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Case for Regional Reallocation of Investment in India

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Structural Change, Economic Growth and Trade: Case for Regional Reallocation of Investment in India

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Abstract: The economic structure and rates of growth across the states in India are markedly different, with significant disparities in income per capita growth as well as sector-specific performance. The high-income states have typically led the Indian growth story with their high growth rates, while regional inequality continues to increase. The recent policy focus in India has been to encourage *inclusive growth* across sectors and disparate regions within the country through development of core public services (water, education, transport, healthcare, etc), especially in the poor and special status states. To understand the structural challenges facing India, it is important to understand which economic sectors have been the most critical in driving regional inequality over the years and how these sectors impact economic growth. Given the new thrust in developmental capital expenditure in the special states (with special economic incentives to help enhance economic growth) and poorer states to boost economic well-being, it is pertinent to evaluate whether such public expenditure has helped alleviating inequality and triggered structural change.

We use income and disaggregated sector-specific output data of 31 Indian states and union territories to examine the structural change experienced over the last three decades from 1980 through 2008. Considering the major regime shift implemented in India through economic reforms of deregulation and liberalization during the early-1990s, we also determine how this impacted the structural performance and regional disparity in the country. We examine these relationships in an augmented Chenery-Syrquin model, and test whether the state capital and development expenditure has had structural impact and whether it has lowered regional inequality. We find at the macro level, India experienced higher economic growth with increasing inequality in both the agricultural and the manufacturing sector during 1980-2008, however, as the disaggregated regional growth analysis reveals, at the micro-level, the states with higher agricultural and manufacturing orientation enjoyed higher average economic growth. The high growth states also gained in the post-reform period, indicating that laggard states have lost out even on the trade front due to their structural backwardness. Our estimated Chenery model indicates that liberalization has had significant positive impact on services share in state output, but no significant manufacturing orientation. Moreover, state capital/ development expenditure has also had no significant effect on the manufacturing –orientation of the states, and indeed inequality has further increased for the special states. The special states have increased their service-orientation even as their manufacturing share significantly declined in the last two decades. We conclude that although the state development expenditure can play a critical role in reducing regional disparity, the special status poorer states have failed to utilize state development investment to trigger structural economic change and reduce regional inequality.

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Introduction

While India has successfully maintained a healthy annual growth rate of 8% during the last ten years, maintaining this growth in the face of challenges (from supply-side bottlenecks, resulting in inflation) and rolling the economy onto a higher growth path of 9% remains an important objective (Economic Survey 2009-10). Moreover, the disconcerting phenomenon of increasing regional inequality has forced policy makers to push for an *inclusive growth* path in the country, which enhance economic performance of the laggard states. In a large country like India, the rates of growth across the regions are markedly different. This is true for both the overall income per capita growth as well as sector-specific growth across the states. While the high-income states have typically led the Indian growth story with their high growth rates (given their infrastructure capacity and investment advantage), it is recognized that uneven rapid growth brings in its fore disappointing outcomes in terms of progress against poverty as well as other dimensions of well-being (Chaudhuri and Ravallion 2006).

Recent policy focus in India has encouraged the development of core public services (through development expenditure for water, transport, healthcare, etc) especially in the poor and special status states. It is pertinent to evaluate whether such public expenditure has helped in alleviating inequality and triggered structural change in the poorer states. It is perhaps more critical to understand which economic sectors have been the most significant in driving regional inequality over the years and how these sectors have impacted economic growth.

In India, despite a planned approach to economic development since the fifties, the emergence of increasing inequalities in state incomes and sectoral activities began to raise serious concerns (Dholakia and Dholakia 1980, Das and Barua 1996). During the early 1990s, as the country implemented reforms to move towards open-economy growth path along with increasing de-centralization, a new question was raised on the impact of liberalization in regional disparity in India. While most studies have shown that the post-reform period has failed to reverse regional disparity (Bhattacharya and Sakthivel 2004, Kalirajan et al 2009), a recent study (Barua and Chakraborty 2010a) observed that high income states have gained in terms of manufacturing sector and trade with liberalization, and hence regional inequality has increased further. The structural transformation in the laggard states requires systematic infrastructural development that would be able to support and encourage greater economic activity.

It is well-established that the structural transformation of an economy during development is intrinsically determined by the initial economic conditions and accompanying investment, regulatory and institutional policies. While the growth maximizing composition of public and private investment is not unique, and depends on the level of infrastructure and development of a region, it is important to note that in India, the expenditure of the state governments has been increasingly dominated by revenue expenditure, which accounts for general functioning expenses of the government.[1] Moreover, the State government capital expenditure as a

[1] During 1980-85, revenue expenditure constituted about 69.5% of total state expenditure, while capital expenditure constituted 30.5% (and capital outlay was 13%). Over the years, revenue expenditure grew at a compound rate of 15% annually during 1980-81 to 2009-10; while capital expenditure grew at a rate of 12.4% during the same period. (RBI 2010: 74). During 2005-10 about 78% of total state expenditure was revenue expenditure, while capital expenditure constituted the residual 22%.

percentage of state GDP on average declined during the 1980s and 1990s, while revenue expenditure increased during the same period. In particular, within capital expenditure, the component of capital outlay, which is indicator of state investment activity,[2] as a share of state GDP declined in the 1980s and 1990s, from 2% in 1980-85 to 1.4% in 1995-2000, and began pick up in the 2000s, particularly sharply since 2002-03, and now stands at 2.4% (RBI 2010: 73 and 78).

