise dissenting at times even impassionate voices over adverse implications of trade liberalization on income distribution within an economy. In academic debate the issue is as old as the development of modern trade theory itself. Both theoretical as well as empirical literatures on the subject are dense and ever growing. For instance, the standard neo-classical general equilibrium analysis provides the basic (static) framework of analysing the effects of globalization on income distribution on various classes in society. The well-known theory a la Stolper-Samuelson states that income distribution will favour the relatively intensive-factor in the production of goods in which the country has a comparative advantage. Following this argument Rodrik (1999) argues that globalization is responsible “for the stagnation or decline in the real wages of the low-skilled workers in the Anglo-Saxon countries and for increasing unemployment in the continental European countries”<sup>i</sup>. But in his scheme of analysis, he seems to underplay the role of *price effects*<sup>ii</sup> and has instead emphasized on the changes in the *elasticity of labour demand*. Thus, according to Rodrik elasticity of labour demand rather than a downward shift in demand constitutes the crucial factor in explaining the trends in wage movements in advanced economies. In contrast, however, in analysing the effects of globalization on income distribution with respect to the developing countries the *price-effects* seem to play its traditional role in causing changes in income distribution. The main reason for this is that the developing countries have started off from very high tariffs at the beginning of the WTO reforms and therefore their tariff cuts have led to substantial fall in the prices of traded goods within the domestic economy. It is therefore expected that the developing countries should experience a rise in the real wage rate of the unskilled labour and consequently a fall in skill-wage inequality (Adrian Wood, 1999). Empirical evidence for the advanced industrial countries<sup>iii</sup> while substantiate the above trend as described by Rodrik (Freeman, 1996), the experiences of Latin American and the East Asian countries since 1980s are however quite opposite (Wood, 1999). Thus, at the empirical level different countries have undergone different kinds of experiences of globalisation.

Issues of intra-regional distribution of standard of living are extremely relevant in India’s economic development. The concept of relative inequality among the regions (the states or provinces and Union Territories of the Indian Republic are taken as regions in our references to other studies and also in our own study) is equally important in view of the fact that the forces of regionalism and secessionism originating from extreme inequality in the regional income distribution continuously endanger the foundation of India’s federal economy. It is the regional income distribution rather than personal income distribution which deserves more attention, as all econometric studies of production function estimation conclusively show that the share of labour in India’s national income has remained constant over a long period of time (Barua and Das, 1996). On the other hand, the forces of regionalism have become so strong in India that the economic costs of buying political conformism to shore up politically unstable and economically deprived regions have assumed huge proportions in the form of current expenditure on unproductive items. So, it is in this context that we think it is important to examine whether it is the case that regional disparities in India are increasing with the new trade policies over the years. If India’s development experience confirms such a perception or belief then it immediately provides the basis of reform measures to be pursued towards the realisation of the stability of India’s federal political system.

In a more or less recent study Elizondo and Krugman (1992) has tried to relate regional disparities in a federal economy with the trade policy regime of the country. In an interesting model it is shown that in a country, which follows a restrictive, and inward looking policy, internal trade compensate for the meagre size of its foreign trade. This leads to concentration of production and trading activities in large metropolitan cities, which have traditionally developed infrastructural facilities for large-scale production, manpower training, financial transactions and marketing. An opening up of the economy is likely to break the monopoly power of these highly concentrated productions and trading centres, weakens the traditional forward and backward linkages and lead to a more even distribution of economic activities across regions along with an expansion of foreign trade. Thus, it follows from their analysis that in an open economy there may not be any conflict between economic growth and regional distribution of income and in fact, the openness of an economy is the instrument to achieve both economic growth and a geographical dispersion of activities. Following the Elizondo and Krugman analysis an interesting testable proposition of interregional inequalities may be constructed as follows: inter-regional inequalities given the degree of federal intervention, tend to increase as an economy moves from a liberalised trade regime to a restrictive trade regime and vice versa. Thus, regional inequality may decline as a result of trade liberalization.

## II. Trade and Inequality: Empirical Findings

Growing levels of income inequality in countries coincident with increasing participation in international trade have also led to detailed empirical investigations of the trade-inequality relationship that have thrown up divergent conclusions. Recent research suggests that increasing trade has contributed to widening dispersions between the wages of high-skill and low-skill workers in the USA by causing a decline in the relative demand for unskilled labour (Cline 1997, 2001, Bernard and Jensen 1995; Krugman 1995, Wood 1994; Borjas, Freeman, and Katz 1992). While Cline (2001) is of the opinion that only 6 percent of the rise in inequality in the United States during 1970-1990 was due to the influence of international trade, Wood (1999) claims that this share may be as much as 20 percent. With regard to the Latin American region, too, Ganuza et al 2004 are of the opinion that trade liberalization is not the cause of rising inequality.

In recent years however the debate on income distributional implications particularly in the context of the developing countries has shifted its focus from relative to absolute income inequality. That is, the major concern in the developing countries is whether globalization leads to a decline or rise in *poverty*. The shift in focus on absolute rather than on relative income distribution of globalization makes the issue politically more sensitive making the speed of implementation of liberalization policies vulnerable to lobbying and pressure groups. However, there is no a priori reason to believe that trade may lead to increase in poverty and in fact economists tend to believe that it may even reduce poverty by its effects on growth and technical change. The trade-growth nexus and its impact on poverty have been considered at both theoretical and empirical level by Bhagwati-Srinivasan and Srinivasan-Wallack. There is no doubt that by providing incentives for a more efficient allocation of resources in the economy, trade constitutes an important precondition for broad-based and sustained growth (Bannister and Thugge 2001). The various channels through which a static efficient allocation of resources may boost growth are increased efficiency of investment, ability to expand at constant (rather than diminishing) returns for a longer period through access to markets (Ventura 1997), higher rate of domestic saving and/or foreign capital inflow, higher real return to capital in unskilled labour abundant countries that exploit their comparative

advantage, openness to ideas and innovations generated in other countries to boost productivity, etc. The theory of long run economic growth, on the other hand, claims that openness raises the steady state level of income along with the growth rate of any country out of equilibrium, via efficient resource allocation (Berg and Krueger 2003).

There is yet another tangle of the trade-distributional relationship which has received significant and considerable importance in recent years in India as well as in other countries. This relates to the impact of globalization on *regional income distribution*. The analysis of per capita income convergence or divergence and the analysis of inter-temporal regional inequality measures essentially pertain to explain the same phenomenon. There is however a difference between the two approaches. The former is based upon certain theory of dynamic growth processes whereas the latter is an absolutely statistical artefact without having any theoretical underpinnings. The advantage of the latter approach is that while the former merely is a test of falsification (or validation) of a particular theory of growth, the latter leaves it opens for testing to any contestable proposition in regional growth theory. Further, the former has other disadvantage; as per capita income is a poor measure of growth (Agarwal and Basu, 2005).

The issue is whether globalization has contributed to uneven growth across regions such that some regions develop at the expense of the others and if that is the case then what explains such an occurrence. Both convergence analysis and inequality measure cannot be of any help in giving us an explanation for this. We make an attempt in this paper to explain this by putting the well-known Chenery-Syrquin hypothesis to test in the context of the Indian economy. For this, we consider an open economy in contrast to the standard closed economy environment of the convergence analysis and examine how trade may affect structural transformation.

### **III. Regional Inequality in India**

There are has been a proliferation of studies showing rising inter-regional inequality rather unabatedly in India (Dholakia 1985, Mathur 1987, Das and Barua 1996, Rao, Shand and Kalirajan 1999, Bajpai & Sachs 1996, Marjit & Mitra 1996, Dasgupta et al 2000, Shankar and Shah 2001, Sachs et al 2002, Barua and Bandyopadhyay, 2005). Of late, economists find it convenient to claim that the WTO-led trade liberalization policies undertaken in India since the mid 1990s are chiefly responsible for sharp increase in inter-regional inequality in income.

Bhattacharya et al. (2004) attempts to probe the question that regional disparity widened in the post-reform period or not. They analysed this question by analysing the growth rates of aggregate and sectoral domestic product of major states in the pre- and post- reform periods. The results indicate that while the growth rate of gross domestic product has improved marginally in the post reform decade, regional disparity in the state domestic product (SDP) has widened much more drastically. Industrial states are now growing much faster than backward states, and there is no convergence of growth rates among Indian states and one of the reasons of this increasing disparity can be stated as- backward states with higher population growth are not able to attract investment- both public and private due to a variety of reasons, like poor income and infrastructure and probably also poor governance. These liberalization policies have helped these growing states to make their backward and forward linkages stronger. Disturbingly, there is also an inverse relationship between population growth and SDP growth.

Kurian (2000) assessed regional disparities in India in terms of demographic indicators, female literacy, state domestic product and poverty, development and non-development expenditure by state government, shares in plan outlay, investments, banking activities and infrastructure development. He pointed out that inter-state economic and social disparities in India have been increasing in spite of various governmental measures to develop backward states. He said that there is a marked dichotomy between the forward and backward groups of states has been emerging and the gap is being widened more in the post-reform period. Kurian also pointed out the lack of investment in both social sectors and infrastructure in the backward states due to non-favourable investment climate is one of the main reasons for this widening disparity in the post-reform period.

McNay et al. (2004) examined India's regional disparities in economic performance between 1970-97. Preliminary analysis shows that, in absolute terms, initially poorer states grew at slower rates than initially wealthier ones and that there is also evidence of increasing dispersion of income levels across the states. In the study, the econometric analysis investigates the possibility of club convergence and conditional convergence. Although, there is no evidence of the former, the paper suggested some of the factors associated in the latter. The research indicates that the onset of liberalization policies significantly intensified growth differentials between the states.

Rao et al. (1999) examined the trends in interstate inequalities in the levels of income in India over the last three and a half decades. Contrary to the predictions of neoclassical growth theory that interstate differences in income levels tend to reduce as they approach the steady state equilibrium, the analysis showed widening interstate disparities. To understand the cause of the divergence, the article examined the determinants of interstate differences in growth rates and analyses the role of interstate transfers- explicit and invisible- in determining the geographical spread of investment and incomes. It finds that divergence in income levels has been mainly caused by the allocation of private investments which in turn, has been influenced by the inequitable spread of infrastructure. The inequitable nature of public expenditure spread across states is attributed to the inability of the intergovernmental transfer mechanism to adequately affect the fiscal disabilities of the poorer states as well as regressive nature of the invisible interstate transfers.

Aghion et al. (2003) studied the liberalization to illustrate how such a reform may have unequal effects on industries and regions within a single country. They developed a Schumpeterian model to analyze the effects on growth and inequality of liberalization reforms aimed at increasing entry. The study found that the liberalization in India had strong inequalizing effects.

Certainly there are some well known cases of countries where inequality has risen as they become more integrated into the world economy (World Bank Briefing Paper, 2004). Wages of high school educated males in the US fell 20 percent between 1970s and the mid 1990s. Income inequality increased in countries such as Argentina, Chile, Columbia, Costa Rica and Uruguay after they liberalized trade at different times in the last three decades. China, one of the fastest integrating economies, also experienced one of the largest increases in inequality; however this was from a situation of very high levels of economic equality prior to integration. Growth was still fast enough to massively reduce poverty. But, Global Economic Prospects 2004 found the number of people living on less than \$1 a day in China fell from 361 million in 1990 to 204 million in 2000.

The distribution of per capita income between countries has become more unequal in recent decades. For example, in 1960 the average per capita GDP in the

richest 20 countries in the world was 15 times that of the poorest 20. Today this gap has widened to 30 times, since richer countries have on average grown faster than poor ones. Indeed, per capita incomes in the poorest 20 countries have hardly changed since 1960, and have fallen in several (World Bank Briefing Paper, 2004). However, concomitance need not necessarily imply causation. Simultaneous occurrence of greater openness and rising income inequality in the country does not justify the conclusion that the former is the chief cause of the latter.

Further, trade may lead to inequality if the federal government fails to follow optimal redistribution policies. In fact, as stated by Samuelson, free trade is only “potentially” superior to no trade in the sense that free trade by itself does not ensure that everybody can be made better-off. The onus of ensuring that everybody shares in the welfare gains accruing from trade lies with the government, which it can achieve by undertaking redistributive policies. In a federal and democratic country like India such a trend of widening inter-regional disparities is potentially dangerous because not only it may dampen the speed of liberalization but also it can disrupt the political order.

To the extent that trade acts as an engine of growth, an investigation into the impact of trade on growth and also on the incidence of inter-regional inequality would be of much interest, especially in the context of examining the frequently held notion that the Indian development process has been achieved at the cost of increasing regional disparities. Given that increasing specialization in manufacturing is often treated as an indication of growth, India has had a history of concentrated growth of manufacturing in certain regions. In this context, it has often been argued that instead of breaking the monopoly of these concentrations, a la Elizondo and Krugman (1992), trade in India has, in effect, accentuated concentration in manufacturing and has contributed to inter-regional and interstate inequality in the country. The states that had a first-mover advantage and were already industrially prosperous could use trade as an engine of growth and grow faster while those that were laggards earlier saw their situation worsen so as to further behind the former group.

In what follows we try to show, first, the trend of inequality and whether it is affected by liberalization policies or not by using a simple regression model. After examining this trend we try to explain the cause of inequality in terms of the structuralist hypothesis that inequalities in inter-regional income are caused by inter-state disparities in the development of the manufacturing sector. Having done this we finally consider the case whether trade or openness accentuates or decreases inter-state disparities in manufacturing orientation and thereby causing increase or decrease in inter-regional inequalities.

### **a. Theil Measure**

Following the above scheme of our analysis we first of all give below recent estimates of regional inequality in India from an unpublished manuscript by Das and Barua (forthcoming). They have used inter-state data provided by the CSO (see **Appendix A.1** for the detail of the data source) to estimate regional inequality by using the Theil measures of regional inequality in India (see Das and Barua, 1996 for detail). Using the same notation as in the above study the entropy measure of inequality,  $E_x$ , is defined as follows:

$$E_x = \sum x_i \log (x_i / p_i)$$

where  $x$  is an indicator such as per capita NSDP, agriculture, manufacturing, services, infrastructure etc;  $i$  = regions i.e. state's of India;  $p_i$  = region  $i$ 's share in total population and  $x_i$  = region  $i$ 's share in various economic activities of India like NSDP, Agriculture, Manufacturing etc. Thus  $E_y$ ,  $E_a$ ,  $E_{pri}$ ,  $E_{ap}$ ,  $E_{rm}$ ,  $E_{urm}$ ,  $E_m$ ,  $E_{infra}$ ,  $E_s$ , are respectively the entropy measures of inter-state inequality in income (NSDP), agriculture, primary activities, agriculture-primary combined, registered manufacturing, unregistered manufacturing, registered-unregistered manufacturing combined, infrastructure and services in a given year. The inequality measures  $E_x$  take non-negative values. An equal distribution is denoted by  $E_x=0$ , which happens when every region's population share and its share in the economic indicator are equal. A rise in the value of  $E_x$  over time means that inequality is rising. Since the estimates of the  $E_x$  lie between 0 and 1, for visual convenience therefore we multiply all values of  $E_x$  by 100.

Entropy is an information-theoretic measure based on prior and posterior probabilities. In the measures  $E_x$ ,  $p_i$ ,  $x_i$ , can be regarded as prior and posterior probabilities, because  $\sum x_i = \sum p_i = 1$ . One advantage of this measure is that it is independent of size-variations among regions as has been shown by Azad (1992). Further, the entropy captures all moments of the distribution, whereas the commonly used measures such as coefficient of variation or disparity ratio are based upon mean and dispersion only. Moreover, while the coefficient of variation is an average index of inequality for all the regions, the entropy measure apart from giving an average index also provides information on the relative position of a region in the sample as described in terms of the ratios. These are the reasons for our preference of the entropy index of inequality over other similar measures for measuring inter-regional income inequalities in India.

**Table 1: Entropy Estimates at Constant Prices (26 States & Union Territories) 1980-81=100**

Year	$E_y$	$E_m$	$E_s$	$E_{ap}$	$E_{rm}$	$E_{urm}$	$E_a$	$E_{pri}$
1981	2.10	9.49	4.24	1.52	32.76	13.25	3.92	18.24
1982	2.09	8.29	4.17	1.68	26.68	13.33	4.62	18.74
1983	2.21	7.85	4.36	1.96	25.42	12.05	5.29	18.14
1984	2.05	7.92	4.21	1.64	25.51	12.81	4.25	17.26
1985	2.10	7.54	4.01	1.50	22.56	13.99	4.00	18.21
1986	2.34	8.42	4.47	1.79	25.78	14.04	4.63	17.31
1987	2.31	9.04	4.34	1.77	28.56	14.20	4.68	16.51
1988	2.46	7.62	4.18	2.14	21.94	14.39	5.75	16.77
1989	2.36	7.45	4.12	1.94	21.01	14.60	5.29	15.54
1990	2.78	7.72	4.28	2.06	21.58	15.11	5.61	17.33
1991	2.65	8.23	4.22	1.94	24.34	14.33	5.40	15.95
1992	2.29	8.10	4.99	2.19	23.07	15.72	6.34	13.88
1993	2.52	9.75	5.27	2.37	27.41	18.41	6.61	16.00
1994	3.69	10.22	5.76	2.38	27.75	20.40	6.59	15.95
1995	4.38	9.97	4.77	2.08	25.51	21.98	5.90	16.69
1996	4.98	10.40	5.24	2.34	26.70	23.16	6.69	16.96
1997	5.15	11.07	5.12	2.27	28.61	23.67	6.43	15.32
1998	5.19	9.99	5.38	2.38	25.67	21.90	6.79	15.05
1999	5.38	10.37	5.70	2.12	27.02	24.23	6.15	12.20
2000	4.50	10.62	5.93	2.47	25.74	27.25	7.30	12.00

*Source: Barua and Das, Economic Reforms, Regional Inequality and Growth: Policy Analysis (forthcoming)*

It is clear from the above **Table 1** giving Theil measure of inequality that (i) the Theil measures exhibited higher absolute values in some of the sectors (ii) the manufacturing inequality levels are always above the income inequality levels and further (iii) both are increasing.