A more broad-based measure of state capital investment is the *development* expenditure that covers economic as well as social services, with the potential to impact capacity to produce as well as quality of life directly[3]. On average, the *development* expenditure as percentage of state domestic product in India witnessed a declining trend during 1980-2004, but has witnessed an increase in more recent years (2005-2010) across several states, especially in special category states of Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Sikkim, Tripura, and Uttarakhand, and non-special category states like Bihar, Madhya Pradesh, Uttar Pradesh and Orissa, those with per capita income below the national average.[4]

In this paper we examine the relationship between regional disparity and economic structure orientation across 31 states and union territories during the last three decades (1980-81 to 2008-09), and the significance of state capital expenditure/ development (economic and social) expenditure in the performance of the Indian states. We also control for the special status states (where the government provides economic incentives to encourage manufacturing orientation in the state), to test whether the special status has succeeded in reducing inequality or impacting the manufacturing orientation of the states.

In examining the relationship between economic performance and investment we draw on some of the seminal growth and planning models that addressed the allocation of investment to maximize the overall rate of economic growth with differentiated capital namely, manufacturing versus infrastructure, and economies with regional disparity. Section 2 is a brief literature review on the significance of public investment in economic growth; section 3 outlines the structural model estimated and the data sources; section 4 gives the results of our estimation exercises; and section 5 concludes.

2. Theoretical Underpinning and Empirical Studies

[2] Capital outlay covers expenditure on social and economic services (including public works, water, sanitation, housing, etc, under the former and agriculture, industry, irrigation, transport, communication, etc under the latter).

[3] Development expenditure comprises expenditure on social services (e.g. education, sports, art and culture, medical and public health, family welfare, water supply and sanitation, housing, urban development, welfare of Scheduled Castes, Scheduled Tribes and other Backward Classes, social security and welfare) and economic services (e.g, agriculture and allied activities, rural development, special area programmes, major and medium irrigation and flood control, energy, industry and minerals, transport, communications, science, technology and environment and general economic services. While non-development expenditure includes expenditure on general services including organs of the State, fiscal services, interest payments and servicing of debt, administrative services, pensions and miscellaneous general services

[4] It is interesting to note that the share of economic services in aggregate development expenditure of the States was higher than that of social services during the 1980s and 1990s. During the subsequent period, however, the average share of economic services in the aggregate development expenditure of the States was lower than that of social services.

Traditional economic development literature has always held savings and capital investment as critical to growth and to enhancing labour productivity. With the industrial sector being recognized as the leading sector in economic growth, the investment in manufacturing physical capital was recognized as critical in the early development literature. Experience in the industrial economies in the sixties and seventies, however, indicated that factor productivity could decline even in the face of manufacturing capital, implying that the latter was not sufficient to maintain high growth. In a seminal paper, Weitzman (1970) distinguished between two complementary forms of capital, namely the typical manufacturing capital versus overhead infrastructure capital, where investment in the latter exhibits increasing returns. Weitzman categorized overhead capital into *public service* capital (facilities for education, research, public health, etc) and *public utilities* (transportation, communication, power and water supply utilities) whose creation exhibit substantial economies of scale and involve lumpy costs.

Weitzman argued that, given the complementariy between the two forms of capital in output production, periodically the overhead infrastructure capital became the binding constraint in economic growth, such that the income trajectory exhibited phases of stagnant income and consumption where inventory-building took place to augment the infrastructure capital. More significantly, during the initial development stage, the productivity of conventional capital as well as average cost of infrastructure capital is higher than in later stages of development, and the optimal growth path required periodically switching investment from conventional capital to infrastructure capital in order to provide a "big push" to income growth capacity. Weitzman observed that the time period of no-growth stagnant income-consumption during the building of infrastructure capital is likely to be more the lower the stage of development of an economy.

In one of the early empirical support to the significance of public investment, Aschauer (1989) observed that declining public capital investment can explain much of the decline in U.S. productivity during the 1970s. Aschauer's study highlighted that public investment decisions, especially increase in the stock of non-military structures such as highways, streets, water systems, and sewers, are important for economic growth and productivity improvement, and noted that in the US, the fall-off in productivity growth was matched or slightly preceded, "by a precipitous decline in addtions to the net stock of public nonmilitary structures and equipment."

The Weitzman model and Aschauer's empirics pertained to a region with uniformity, faced with the goal of maximizing output and welfare. The challenge to maximize wealth for a multi-sector developing country with regional income disparity was addressed by Rahman (1963) and Dorfman (1963), who showed that the optimization exercise needs to balance across sectors and regions. Optimality in these models required that capital be allocated to the region with the highest internal rate of growth (ratio of savings rate to capital productivity), and in a long enough planning period a less productive region could be favoured for investment for a number of initial years if it had a relatively large savings rate such that loss of income from investing in less productive region was offset by the savings generated during those initial years.

The problem of regional disparity in developing countries like India in particular, began to emerge as a serious concern within three decades of planned economic growth. Despite planned efforts to nurture industrial development with the Mahalanobis model, under a protected

environment, by the end of the seventies it was apparent that all was not well. Protection did not lead to healthy (efficient) industrial growth, and increasing inequalities in state incomes and sectoral activities was apparent (Dholakia and Dholakia 1980, Das and Barua 1996). The persistent regional income inequalities in India were found to be significantly accounted for by the differences in the infrastructure capacity particularly for the lower income states among other factors[5] (Nagraj et al 1998, Bandopadhyay 2002). Following the Weitzman, Rahman and Dorfman models, this suggests that an efficient policy needs to target public investment toward specific infrastructures in states that offer the highest pay-off in terms of growth.

The major regime shift of deregulation and liberalization implemented during the early-1990s in India, raised a new question on the impact of openness on regional disparity/ convergence in India. Several studies suggests that the post-reform period seems to have been unable to reverse the regional disparity (e.g. Bhattacharya and Sakthivel 2004, Kalirajan et al 2009), and that regions have witnessed an increased inequality through concentration of manufacturing and trade (Barua and Chakraborty 2010a). The latter study observed that the high income states, with better infrastructure capacity, gained in terms of manufacturing and trade with liberalization, and hence regional inequality has increased further.