## b. Trends in Regional Inequality

**Table 1** above gives the Theil entropy measure for all the 26 states over the period from 1980-81 to 1999-2000. We have made the following disaggregation of the NSDP data: agriculture, primary products (which includes forestry and logging, fishing, mining and quarrying), manufacturing (which is further separated into registered and unregistered), infrastructure (which includes construction, electricity, gas and water supply and transport, storage and communication), and services (which includes trade, hotels and restaurants, banking and insurance, real estates, ownership of dwellings and ownership services and public administration and other services). The Theil index has been calculated for income as well as for all other components of income. The values as shown in the **Table 1** indicate that inequality has increased in almost all the counts.

**Table 2: Inequality Trends**

Inequality Index	Average Annual Growth Rate	t-value
Ey (1981-2000)	4.69	5.46
Ea (1981-2000)	8.46	18.6
E <sub>pr</sub> i (1981-2000)	-0.25	-5.76
Erm (1981-2000)	-0.95	-0.55
Eurm (1981-2000)	1.66	4.49
Em (1981-2000)	1.27	3.77
Es (1981-2000)	0.93	2.20
Einf (1981-2000)	10.88	7.84
Eapr (1981-2000)	-1.00	-0.53

Source: Das and Barua, *Economic Reforms, Regional Inequality and Growth: Policy Analysis* (forthcoming)

The estimates of the Theil inequality trends have been analysed in **Table 2**. The annual average rate of growth of inequality has been the highest in infrastructure (10.88 per cent) followed by NSDP (4.69 per cent) and the estimates are highly significant. The increase of inequality in manufacturing is also found to be positive and significant. However, the break up of manufacturing into registered and unregistered shows divergent trends, that is, while the registered manufacturing shows a decreasing trend, though not significant, the unregistered manufacturing has shown significantly increasing trend. Interestingly, we noticed that a break-up of the period for manufacturing combined, registered and unregistered both, shows a decreasing trend during the period 1981-1991 and an increasing trend during the period 1992-2000 (not reported in Table 2). However, a break up of manufacturing into registered and unregistered shows that unregistered manufacturing is increasing at 1.66 percent significantly, whereas the registered one shows a negative growth rate. This is mainly due to the different type of labour conditions that exists in both the markets. Similarly, for services and agriculture & primary sectors combined, we have observed that the inequality in case of the former has been rising at the significant rate of 0.93 per cent, but for the latter it has been decreasing at the rate 1 per cent per annum. However, the



coefficient for the latter the result is not significant. The linear trend results, particularly in case of manufacturing, convince us that some measure of non-linearity may exist in the behaviour of inequality over time. Table 3 gives the results of estimation of non-linear trends in the relationships between inequality and time.

**Table 3: Non-Linearity Trends, Theil Index of Inequality State Domestic Product and its Components for 26 States and Union Territories**

	Time-period	Constant	T	T <sup>2</sup>	T <sup>3</sup>	R <sup>2</sup>
E <sub>y</sub>	1981-2000	0.032472 (3.859710)	-0.006703 (-2.164)	0.000875 (2.83)	-2.51e-05 (-2.8323)	0.71
E <sub>a</sub>	1981-2000	4.26006 (8.21)	-.0052234 (-.03)	-.02075 (0.91)	-.0007124 (-1.00)	0.81
E <sub>pri</sub>	1981-2000	20.07879 (18.08)	-1.024073 (-2.29)	.1010052 (2.07)	-.0034548 (-2.26)	0.70
E <sub>m</sub>	1981-2000	0.102948 (16.73059)	-0.010321 (-4.556)	0.001167 (5.157)	-3.28e-05 (-5.094)	0.77
E <sub>rm</sub>	1981-2000	34.2374 (14.8)	-3.417429 (-3.67)	0.3240738 (3.19)	-.0086975 (-2.73)	0.42
E <sub>urm</sub>	1981-2000	13.13 (14.93)	-.19619 (-1.02)	.0443814 (4.97)	-	0.93
E <sub>s</sub>	1981-2000	0.049359 (10.98897)	-0.004353 (-2.632)	0.000582 (3.523)	-1.82e-05 (-3.861)	0.61
E <sub>apr</sub>	1981-2000	0.019952 (5.072884)	-0.002286 (-1.512)	0.000375 (2.374)	-1.36e-05 (-2.873)	0.51
E <sub>inf</sub>	1981-2000	0.069311 (1.063260)	0.021402 (0.8917)	-0.004093 (-1.708)	0.000221 (3.224)	0.94

Notes: Figures in the Parenthesis are t-values

Source: Barua and Das, *Economic Reforms, Regional Inequality and Growth: Policy Analysis* (forthcoming)

It is clear from the **Table 3** that except for agriculture non-linearity in the remaining cases are found to be significant in the sense that the coefficients of the higher degrees of time are all significant. In agriculture we observe in Table 3 a steady linear rising trend in inequality over time. In a way, this is also true for unregistered manufacturing although we observe non-linearity up to second degree significant. For the other cases, significant polynomial relationship up to third degree can be seen for NSDP, Manufacturing combined, registered manufacturing, unregistered manufacturing, Services, Agriculture, primary, agriculture-Primary combined and Infrastructure. The sharp fall in inequality in the primary sector perhaps dominates the polynomial relationship for agriculture-primary sector combined. The above results of non-linearity make it clear that the relationship between the growth of inequality and time shows a cyclical behaviour.

It should however be kept in mind that measure of inequality irrespective of the types are merely statistical construct and therefore they do not by themselves provide any explanation of the causes of increasing trend of inter-regional income disparity in India. The above table 3 however indicate certain interesting relationship between manufacturing and income inequality, that is, whenever income inequality rises we also observe a rise in manufacturing inequality and in the same way a fall in income inequality is associated with a fall in the manufacturing inequality. In **table 3** above we

can notice a down turn in both these inequalities captured by the negative coefficients of the third degree polynomial in time. Thus, following the Theil trend results we may conclude that both income and manufacturing inequality may be systematically related with each other. As a preliminary investigation in to the relationship between income inequality and the inequalities in various components of income we have estimated the regression equation of income inequality on inequality in manufacturing, services, agriculture and primary. We have found that manufacturing and infrastructure inequalities are highly correlated (the correlation coefficient is 0.713) and therefore we have excluded infrastructure inequality from the regression equation to avoid multi-collinearity. The results are reported in **Table 4** below:

**Table 4: Regression Results of Income inequality**

$E_y =$	Constant	+	$E_m$	+	$E_p$	+	$E_a$	+	$E_s$
	-2.795		0.7545		-.0836		0.550		-0.528
	(-0.91)		(3.64)		(-0.74)		(2.19)		(-0.83)
$R^2 = 0.7898$	$N = 20$								

The above regression results clearly show that only manufacturing and agriculture inequalities positively affect income inequality. The primary and service sector inequalities have depressing impact on income inequality but the coefficients for both these variables are not significant.

In what follows below we try to examine the relative importance of these two explanatory variables of income inequality – manufacturing and agriculture inequality – in terms of structural transformation of an economy.