A distinction between the sectoral compositions of output growth across states during 1991-2005, however, revealed a more nuanced phenomenon with respect to openness, structural change, and per capita income (Barua and Chakraborty 2010). The study suggested that the poorer states in India have exhibited higher growth in service-orientation compared to manufacturing orientation. However, it remains to be seen how the trend in inequality and sectoral bias have indeed affected structural change across the states in India.

3.1 The Econometric Model

In examining the structural change witnessed across the regions in India, we consider the Chenery-Syrquin model that was used in a cross-country growth analysis for income and disaggregated sector orientation. Here the different regions are the states and union territories of India, as opposed to countries, but the essential arguments remain the same. The Chenery-Syrquin model postulated that along the growth path of an economy, the share of the leading sector, namely manufacturing, grows along with the per capita income of the region and population size and any other relevant data (capital inflow, trade, etc). By extension of this logic, in case the service sector output happens to be the more important sector, then service output-orientation of a region would increase with per capita income and population In particular they formulated a semi-log function (S-type function) as follows:

$$x_{it} = \alpha_i + \beta_1 \ln y_{it} + \beta_2 (\ln y_{it})^2 + \gamma_1 \ln N_{it} + \gamma_2 (\ln N_{it})^2 + \delta D_l \qquad (1)$$

Where x is the dependent variable, (manufacturing output share in Net State Domestic Product (NSDP), or service share in NSDP); α_i is the region specific effect, y_i is the per capita NSDP, N_{it} is the population of the state, and D_l is dummy for time. In our case, we use the latter as a dummy for separating two time-periods, pre-1995 and post-1995 to mark the deregulation and

[5] Other factors included in the regression of various studies included production structure, capital expenditure, fiscal deficit, education, etc.

liberalization policy regime in effect in the later period (although the policies were gradually put into effect since the early 1990s and some late 1980s, 1995 marks the year when WTO came into effect, and hence a reasonable benchmark year).

3.2 Data

The state output data, disaggregated by component sectors namely, agriculture, primary, manufacturing (further classified as registered and unregistered manufacturing), infrastructure and services, have been sourced from the National Accounts Statistics of Central Statistical Organization. While the CSO data series at constant prices for the years 1980-81 through 2008-09 are available in different base year prices (1980-81 prices, 1993-94 prices, and 1999-2000) we have converted all output data to a common base of 1993-94. The output data for 31 Indian regions correspond to 27 states and 4 union territories are the Net State Domestic Product (NSDP) in Rs crores. The time period covered in the analysis spans over the three decades (29 years), during which the new states of Chhattisgarh, Jharkhand, and Uttarakhand were formed and incorporated as new entities since 1993-94 in the CSO database.

Since the newer states were carved out of existing states, during the period of our analysis, the per capita values of output and development expenditure become more appropriate rather than aggregate values. We thus construct and use Theil indices and ratios for the analysis of regional disparity, since they are size-independent and provide the most apt measures in this case.

The trade data has been taken from India Trades Database of the Centre for Monitoring Indian Economy (CMIE) and Directorate General of Commercial Intelligence and Statistics. Trade corresponding to the 2-digit HS code (01 to 99) was used to construct the regional trade estimates. A state's manufacturing (agricultural) export in India's total manufacturing (agricultural) export is taken to be in the same proportion as its manufacturing output in the country's total manufacturing output. The construction of state imports of manufacturing (agricultural) output is based on the assumption of homothetic preferences. (see appendix of Barua and Chakraborty 2010 for details) The trade data covers the period from 1990 through 2005.

The state capital expenditure and per capita state development expenditure data have been taken from the Reserve Bank of India publication. We use the annual state capital expenditure to estimate the Chenery-Syrquin model. The state development data is available only for 27 states, and was available in 5-yearly average series beginning 1980-84 through 2005-2010 (the last period averages span less than five years). We use the 5-yearly average state development expenditure in estimating the elasticities with respect to the different sector inequalities. The combined data of trade, capital expenditure and output however, covers the period 1990 to 2005, and some regions were also dropped due to missing data. The region covered for the pooled data analyses are indicated in the summary results reported in the tables.

4. Estimations

In analyzing the structural relationship between regional inequality, openness and public development investment, we begin by first checking for the overall trends in regional disparity in

India in terms of state output as well as the different sectoral outputs, measured in terms of Theil indices. Next, we evaluate the compositional significance of the NSDP Theil indices to determine to what extent each of the component sectors are driving regional inequality in India. Third we estimate the Chenery-Syrquin structural relationship between manufacturing-orientation (as well as service orientation) as determined by state per capita income, population, and per capita state development expenditure, while controlling for the pre-reform and post-reform period. Finally, we estimate the elaticities of regional inequality with respect to per capita state development expenditure inequality and liberalization.

4.1 Regional inequality trend during 1980-2008

While several studies have noted the increasing regional inequality in India since the 1980s, we check for the pattern of regional inequality until more recent years with our extended data-base spanning over 29 years. Our regional coverage is also far greater, since we considered 31 regions (27 states and 4 union territories). Since the regions vary largely in size, we choose the measure of Theil index which is size-independent and reveals the relative position of a region in the sample. The country-level Theil index of inequality for any economic activity is defined as

$$E_x = \sum_i x_i \log\left(\frac{x_i}{p_i}\right) \qquad (2)$$

Where x_i is the share the i^{th} region in total economic activity (aggregate output, or sector specific outputs from agriculture, manufacturing, services, etc), and p_i of the i^{th} region's share in total population. Consequently, E_x measures the entropy of inter-regional inequality in the corresponding economic activity, and $E_x = 0$ corresponds to perfectly equal distribution.