#### IV Structural Change and Rising Inequality

As we have discussed above, there seems to have certain systematic relationship between income inequality and manufacturing inequality and in order to find some clue to this relationship we shall be using the cross-country analysis of structural evolution as proposed by Chenery-Syrquin model. The well-known Chenery-Syrquin analysis provides the basic structuralist view on economic growth. It states that the manufacturing sector is the key sector that provides momentum for economic growth and thus determines the level of income. That is, as the per capita income rises, the share of manufacturing in GDP also rises and paripassu the share of agriculture and primary goods falls. Following this basic structuralist hypothesis, Barua and Bandyopadhyay (2005) attempted to explain that the differences in inter-state income and hence inequality may be the result of differences in manufacturing growth trajectories across the states of the Indian economy. Thus, they argue, if economic growth process of a country leads to concentration of manufacturing activities only in a few regions, then it would lead to divergences in the regional growth rates which eventually would be reflected in rising inter-regional income inequality in the country.

For our analysis we use the basic Chenery-Syrquin regression equation as given below to analyze the pattern of structural change across the Indian states. The regression equation for estimation with cross-state data is given in equation (1):

$$x = \alpha + \beta_1 \ln y + \beta_2 (\ln y)^2 + \gamma_1 \ln N + \gamma_2 (\ln N)^2 + \varepsilon F \quad (1)$$

Where  $x$  is the share of manufacturing in GDP,  $y$  is per capita income or GDP per capita,  $N$  is population size and  $F$  is the trade balance. Chenery-Syrquin used this equation to analyze the patterns of structural change with the help of cross-country data. In the context of our study using cross-state data for the Indian economy we first of all ignore trade balance variable and consider a closed economy framework. However, we relax this assumption later and introduce international trade. We estimate this equation by taking data on the variables for the period 1991-2000.

The regression equation is purported to explain that manufacturing output share depends on per capita income as well as the size of the population. While per capita income variable captures income effect of demand and the operation of the Engel's law, the population size variable represents the extent of demand, which affect the size of production and economies of scale. We expect that the coefficients of these variables will take positive values implying that as income rise the demand for manufactures will rise following Engel's law and therefore it leads to a rise in the share of manufactures in GDP. Similarly, as the size of the population increases, the scale of production also rises with concomitant effects on reduction of the cost of production. The latter effect also will have an upward thrust on the share of manufactures.

Since our data consist of cross-state and time series for the period 1981-2000, we estimate the equation by using the standard Feasible Generalized Least Square Method. With the pooled sample we first of all estimate the *Fixed Effect Model*, which is essentially the Least Square Dummy Variable Model where the states and time are used as dummies. By taking the Hausman test on the desirability of the application of *Fixed Effect* or *Random Effect* Model we finally estimate the statistically desirable model. The Hausman test confirms that the desirable testing procedure either in favour of the Random Effect or the Fixed Effect Model and accordingly report our results. Our estimated equation gives the result as presented below:

**Table 5: Structural Change Equations (Closed Economy Model)**

Variable	Coefficients	Std. Err.	z	P >  z
Log y	-0.515	0.1313	-3.92	0.00
Log y <sup>2</sup>	0.0354	0.0083	4.26	0.00
Log N	0.0455	0.0818	0.56	0.578
Log N <sup>2</sup>	-0.0016	0.0026	-0.62	0.537
Constant	1.694	0.888	1.93	0.054

In the above **Table 5** we notice that manufacturing share variable while is significantly negatively related to per capita income it is also positively and significantly related to square of per capita income. On the other hand, the population variable as expected is not at all significant. This could mainly be because over population may sharply set in diminishing returns in production. In order to find the relationship between manufacturing share and per capita income we need to calculate elasticity of manufacturing share with respect to per capita income and we expect this to be positive. The estimated equation for elasticity can be written as:

$$(Y/x) (Dx/dy) = [\beta_1 + 2\beta_2 \ln y]/x$$

Putting the values of  $\beta_1$  and  $\beta_2$  into the above equation, the elasticity is coming significantly positive. This implies that the graph depicting the relationship between

manufacturing share and per capita income as shown below is a positively sloped increasing curve. This result in the context of increasing inter-state income inequality can be interpreted as an indication of disproportionate growth in manufacturing production across the states of Indian union. Thus, India's development process has been uneven in the sense that certain states are enjoying greater manufacturing orientation compared to some other states, resulting in increasing inter-state income inequality. Therefore, if inter-state inequality has to be reduced, manufacturing production should be rather evenly distributed across the states. The relation between per capita income and estimated manufacturing share as shown in Figure 1 shows that as the income rises the share of manufacturing in GDP also rises and this result is consistent with the standard cross-country results.

Figure 1

**Fitting of linear trend: *Estimated Manufacturing Share and Per Capita Income:***

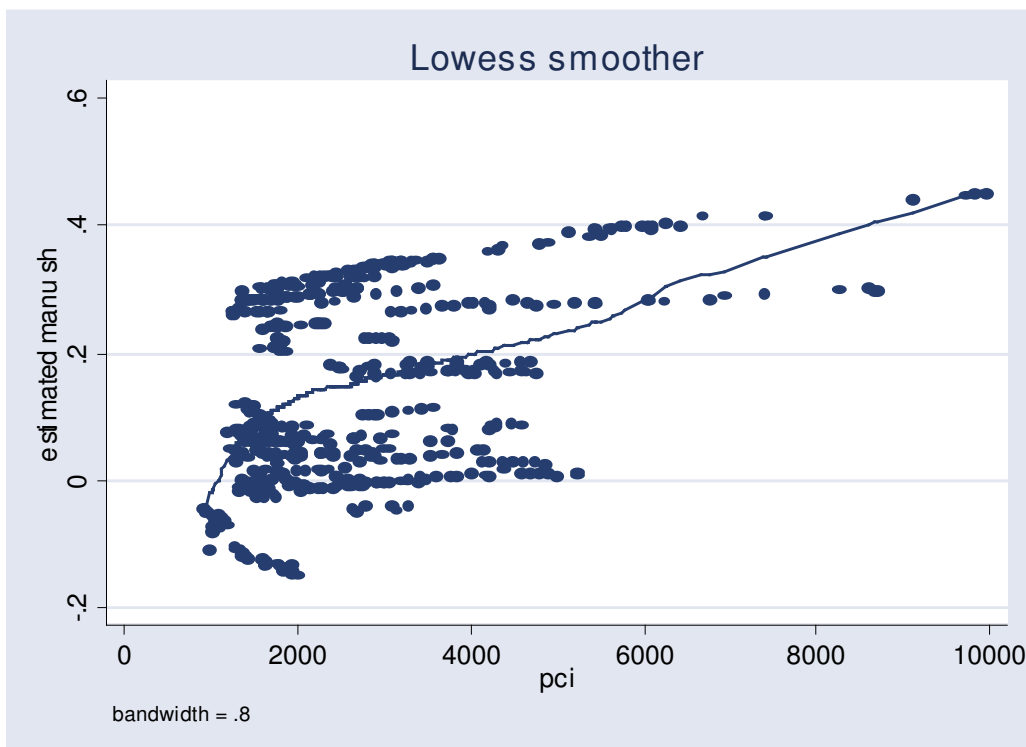
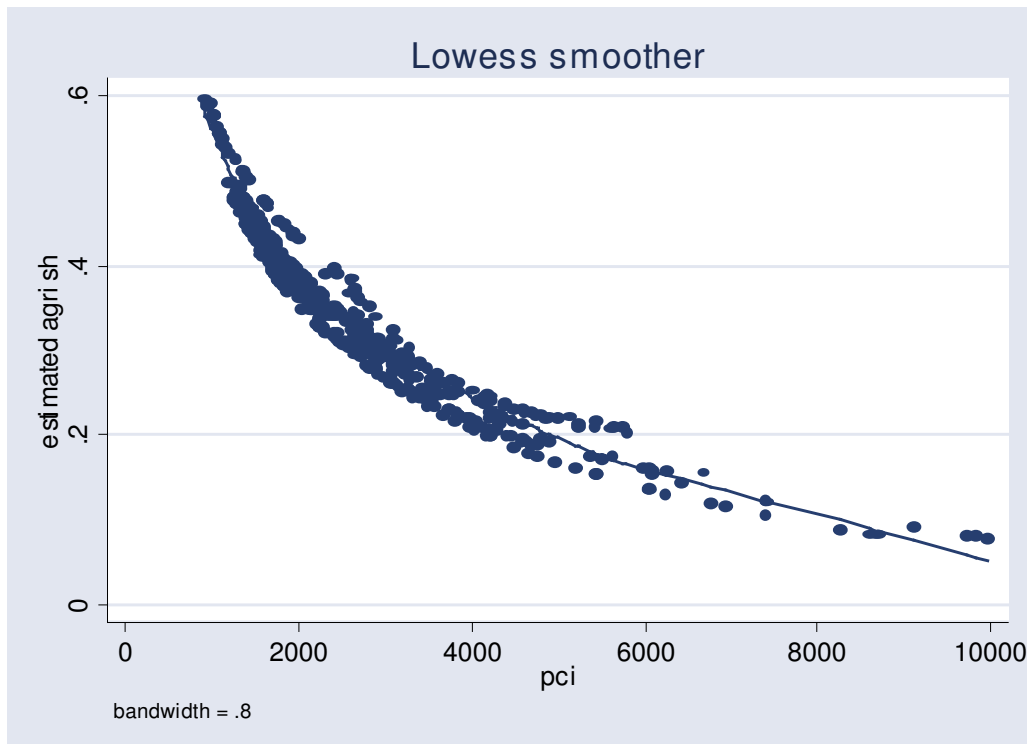