We would like to note here that since x_i / p_i represents the relative position of the i^{th} region, we also utilize these Theil ratios in our analysis in order to capture region specific structural relationships with other variables or indices of interest.

While traditionally, economic activities are classified under three categories of agriculture and allied (primary), manufacturing, and services, we consider a different aggregation of economic activities from the CSO data to yield finer categorization to represent agriculture, primary, registered manufacturing, unregistered manufacturing, infrastructure (including transport, communication, construction, gas, electricity), and services (including banking, insurance, public administration, real estate, hotels, restaurants).

The country-wide measures of inequality in aggregate output (NSDP), and sector specific outputs including agriculture, manufacturing (registered and unregistered), infrastructure and services for the last three decades are reported in Table 1. Regional inequality has been consistently increasing through the years in NSDP and agriculture, while in all the other component sectors inequality has increased with variation during some years. For example, manufacturing inequality began to dip in the 1980s, but then began to rise in the 1990s (see Table 1).

Table 1. Theil Index of Inequality of 31 Indian regions, 1980-2008

(using data in 1993-94 prices)

Year	*NSDP*	*Agriculture*	*Primary*	*Regd Manufacturing*	*Unregd Manufacturing*	*Manufacturing*	*Infrastructure*	*Services*
1980	0.058	0.036	0.705	0.379	0.239	0.282	0.117	0.107
1981	0.059	0.045	0.603	0.344	0.240	0.262	0.122	0.105
1982	0.061	0.048	0.554	0.324	0.217	0.248	0.132	0.109
1983	0.057	0.040	0.546	0.322	0.231	0.247	0.131	0.104
1984	0.059	0.038	0.578	0.307	0.251	0.250	0.132	0.100
1985	0.063	0.040	0.571	0.331	0.225	0.261	0.132	0.108
1986	0.062	0.040	0.564	0.353	0.218	0.269	0.129	0.106
1987	0.064	0.045	0.530	0.288	0.226	0.236	0.134	0.103
1988	0.065	0.047	0.489	0.286	0.222	0.237	0.132	0.101
1989	0.074	0.050	0.506	0.287	0.197	0.234	0.141	0.104
1990	0.071	0.044	0.453	0.310	0.198	0.245	0.133	0.102
1991	0.077	0.053	0.391	0.300	0.193	0.237	0.140	0.117
1992	0.092	0.059	0.380	0.330	0.222	0.271	0.148	0.123
1993	0.092	0.055	0.634	0.321	0.241	0.269	0.150	0.136
1994	0.094	0.056	0.639	0.308	0.237	0.262	0.159	0.140
1995	0.104	0.063	0.610	0.326	0.247	0.276	0.160	0.153
1996	0.102	0.063	0.603	0.322	0.249	0.278	0.163	0.151
1997	0.108	0.065	0.629	0.325	0.222	0.265	0.177	0.159
1998	0.111	0.061	0.604	0.367	0.251	0.294	0.171	0.162
1999	0.112	0.064	0.596	0.329	0.283	0.280	0.158	0.170
2000	0.113	0.074	0.605	0.304	0.286	0.274	0.172	0.170
2001	0.118	0.067	0.530	0.317	0.287	0.285	0.171	0.174
2002	0.120	0.065	0.590	0.333	0.303	0.295	0.172	0.182
2003	0.126	0.076	0.594	0.336	0.293	0.293	0.186	0.186
2004	0.130	0.070	0.609	0.343	0.301	0.300	0.194	0.192
2005	0.142	0.079	0.561	0.379	0.464	0.315	0.153	0.206
2006	0.143	0.068	0.606	0.410	0.457	0.322	0.151	0.214
2007	0.153	0.080	0.669	0.415	0.467	0.315	0.139	0.229
2008	0.142	0.089	0.886	0.450	0.694	0.358	0.143	0.175

We fit both linear and non-linear trend equations to the inequality indices to examine which provides for a better fit in the behavior of regional disparity in India during the last three decades. Table 2 summarizes the linear trend estimations, and Table 3 summarizes the non-linear trend in the inequality indices.

Table 2. Linear trend in the Theil Inequality Indices, 1980-2008

Sector	***Average Annual trend***	***t-value***	***R^2***
NSDP	0.35	27.21***	0.96
Agriculture	0.15	15.34***	0.89
Primary	0.38	1.94*	0.12
Manufacturing	0.27	6.59***	0.62
Registered Manufacturing	*0.23*	*2.97****	*0.25*
Unregistered Manufacturing	*0.89*	*5.11****	*0.49*
Infrastructure	0.17	5.32***	0.51
Services	0.43	13.96***	0.88

***Significant at 1% level , * significant at 10%

The linear trend in the Theil inequality index is significant for all economic activities, (though less significant for the primary sector, see Table 2). The nonlinear trend, however, is a better fit for all the Theil indices, although significant non-linear time coefficients are seen for only NSDP, unregistered manufacturing, infrastructure and services.