Figure 2

**Fitting of linear trend:** *Estimated Agricultural Share and Per Capita Income:*



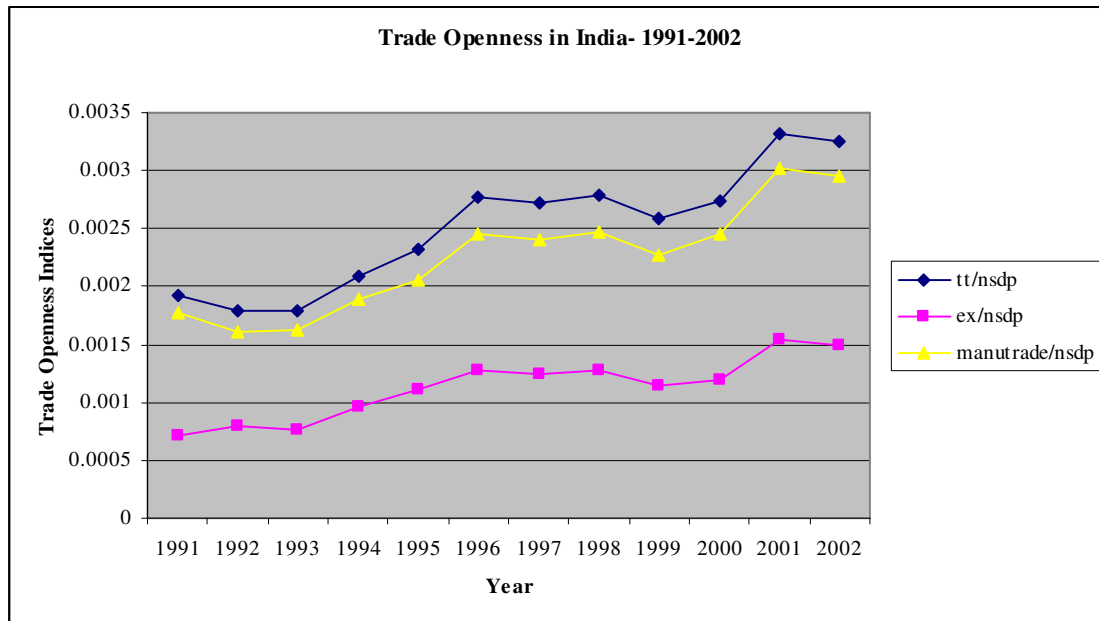
Similarly, the relationship between agricultural share and per capita income is depicted by the estimated negatively sloped curve as shown in Figure 2 above. This result is again consistent with the Chenery-Syrquin cross-country results.

## V Trade Liberalization and Income Inequality

There is a lack of a globally defined and internationally comparable measure of a country's trade orientation. The two concepts "trade liberalization" and "trade openness", while are closely related, are not identical (Sarkar et. al, 2005). In the relevant literature "increased trade openness" is considered in the sense of an increase in size of the country's traded sector in relation to total production as an acceptable proxy for trade liberalization. It may be noted that the World Bank itself, when measuring the success or otherwise of structural adjustment programmes, uses the ratio of export to GDP as an indicator of increased openness or outward orientation. In the resent analysis on the basis of data available from CMIE India Trades Database, three indices of liberalization are calculated over the period 1991-2002 for India: total trade/nsdp, exports/nsdp, manufacturing trade/nsdp. India's trade openness indices are diagrammatically represented in Figure 3.

Figure 3

### Trade Openness Indices of India



To examine the impact of trade liberalization on regional inequality, we need to look at how trade determines the inter-state manufacturing growth paths. While international trade has often been cited as a cause of increasing income inequality between classes (Stolper-Samuelson) and between countries (the terms of trade effect), much less attention has been paid on the effects of trade across the regions within a country (Silva and Leichenko, 2003). This is mainly because the standard general equilibrium trade models are essentially space less in the sense that the entire country is conceived of as a single market point characterized by single product price and single factor price prevailing everywhere. In fact Bertil Ohlin in his path breaking work emphasized mainly on inter-regional trade because he assumed that transport cost breaks continuity of markets which leads to imperfect factors and goods mobility across regions. It is however not difficult to imagine a country characterized by existence of different factor and product market conditions. In the same way as we have discussed above that there are some new theories of trade developed within a monopolistic competition framework that try to bring about a fusion between trade theory and geography. In what follows we shall try to examine the issue of the effects of trade on income inequality through its effect on manufacturing production across states.

How do we expect trade to affect manufacturing? The liberalization drive in the developing countries is based on the presumption that trade liberalization will allow resources to be shifted away from agriculture and primary to the manufacturing enterprises since the developing countries have comparative advantage in labour intensive industries. If it does indeed happen so then we expect that the share of manufacturing in GDP will also rise for each state and accordingly each state should experience a rise in its per capita income as argued above in our analysis of structural change and economic growth. However, trade may increase or decrease income

inequality depending on whether the impact on manufacturing specialization is unevenly or evenly spread out across the states. We may provide two propositions not necessarily mutually exclusive as follows:

In proposition 1 we assume that relatively backward regions with very low manufacturing orientation have relatively lower labour prices, capital being perfectly mobile across states. Thus our testable hypothesis is that the developed states within India are relatively at a disadvantageous position in comparison with the relatively backward states in terms of labour cost. It is a known fact that in most urban centres labour is more expensive and so are other costs such as rent. The rural-urban differences in wage structure are further accentuated by imperfect factor mobility particularly with respect labour across states. The labour market is not as highly integrated as the capital market because the Central Government has intervened with the capital market by establishing banking and other financial institutions in the states, which enhances capital mobility. Similarly, over the years there has been remarkable improvement in the transport network connecting the metropolis with periphery. We may cite the rise of multi-lane high-speed roads that have come up in recent years. The growth of educational institutions across states and with the rise in distant educational facilities and in internet communication etc., the peripheral states are no more in any disadvantage in comparison with the developed regions. Then we should expect a dispersal of industrial spectrum across states, which will result in an even distribution of industrial activities. Trade is expected to lead to decline in the capital-intensive industries from the metropolis and the rise in labour intensive enterprises in the periphery. The metropolis will specialize in providing services in which cheap capital and skilled labour are important and which are relatively abundant in the metropolis and the periphery will specialize more and more on commodity production. While there might be a rise in the skilled-unskilled wage disparities but since the share of unskilled labour in total labour force is much higher, the over all impact of manufacturing growth on per capita income is bound to have positive effect. Thus, we may expect that trade liberalization will lead to higher growth and reduced income inequality.

In the same way, in proposition II we follow the basic Elizondo-Krugman (1992) that in a closed economy manufacturing production is concentrated more in the metropolis resulting inequalities across regions. With the opening up of trade, the hegemony of the metropolis breaks down and manufacturing production as a result gets evenly distributed across regions, which then would lead to fall in income inequalities.

In order to examine the effects of trade on manufacturing across Indian states we require data for exports and imports for each state of India, which unfortunately is not available. What in fact we have is the aggregate trade data for exports and imports for the country as whole. Therefore, we have used in our study a proxy rule to estimate the export-import data for each state (see **Appendix A. 2** for our procedure to estimate the state wise export and import data). We then introduce another variable, openness, in equation (2) to capture the trade effect. The openness variable is defined as total trade that is export plus import, as a percentage of the GDP for each state.

To examine the effect of trade on manufacturing share across states we re-estimate equation (1) by incorporating the total trade variable (tt). The results of the estimated equation are presented below:

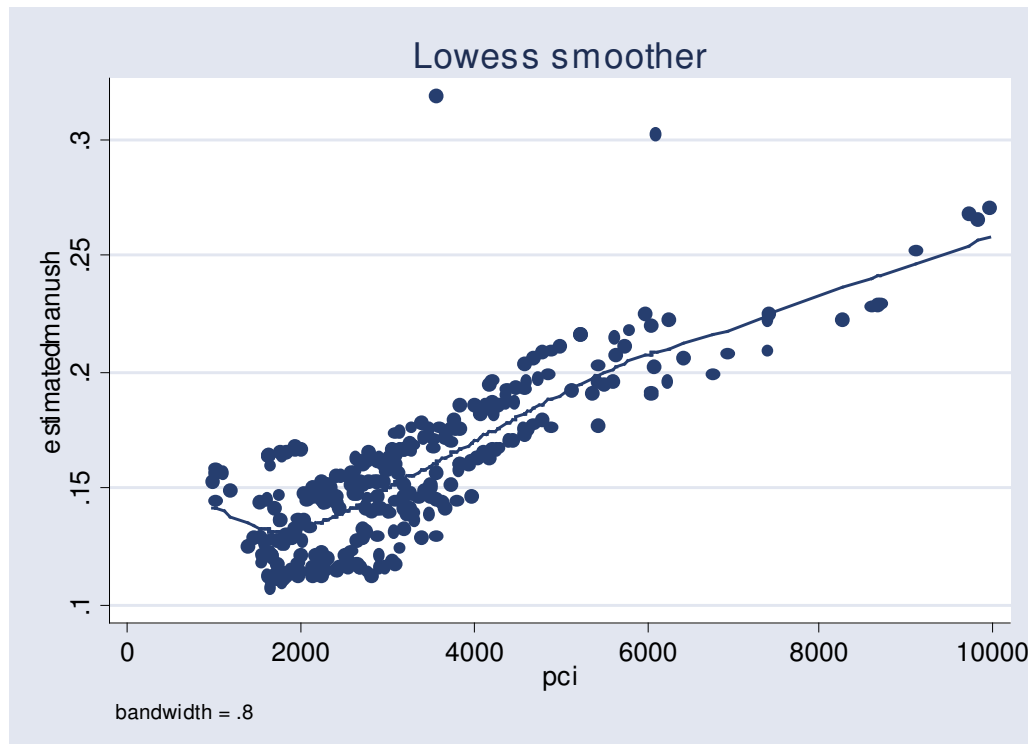
**Table 6: Results of the Chenery Sryquin Model with Total Trade /NSDP (tt/nsdp) as Openness variable**

Variable	Co-efficient	Standard Error	z	P> mod.z
Log N	-0.1148578	0.1172995	-0.98	0.327
(Log N)^2	0.003718	0.0036737	1.01	0.312
Log Y	-0.5927923	0.1991868	-2.98	0.003
(Log Y)^2	0.0398124	0.0125301	3.18	0.001
tt/nsdp	6.851677	2.235855	3.06	0.002
const.	3.199081	1.260059	2.54	0.011

We can clearly see from the results given in Table 6 that the total trade as a percentage of GDP is positively and significantly affecting manufacturing output proportion. This result seems quite expected, as opening up of the economy is likely to break the monopoly power of the states by weakening the traditional forward and backward linkages and lead to more even distribution of economic activities across regions along with an expansion of foreign trade (Elizondo and Krugman, 1992). The post-reform time dummies are also positively and significantly related with the manufacturing share.

**Figure 4**

*Estimated Manufacturing Share and Per Capita Income with Total Trade*



Next, we have included the total manufacturing trade as a percentage of GDP in the regression equation to find how trade openness would affect manufacturing share. The difference in the impact of total trade variable and manufacturing trade variable could be stated as follows. The total trade variable captures the effect of capital flows



while the manufacturing trade variable determines the overall impact of trade on manufacturing production. The estimates are given in table 7 below.

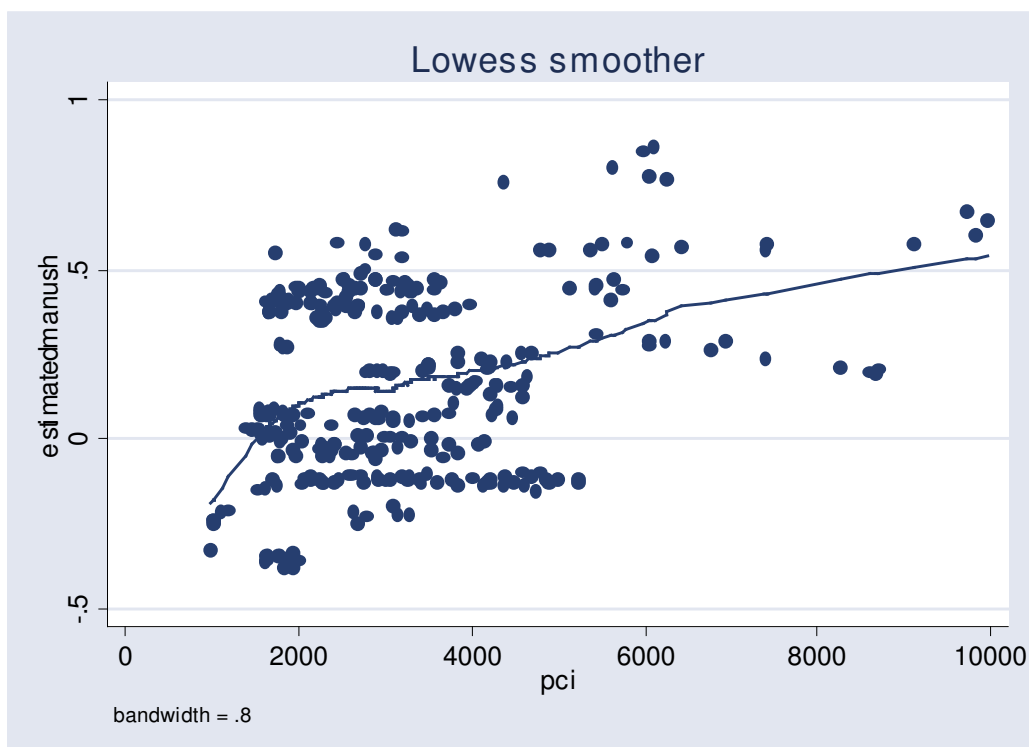
**Table 7: Results of the Chenery Sryquin Model with Total Manufacturing Trade/NSDP (manutrade/nsdp) as the openness variable**

Variable	Co-efficient	Standard Error	z	P> mod z
Log N	0.8186	0.14231	5.75	0.00
(Log N)^2	-0.03031	0.00444	-6.83	0.00
Log Y	0.5916	0.11479	5.15	0.00
(Log Y)^2	-0.03788	0.00734	-5.16	0.00
manutrade/nsdp	0.00125	0.00005	24.68	0.00
const.	-7.42334	1.329	-5.59	0.00

The results in table 7 show that openness favourably affects the manufacturing shares in GDP. The graph is given in Figure 5 below.

**Figure 5**

*Estimated Manufacturing Share and Per Capita Income with manufacturing trade*



**Table 8: Results of the Chenery Sryquin Model with Total Exports/NSDP as the openness variable**

Variable	Co-efficient	Standard Error	z	P> mod z
Log N	-0.1248282	0.1150156	-1.09	0.278
(Log N)^2	0.0040449	0.0036022	1.12	0.261
Log Y	-0.5822759	0.1970682	-2.95	0.003
(Log Y)^2	0.0392751	0.012383	3.17	0.002
ex/nsdp	9.348798	2.32807	4.02	0.000
const.	3.230874	1.239648	2.61	0.009

Finally, we have regressed another openness variable i.e. exports/nsdp on the manufacturing orientation in the net state domestic product. In this case also, the openness indicator is positively & significantly related to our dependent variable. That means trade liberalization may have helped us in improving our export performance, which in turn helped in increasing the manufacturing share in the net state domestic product.

So, on the basis of three openness indices results on the manufacturing orientation, it can be said that trade has played a significant role in determination of manufacturing output. The above results showing the effects of trade liberalization on income and manufacturing production are consistent with our expected results. The standard trade theory suggests that trade liberalization in a relatively labour abundant country like India will result in a shift of resources to the production of manufactures which will use its abundant factor intensively i.e. labour. This will then result in increase in income and also increase in consumers' welfare provided the state follows optimal redistribution policy. Further, following our assumption of imperfect labour mobility and perfect capital mobility within the domestic economy we expect that relatively backward regions with poor manufacturing shares will experience proportionately more resources shifted towards their manufacturing which will then result in an even distribution of manufacturing output across regions. Both these effects will lead towards equalization of per capita income across the states and therefore reduction in income inequality. Our non-linear estimates of income and manufacturing inequality showed this trend. This is further confirmed by the following regression equations:

**Table 9: Estimates of Inequality measure on Trade/GDP ratio**

Inequality Index	Constant	TRGDP	TRGDP^2	TRGDP^3	R^2
Income ( $E_y$ )	3.1594 (6.53)	-0.3259 (-2.82)	0.03149 (4.23)	-0.00062 (-4.41)	0.96
Manufacturing ( $E_m$ )	10.17 (8.74)	-0.5793 (-2.08)	0.0459 (2.56)	-0.000877 (-2.60)	0.79
Agriculture ( $E_a$ )	1.75687 (2.05)	-0.6747 (3.29)	-0.03279 (-2.48)	0.0005297 (2.13)	0.81

C= Constant; TRGDP= Trade/GDP ratio; TRGDP^2 and TRGDP^3 are higher order of Trade/GDP ratio.