Table 3. Non-linear trend in the Inequality Indices, 1980-2008

Sector	***Constant***	***Year***	***$Year^2$***	***$Year^3$***	***Adjusted R^2***
NSDP	0.057 (15.41)***	-0.0007 (-0.69)	0.0003 (3.39)***	-5e-6 (-2.80)***	0.98
Agriculture	0.039 (9.95)***	0.0003 (0.27)	7.72e-5 (0.90)	-1.3e-6 (-0.68)	0.89
Primary	0.669 (10.29)***	-0.029 (-1.58)	0.001 (1.13)	-1.9e-5 (-0.59)	0.33
Manufacturing	0.273 (25.95)***	-0.006 (-2.02)	0.0004 (1.75)	-4.2e-6 (-0.83)	0.82
Registered Mnftg	*0.356* *(19.25)****	*-0.006* *(-1.20)*	*9.07e-5* *(0.22)*	*7.37e-6* *(0.83)*	*0.69*
Unregistered Mnftg	*0.26* *(6.50)****	*0.014* *(1.56)*	*-0.002* *(-2.68)***	*6.29e-5* *(4.16)****	*0.88*
Infrastructure	0.132 (17.61)***	-0.004 (-2.04)	0.0006 (4.07)***	-1.7e-5 (-4.86)***	0.80
Services	0.120 (14.37)***	-0.008 (-3.32)**	0.0008 (4.64)***	-1.6e-5 (-4.09)***	0.94

Figures in parentheses are the t-values
***Significant at 1% level; ** significant at 5% level

4.2 Output Inequality and the Component Sector Inequalities

In order to gauge which components are significant in the trend of regional inequality exhibited over the three decades, we regress the NSDP Theil index on the different sector Theil indices. Tables 4 gives the results.

T**able 4. NSDP Theil Inequality Index regressed on sectoral Theil indices, 1980-2008**

	Coefficients	*Standard Error*	*t Stat*	*Other Statistics*
Intercept	-0.04	0.01	-4.43**	R^2= 0.986
Agriculture Inequality	0.83	0.12	6.88**	Obs = 29
Primary Inequality	-0.02	0.01	-1.81	
Manufacturing Inequality	0.14	0.06	2.33*	
Services Inequality	0.42	0.05	8.82**	

******Significant at 1%, * significant at 5%.

We find that the components of agricultural inequality and service sector inequality have contributed most significantly to regional output inequality during the last three decades, and are the most important factors in regional output inequality of India. Manufacturing inequality is also significant, seems less important in the contribution to the increasing regional inequality. One reason for the relative importance of services inequality over manufacture (in terms of magnitudes of the coefficients) could be that services output has been growing more rapidly than manufacturing output in India during the last decade or so, where the growth is led by higher income states thereby accentuating pre-existing inequality.

4.3 Regional inequality, liberalization and state development expenditure

While the above trend analysis of regional inequality tracked the pattern for the country as a whole, it is interesting to ask how the group of poor versus richer regions fared with the change of trade regime. Although the liberalization reforms began earlier than 1995, we consider the latter year as the benchmark year since the WTO came into effect and the regime implemented in India was by far more liberal than before. We also control for poor special status states, versus the rest of the regions. We regress the Theil ratios of NSDP (agriculture, manufacturing, registered manufacturing, unregistered manufacturing, and services) on liberalization (dummy), Theil ratio of State Development Expenditure, and poor/ special state status (dummy) to determine their respective elasticities.

Interestingly, we find that liberalization had no significance impact on any of the sector inequalities (see Table 5). However, lower inequality in state development expenditure lead to lower inequality in NSDP, agriculture, unregistered manufacturing, and services. In the poor and special status states, however, inequality increased in all fronts. This implies that although state development expenditure can help in reducing inequality, the poor states (Bihar, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh) and special status states (Arunachal Pradesh, Assam, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Sikkim, Tripura) have not been able to overcome their structural challenges with the state development expenditure. It is important to recall here that economic component of the state development expenditure has reduced, which has immediate implications in terms of direct economic capital building. While social investment is important and complementary to economic investment, the lower priority of economic investment has led to the inefficacy of increasing state development expenditure in recent years.

Table 5. Elasticity of Inequality Ratios with State Development Expenditure Inequity and Openness, 1980-2008 (27 states)

	Intercept	*Liberalization*	*Ln(Devt ExpendTheil)*	*Special/Poor State*	R^2	*F Statistic*	*Obs.*
ln(NSDP inequalityTheil Ratio)	0.226 (6.21)***	0.055 (1.49)	0.363 (11.18)***	-0.584 (-15.20)***	0.68	104.59	149
Ln(Agriculture Inequality Theil Ratio)	0.157 (3.68)***	0.036 (0.83)	0.208 (5.47)***	-0.27 (-5.94)***	0.28	19.03	149
Ln(Manufacturing Inequality Theil Ratio)	0.400 (3.37)***	0.130 (1.07)	-0.064 (-0.60)	-1.56 (-12.42)***	0.53	53.5	149
Ln(Regd Manufacturing Inequality Theil Ratio)	0.39 (2.09)**	0.13 (0.67)	0.007 (0.04)	-1.837 (-9.27)***	0.38	29.28	149
Ln(Unregd Manufacturing Inequality Theil Ratio)	0.365 (3..42)***	-0.08 (-0.73)	0.26 (2.73)***	-1.37 (-12.15)***	0.51	50.08	149
Ln(Services Inequality Theil Ratio)	0.215 (5.00)***	0.008 (0.19)	0.446 (11.63)***	-0.598 (-13.20)***	0.65	90.42	149

Liberalization dummy = 1 for 1995-2008.

Special/Poor State dummy = 1 for the special states of Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Nagaland, Sikkim, Tripura, and Uttarakhand, and non-special states of Bihar, Chattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and Uttarakhand

Figures in bracket below the estimated coefficients indicate the t-statistic.

***Significant at 1%, ** significant at 5%

4.4 Growth Rate, Sectoral Inequality and Trade

We now turn to examine how regional inequality in agriculture and manufacturing has affected the growth rates of aggregate output and regional output over the three decades, 1980-2008.

The regression of the year-on-year growth rate of the Indian economy on the Theil index of agriculture indicates the inequality in the agricultural sector has led to significant loss of growth for the country. Similarly, regional inequality in the manufacturing has led to significant loss of national output growth (see Table 6).

Table 6. Growth Rate of the Indian Economy and Sector Inequality, 1980-2008

Year-on-year growth on agricultural inequality		*Year on year growth on manufacturing inequality*	
	Coefficient *(t-statistic)*		Coefficient *(t-statistic)*
Intercept	0.222 (2.9)***	*Intercept*	0.478 (3.52)***
Theil Index of Agriculture	-3.205 (-2.50)***	*Theil Index of Manufacturing*	-1.564 (-3.28)***
R^2	0.18	R^2	0.28
No. of Observations	29	No. of Observations	29
$F_{1, 27}$	6.24	$F_{1, 27}$	10.73

***Significant at 1%.

While the above gives us the macro-relationship between growth rate and regional inequality, we considered the regional output data to estimate the relationship between growth rate and inequality at the micro-level. We consider the average 5-yearly growth rates of the different regions and regress on first, manufacturing inequality (now measured in Theil ratios to retain regional identity) and then trade inequality (state Theil ratios). The results from the Fixed Effect models are summarized in Table 7.

Table 7. Average Regional Growth Rate, Sector Inequality, and Liberalization 1980-2008

Average 5-yearly state growth on manufacturing inequality		***Average 5-yearly state growth on trade inequality***	
(Fixed Effect Model)	Coefficient *(t-statistic)*	(Fixed Effect Model)	Coefficient *(t-statistic)*
Intercept	0.0469 (12.14)***	*Intercept*	0.041 (6.38)***
Liberalization Dummy	0.0105 (2.77)***	*Liberalization Dummy*	0.017 (2.84)***
Average Theil Ratio of manufacturing of region	0.0078 (2.75)***	*Average Theil Ratio of Trade of region*	0.001 (2.32)***
R^2		R^2	
within	0.127	within	0.206
between	0.161	between	0.289
overall	0.126	overall	0.185
No. of Observations	162	No. of Observations	80
No. of regions	27	No. of regions	20
$F_{2,133}$	9.67	$F_{2,58}$	7.55

***Significant at 1%.

While inequality in agricultural and manufacturing sector led to loss of potential growth at the country level, we notice that at the state level the dynamics are different. States with relatively higher proportion of manufacturing output (or trade orientation), as measured by the Theil ratios, enjoyed higher rates of NSDP growth (significant positive coefficients, see Table 7). The post-reform period witnessed higher growth rates across the regions.

So while we earlier found that liberalization had no significant effect on regional inequality in India (recall Table 5), it did bring in higher growth rates among the richer states, which could reap the gains from trade more effectively.

4.4 Augmented Chenery-Syrquin Structural Equations

So far we have established that regional inequality increased over the last three decades, and that the inequality helped the richer states gain from the liberalization regime and enjoy even higher growth of their NSDP. It is now left to determine the structural change across regions due to liberalization, trade and state capital expenditure. The regression results (Fixed effect model and Random Effect Model) for the manufacturing orientation of states are reported in Table 8.

Table 8. Structural Change for Share of Manufacturing in State Output, 1990-2005

Fixed Effect Model		***Random Effect GLS Model***	
	Coefficient		*Coefficient*
Intercept	-5.205 (-2.31)**	Intercept	-0.124 (-0.14)
lnY	0.144 (0.82)	lnY	0.322 (2.22)***
$(lnY)^2$	-0.009 (-0.93)	$(lnY)^2$	-0.013 (-1.65)*
lnPop	0.689 (3.2)***	lnPop	-0.195 (-2.4)**
$(lnPop)^2$	-0.024 (-0.39)	$(lnPop)^2$	0.006 (2.48)**
Liberalization Dummy	0.004 (0.92)	Liberalization Dummy	-0.008 (-1.52)
ln(TheilRatioCaptExp)	-0.002 (-0.39)	ln(TheilRatioCaptExp)	-0.008 (-1.34)
Special State Dummy	-	Special State Dummy	-0.069 (-4.11)***
Share of trade	0.062 (2.27)**	Share of trade	-0.066 (-2.81)***
R^2 within between overall	 0.11 0.01 0.009	R^2 within between overall	 0.003 0.629 0.58
No. of Observations	262	No. of Observations	262
No. of regions	19	No. of regions	19
$F_{7,236}$	4.27	Wald Chi-square (8)	117.88

***Significant at 1%, ** significant at 5%, *significant at 10%
Liberalization dummy =1 for the years 1995 and later;
Special State dummy = 1 for the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, and Tripura in this panel dataset.

Although the Hausman test indicates that the Fixed Effect model is a better fit to our panel data, the Random Effect model yielded better coefficient significance, and thus we have reported both estimation results. It is noteworthy that both models indicate that liberalization and state capital expenditure (measured as inequality Theil ratios) have no significant effect on the manufacture-orientation of the states. However, manufacturing orientation of Special Status states declined over the years. The trade factor seems to have significantly positively affected manufacturing orientation of states (in the fixed effect model).

Thus richer states gained from liberalization in terms of growth rate (result in Table 7), and experienced greater manufacturing orientation as well. In other words, trade certainly seems to have played the catalytic role of increasing manufacturing share and growth rate for the richer states. Figure 2 illustrates this aspect by plotting the manufacturing orientation of states against their per capita income, which is a convex curve indicating that richer states witnessed sharper rise in manufacturing orientation over time.