The three regression equations given in **Table 9** give the estimates of income, manufacturing and agricultural inequalities respectively being regressed on the trade openness variable. The results show that trade openness has depressing impact on both income and manufacturing inequalities but it increases agricultural inequality. These results are not surprising given the fact that agriculture in India is highly regionally concentrated because of the Central government policies of investment on irrigation etc.

in few states like Punjab, Haryana and Western UP. The effects of such policies have been found to be increasing inter-state inequalities over time. However, with the opening up of trade, increase in the relative prices of agriculture has led to more concentration of production in these states. Although world prices of agriculture have fallen since 1997, its impact on the Indian economy has been marginal so far because of relative insulation of the agricultural sector in India. But with increasing liberalization of agriculture the world prices may further fall leading to increase in India's imports of agricultural commodities and thereby a fall in regional concentration. In fact, our structural change analysis confirms that the share of agriculture in GDP has fallen consistently for all states of India. However, the relative importance of labour-intensive manufacturing in India will increase over time due to the changing demographic factors in the advanced economies. Going by these factors, it can be said that although both agriculture and manufacturing have positive impact on increasing income inequality, the increased openness of the economy over time is expected to dampen both agricultural and manufacturing inequality. Thus it may be concluded that as far as the impact of openness on income inequality is concerned, more openness will reduce inter-state income inequality in India.

This essentially neo-classical result is also consistent with the Elizondo-Krugman hypothesis, which is based on monopolistic competition and increasing returns to scale. In fact, both these explanations are not mutually exclusive but complementary with each other.

## **VI. Conclusion**

We may draw the following conclusions from our above analyses: One, regional inequality in India has been increasing in all components of income except for the primary sector where we observe a persistent decline in inter-regional inequality in India. However, since India adopts external liberalization policies we have observed down-turns in both income as well as manufacturing inequalities since 1997-98. This makes us believe that income inequality and manufacturing inequality may be systematically related. Two, regressing income inequality on the inequalities in various components of income shows that only manufacturing and agricultural inequalities do significantly and positively affect income inequality. Third, our structural change analysis shows that with the evolution of the India economy the share of manufacturing has been steadily increasing across all states and the share of agriculture has been declining. This result is consistent with the standard cross-country results of structural change and Engel's law. The introduction of the role of trade in regional economic development process we have observed that trade accentuated this structural process of evolution. Finally, our regression results of the impact of increased openness on average income inequality we have observed that while trade has a dampening impact on both income and manufacturing inequalities, it increases inequalities in agriculture inter regionally. This result has negative implications for the impact of globalization on income inequality insofar as income inequality is positively and significantly affected by agricultural inequality. However, our presumption is that once the full impact of liberalization of agriculture is felt, the world price of agriculture is bound to fall further and therefore increased imports as a consequence will decrease the advantage of the rich agricultural regions in India. In the long run, manufacturing is bound to dominate the fate of inter-regional income inequality. And going by the present trend in structural transformation and trade, it may be concluded that trade will serve positively in reducing inter-regional inequality.

However, for trade to have fuller impact on reducing inter-regional income inequality, the central government has to play a proactive role in attaining an equitable

distribution of income. Our inequality analysis shows that the most significant inequality has been observed in case of infrastructure and we have also noted earlier that there is a very high correlation between infra-structural inequality and manufacturing inequality. Herein lays the role of the state in providing a level playing ground in terms of infra-structural facilities for all states. A failure of the central government in this respect would further increase infra structural inequality across states which will then lead to agglomeration of manufacturing activities in those states which are well endowed with better infrastructure. In no time then we lose the initial momentum of inter-regional income equalization impact of trade and again the country will fall into the otherwise inescapable trap of rising inter-regional inequality.

## Notes:

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<sup>i</sup> Rodrik, Dani, “Globalization and Labour, or: if globalization is a bowl of cherries, why are there so many glum face around the table?” in R. E. Baldwin et al ed. *Market Integration, Regionalism and the Global Economy*, Cambridge University Press, U.K (1999).

<sup>ii</sup> Rodrik’s argument is based on the ground that since the advanced countries have already substantially reduced tariffs during the previous rounds of negotiations, there is very little scope for further fall in prices due to tariff cuts.

<sup>iii</sup> While in America globalization has caused decline in real wages for unskilled labour and increase in inequality across skill groups, in Europe in contrast real wages at the bottom has gone up but unemployment has increased significantly

## References

Aghion, Philippe, Robin Burgess, Stephen Redding and Fabrizio Zilibotti (2003), “The Unequal Effects of Liberalization: Theory and Evidence from India” London School of Economics and Centre for Economic Policy and Research <http://www.iies.su.se/~zilibott/abrzo30305.pdf>

Ahluwalia, M S (2002), “State Level Performance under Economic Reforms in India” in Anne Krueger (ed.), *Economic Policy Reforms and the Indian Economy*, University of Chicago Press, Chicago

Agarwal, Manmohan and Sudip Ranjan Basu (2005), “Development Strategy and Regional Inequality in India”, in A. Barua ed. *India’s North-east: Developmental Issues in a Historical Perspective*, Manohar-CSH Publication, New Delhi.

Azad, N. A. , 1992, *Trade Performance And Trade Distribution: A Study of North Vs South*, Ph. D. Thesis, Jawaharlal Nehru University.

Bajpai, N and J Sachs (1996), “Trends in Inter-State Inequalities of Income in India”, *Discussion Paper No. 528*, Harvard Institute for International Development, Harvard University

Banister, G J and K Thugge (2001), “International Trade and Poverty Alleviation”, *IMF Working Paper 01/54*, Policy Development and Review and African Departments, International Monetary Fund, Washington DC, May

---

Barro, R and J W Lee (1994), "Sources of Economic Growth", *Carnegie-Rochester Conference Series on Public Policy*

Barro, R and X Sala-i-Martin (1995), *Economic Growth*, McGraw Hill, New York

Barua, A. and Arindam Banyopadhyay (2005), *India's North-east: Developmental Issues in a Historical Perspective*, Manohar-CSH Publication, New Delhi.

Berg, A and A Krueger (2003), "Trade, Growth and Poverty: A Selective Survey", *IMF Working Paper WP/03/30* February

Bernard, A, and Jensen, J B (1995), "Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987", *Brookings Papers on Economic Activity: Microeconomics*, 67-119. Brookings Institution, Washington, D.C.

Bhattacharya, B B and S Sakthivel (2004), "Regional Growth and Disparity in India: Comparison of Pre and Post-Reform Decades" *Economic and Political Weekly*, March 6, pp. 1071-1077

Borjas, G J, R J Freeman and L F Katz (1992), "On the Labor Market Effects of Immigration and Trade", in G Borjas and R Freeman (eds.) *Immigration and the Workforce*, 213-44, University of Chicago Press, Chicago

Cashin & Sahay (1996), "Internal Migration, Centre-State Grants, and Economic Growth in the States of India", *IMF Staff Papers*, Vol. 43, No. 1, pp. 123-71

Cline, W (1997), *Trade and Income Distribution*, Institute for International Economics, Washington, DC

Cline, W (2001), "Trade, Immigration and Wage Distribution, in F Welch (ed.) *The Causes and Consequences of Increasing Inequality*, 227-67. University of Chicago Press, Chicago

Das, S K and A Barua (1996), "Regional Inequalities, Economic Growth and Liberalization: A Study of the Indian Economy", in *Journal of Development Studies*, Vol. 32, No. 3, pp. 364-390

Das, S K, A Barua and M N Ghosh (1993), "Interstate Economic Inequality in India: Some Implications for Development Strategy", *Discussion Paper*, International Trade and Development Division, Jawaharlal Nehru University, New Delhi

Dasgupta, D, P Maiti, R Mukherjee, S Sarkar and S Chakrabarti (2000), "Growth and Interstate Disparities in India", *Economic and Political Weekly*, July

Dholakia, R (1994), "Spatial Dimensions of Acceleration of Economic Growth in India", *Economic and Political Weekly*, August 21, Vol. XXIX, No. 35, pp. 2303

Dholakia, R H (1985), *Regional Disparity in Economic Growth in India*, Delhi: Himalaya Publishing House

Dollar, D and A Kraay (2001a), "Growth Is Good for the Poor," *Policy Research Working Paper No. 2587*, World Bank

---

Dollar, D and A Kraay (2001b), "Trade, Growth, and Poverty," *Policy Research Working Paper No. 2199*, World Bank

Elizondo, R L and P Krugman (1992), "Trade Policy and the Third World Metropolis", *NBER Working Paper No. 4238*

Freeman, R (1996), "Will Globalization Dominate U. S. Labour Market Outcome", *Paper Prepared for the Brookings Conference on Import, Export and the American Workers*, January.