Table 8. Structural Change equation for Share of Services in State Output, 1990-2005

Fixed Effect Model		***Random Effect GLS Model***	
	Coefficient		*Coefficient*
Intercept	11.872 (4.30)***	Intercept	5.90 (3.16)***
lnY	-0.318 (-1.47)	lnY	-0.168 (-0.86)
$(lnY)^2$	0.018 (1.51)	$(lnY)^2$	0.010 (0.96)
lnPop	-1.178 (-4.47)***	lnPop	-0.582 (-3.25)***
$(lnPop)^2$	0.34 (4.40)***	$(lnPop)^2$	0.017 (3.16)***
Liberalization Dummy	0.013 (2.59)***	Liberalization Dummy	0.013 (2.41)**
ln(TheilRatioCaptExp)	0.003 (0.46)	ln(TheilRatioCaptExp)	0.003 (0.6)
Special State Dummy	-	Special State Dummy	0.049 (1.08)
Share of trade	0.098 (2.94)***	Share of trade	0.080 (2.88)***
R^2 within between overall	 0.517 0.083 0.115	R^2 within between overall	 0.50 0.12 0.18
No. of Observations	262	No. of Observations	262
No. of regions	19	No. of regions	19
$F_{7,236}$	36.03	Wald Chi-square (8)	221.6

***Significant at 1%, ** significant at 5%, *significant at 10%
Liberalization dummy =1 for the years 1995 and later;
Special State dummy = 1 for the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, and Tripura.

In Table 8 we report similar exercises (Fixed effect and Random Effect models) of the structural model estimations for services-orientation of regions. In both estimations, liberalization and

trade have significant positive effect on the service-orientation of the regions. So, while liberalization did not have any significant impact on manufacturing orientation of the states, it did have a significant positive impact in enhancing service-orientation. Also, special status states seem to have gained in services orientation (positive coefficient), although not significantly. As in the case of manufacturing, however, state capital expenditure had no significant effect on services orientation. Figure 3 at the end of the paper gives the plot of service-orientation of states against per capita income, and it illustrates the increasing orientation among richer states.

Although we have not reported the structural estimations of agricultural orientation, we have included the graph of the plot at the end of the paper (Figure 1). As expected agricultural orientation has declined over time and over higher per capita income states (the traditional structural change expected as economies develop from agrarian entities towards manufacturing orientation and then services).

5. Concluding Observation

To begin with, our analysis reaffirms the increasing regional disparity in India and shows that even today the trend has not been broken despite a thrust on *inclusive growth* in the country. Public capital formation and investment in core services, provide a means of increasing productivity of existing resources, and encourage private investment. However, state developmental expenditure / state capital expenditure have failed to alleviate the position of the poorer and special status states. The poorer states continue to lose in terms of manufacturing orientation, and also overall output growth. Although the share of service-output seems to have increased, the growth has not been large to reverse the increasing divergence.

The structural deficiencies of the laggard states have also prevented them from gaining through liberalization and trade. Although liberalization has enhanced service-orientation of the Indian states, the gains were not substantial to reduce inequality. All in all liberalization has not had any significant impact on regional inequality (either per capita NSDP or component sector outputs) nor, on the manufacturing orientation of the states.

If the goal of inclusive growth in India is to be seriously pursued, the current role of public investment will not suffice. While, the state development expenditure seemed to have helped somewhat (as indicated by the elasticities with respect to inequality), they are not sufficient. The state developmental expenditure in social sectors are important, the deep structural deficiencies in the poorer states cannot be alleviated without more thorough economic sector investments, We feel that it is the deeper economic developmental investments that offer more meaningful payoffs through structural change and enhanced output per capita.

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Figure 1. Share of Agriculture in State Output and NSDP per capita