Frenkel, J and D Romer (1999), "Does Trade Cause Growth", *American Economic Review*, 89(3), 379-399, June

Ganuzza, E, S Morley, S Robinson and R Vos *Is Trade Liberalization Good for Latin America's Poor?*

Hanson, G H (1997), "Increasing Returns, Trade, and the Regional Structure of Wages", *Economic Journal*, 107(440): 113-133

Krugman, P (1995), "Growing World Trade: Causes and Consequences", *Brookings Papers on Economic Activity*, 1:327-62, Brookings Institution, Washington, D.C.

Kurian, N J (2000), "Widening Regional Disparities in India – Some Indicators", *Economic and Political Weekly*, Vol. XXXV, No. 7, February 12-18

Majumder, G and J L Kapoor (1980), "Behaviour of Inter-state Income Inequalities in India", *Paper presented at the Twelfth Conference of the Indian Association for Research on National Income and Wealth*

Marjit, S and S Mitra (1996), "Convergence in Regional Growth rates: Indian Research Agenda", *Economic and Political Weekly*, August 17, Vol. XXXI, No. 33, pp. 2239-42

Mathur, A (1987), "Why Growth Rates Differ" within India: An Alternative Approach", *Journal of Development Studies*, Vol. 23, No. 2, pp. 167-99

McNay, Kirsty and Robert Cassen (2004), "Divergence in India: Income Differentials at the State Level, 1990-97, *Journal of Development Studies*, 2006 (Forthcoming)

Nagraj, R, A Varoudakis and M A Veganzones (1997), "Long-run Growth Trends and Convergence across Indian States", *mimeograph*, IGIDR, Mumbai

Nagraj, R, A Varoudakis and M A Veganzones (2000), "Long-run Growth Trends and Convergence across Indian States", *Journal of International Development*, Vol. 12.

Paluzie, E (2001), "Trade Policy and Regional Inequalities", *Papers in Regional Science*, 80:67-85

Raman, J (1996), "Convergence or Uneven Development: A Note on Regional Development in India", Valparaison University, US, *mimeograph*

---

Rao, M G, R T Shand and K P Kalirajan (1999), "Convergence of Income across Indian States: A Divergent View", *Economic and Political Weekly*, March 27, Vol. XXXIV, No. 13, pp. 769-78

Rodrik, D (1999), "Globalization and Labour, or: if globalization is a bowl of cherries, why are there so many glum face around the table?" in R. E. Baldwin *et al* (ed.) *Market Integration, Regionalism and the Global Economy*, Cambridge University Press, UK

Rowntree, S (1901) *Poverty: A Study of Town Life*, Macmillan, London

Sachs, J, N Bajpai and A Ramiah (2002), "Understanding Regional Economic Growth in India", *CID Working Paper No. 88*, Harvard University

Sarkar, Prabirjit and Brototi Bhattacharyya (2005), "Trade Liberalisation and Growth: Case Studies of India and Korea", *Economic and Political Weekly*, December 31, pp. 5635-5641

Shankar, R and A Shah (2001), "Bridging the economic Divide within Nations: A Scorecard on the Performance of Regional Policies in Reducing Regional Income Disparities", *Country Evaluation and Regional Relations Division*, World Bank, November

Silva, J A and R A Leichenko (2004), "Regional Income Inequality and International Trade", *Economic Geography*, July

Singh, N and T N Srinivasan (2002), "India's Federalism, Economic Reform and Globalization", *Paper prepared for CREDPR project on Globalization and Comparative Federalism*

Sjöberg, Ö and F Sjöholm (2004), "Trade Liberalization and the Geography of Production: Agglomeration, Concentration, and Dispersal in Indonesia's Manufacturing Industry", *Economic Geography*, July

Ventura, J (1997) "Growth and Interdependence" *Quarterly Journal of Economics*, Vol. 112, No. 1, February

Wood, A (1994), *North-South Trade, Employment, and Inequality: Changing Fortunes in a Skill-driven World*, Oxford, UK, Clarendon Press

Wood, A (1999), "Globalisation and the Rise in Labour Market Inequalities" *Economic Journal*, 108:1463-14

World Bank (2004), "Does more International Trade Openness Worsen Inequality?" *World Bank Briefing Paper No. 4*, Economic Policy Group and Development Economics Group, World Bank, Washington D.C

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## **Appendix: Data Sources**

### **A. 1 NSDP Data:**

The National Accounts Statistics (NAS) brought out by the Central Statistical Organization (CSO) is the main source of data for various regional economic activities in India. The regional income data are however compiled by the statistical departments of various regions (that is, the States) and the CSO accepts the data as they are. Since there are variations in the accounting of national income by different regions, it is therefore argued that the regional data series are not strictly comparable. However, the CSO has brought out comparable regional income series for the purpose of Finance Commission in India. The only problem is that the series is available at 2 different base year prices: (1) at 1980-81 prices and the other (2) at 1993-94 prices. We have tried both data series in our measure of inequality or other relevant calculations but the results are almost identical. This made us believe that the regional accounting variations are only minor from the viewpoint of the inequality measure and since our entropy measures are based on shares, minor variations are unlikely to have significant impact on the overall measure of inequality. We must acknowledge here that we have obtained the data directly from the CSO in tapes.

The entropy index of inequality has been calculated for the net state domestic product (NSDP) as well as for the components of the NSDP. The CSO gives us both current as well as constant price data. There are two constant price series- one for 1980-81 prices and the other for 1993-94 prices as told before. Since we did not obtain the constant price series for the entire period of our analysis at 1993-94 prices, we have therefore converted the data for the entire period at 1980-81 prices and used this data for our calculations. In other words, all the variables in this study are measured at 1980-81 prices. The outputs of economic activities for all the state's are given in Rs. Lakhs.

### **A. 2 Estimation of State-wise Trade data series:**

The trade data that we have used for our analysis have been sourced from India Trades Database-Centre for Monitoring Indian economy (CMIE) & Directorate General of Commercial Intelligence & Statistics. We have used trade data based on HS-Code classification from 01 to 99. The initial data, that we thought to use for our exercise is from 1990-91 to 2002-03. But since the recent regional economic activities or the income series data at either 1980-81 prices or 1993-94 prices is not available, so we have restricted our analysis till the period of 1999-2000. The trade values which we have sourced from the above mentioned database is given in Rs. Lakhs.

### **Methodology:**

First of all, we have considered the entire trade series for India based on HS-Code classification ranging from 01 to 99. The entire range of tradeable items has divided into two broad categories: (a) 01-24 has been classified as agricultural items and (b) 25-99 has been considered as manufacturing items. As all the items belonging to the latter category have to be manufactured in some way or the other before trading, so we have accumulated the entire series into 1 broad head.



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In order to calculate state *i*'s manufacturing exports or agricultural exports, on the first hand we noted down the state *i*'s manufacturing share in India's total manufacturing output, which we have calculated as the summation of manufacturing output of all the states. Next, from the CMIE data we computed the total manufacturing or agriculture exports of India i.e. the summation of the trade values of items ranging from HS-Code 25 to 99 or 01 to 24. The state *i*'s manufacturing share has been multiplied with India's total manufacturing or agriculture exports in order to get an estimate of state *i*'s manufacturing or agriculture exports. This is generally known as the "rule of thumb" in calculating state's export figures.

We have used a different way in order to calculate the imports of either agricultural or manufacturing items for each of the state. On the foremost point, we have divided total imports by India's population to get per capita manufacturing or agriculture imports. Subsequently, the above share has been multiplied with the respective state's population in order to estimate each respective state's import figures for either manufacturing or agriculture. This is based on the assumption of homothetic preference for imports across all states.

The exports and imports figures for each states measured as above are then added to arrive at the total trade for a state.

Measurement of the degree of openness of any state has been done by calculating the state's total trade balance, exports and manufacturing trade as a percentage of the Net State Domestic Product (NSDP) of that state. We understand that these are not the actual trade figures from the state but since no data is available for trade from the state, we can perhaps use these estimates as proxies.