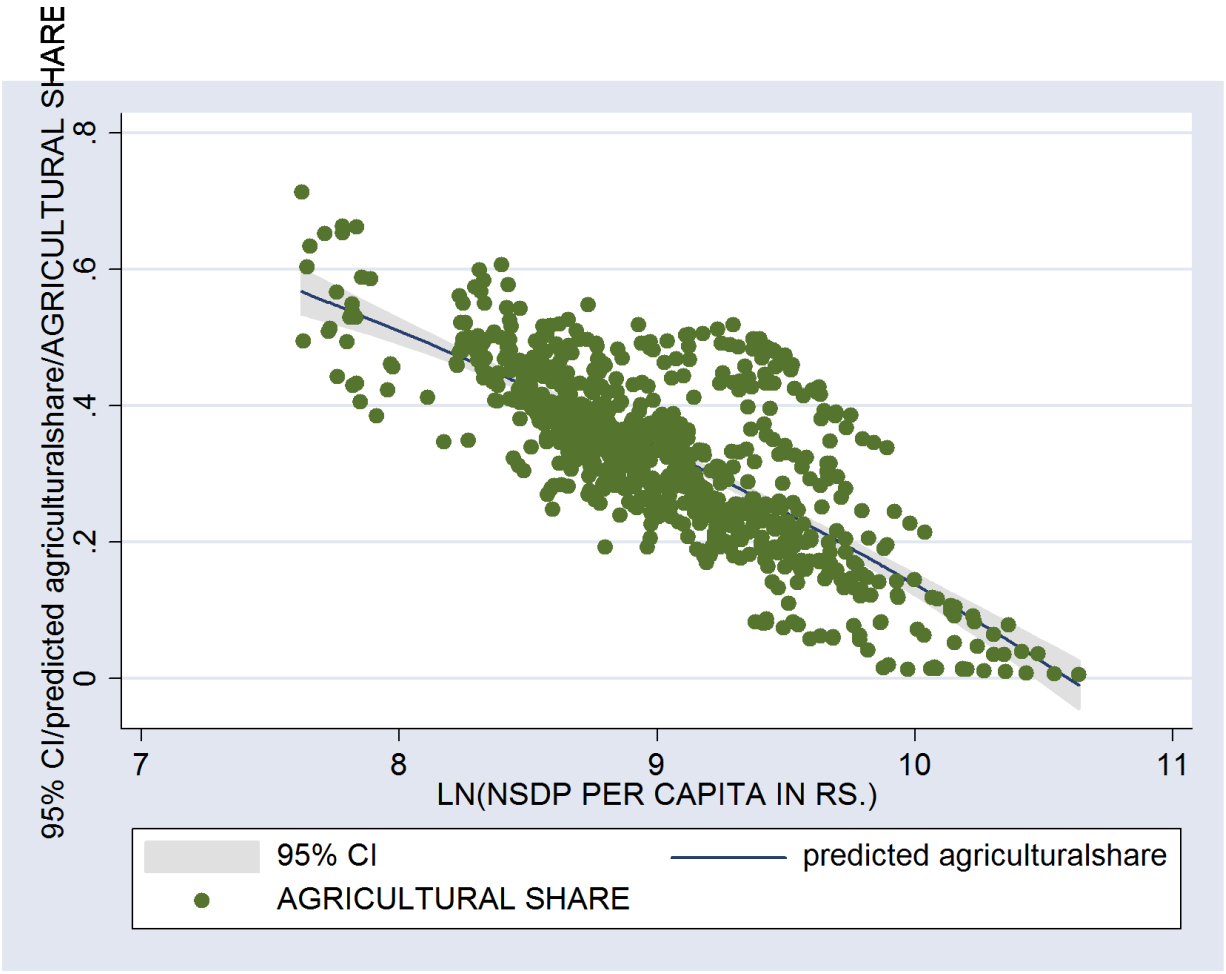

Figure 2. Manufacturing Share in State Output and NSDP per capita, 1990-2006

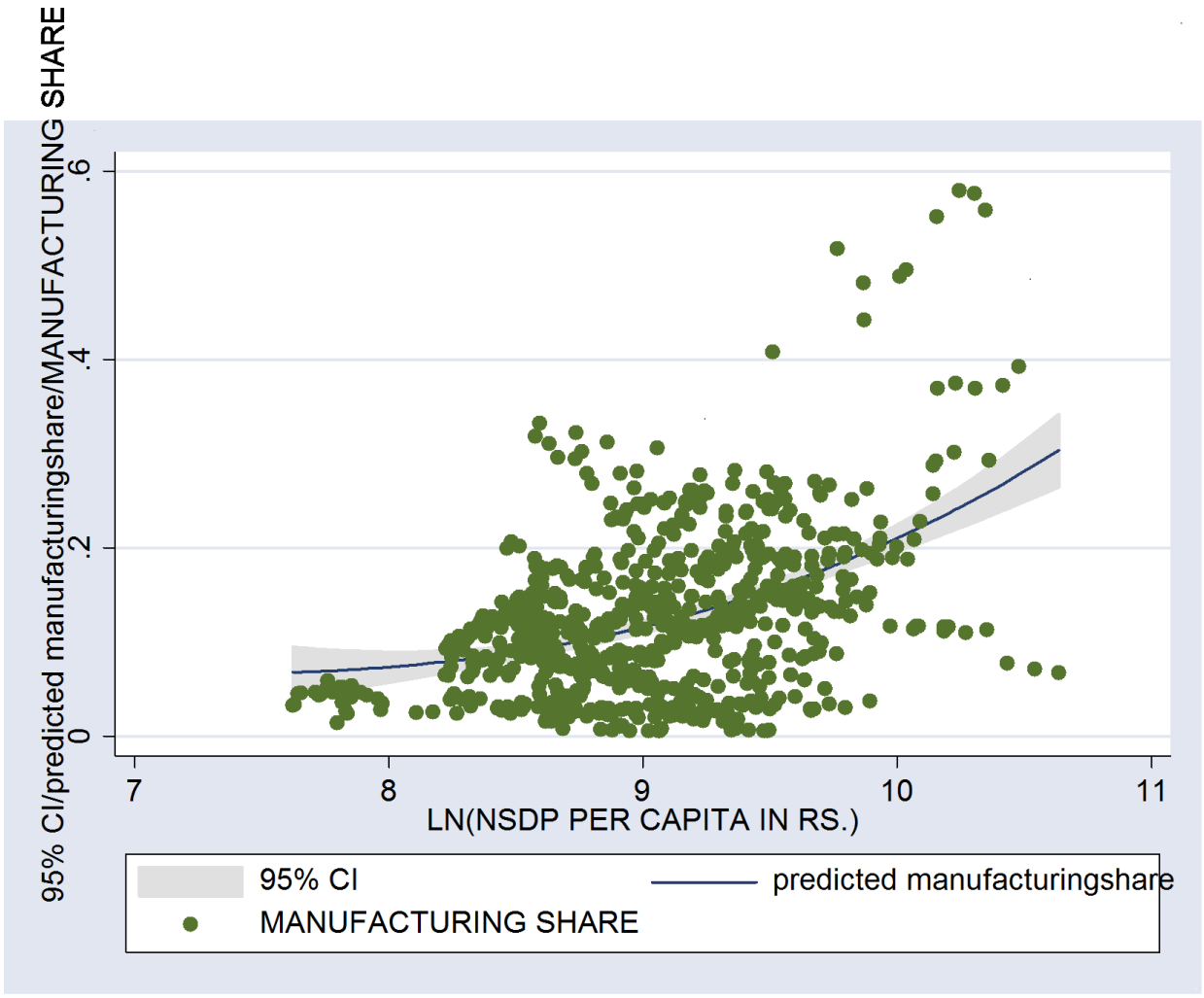

Figure 3. Services Share in State Output and NSDP per capita, 1990-2006