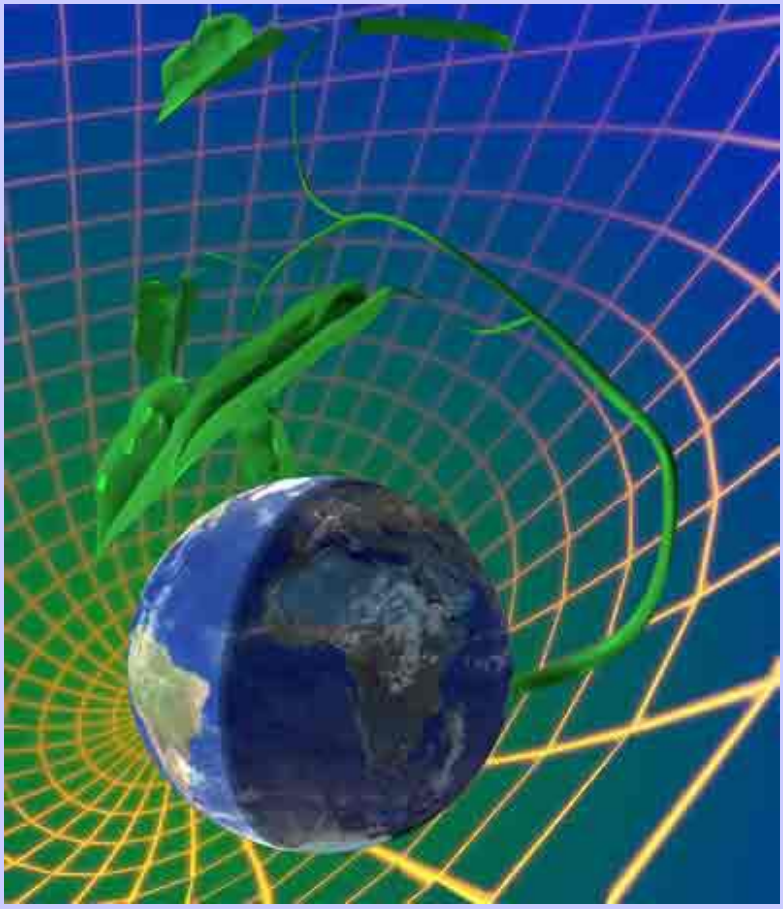
Regional Trade Openness Index, Income Disparity and Poverty

- An Experiment with Indian Data



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Acronyms

ASI	Annual Survey of Industries
CSOs	Civil Society Organisations
DGCI&S	Directorate General of Commercial Intelligence and Statistics
EU	European Union
GDP	Gross Domestic Product
GVA	Gross Value Added
HCR	Head Count Ratio
HDI	Human Development Index
NAFTA	North American Free Trade Agreement
NIC	National Industrial Classification
NSDP	Net State Domestic Product
PCNSDP	Real Per Capita Net State Domestic Product
PGI	Poverty Gap Index
PPP	Purchasing Power Parity
SCs	Schedule Castes
SDP	State Domestic Products
SPGI	Squared Poverty Gap Index
STs	Schedule Tribes
TFP	Total Factor Productivity
TFPG	Total Factor Productivity Growth
TOI	Trade Openness Index

Executive Summary

This study, "Mainstreaming International Trade into National Development Strategy: *A Pilot Project in Bangladesh and India"*, aims to examine how 'open' Indian states are with respect to international trade and uses the index of regional openness thus constructed to reflect on several aspects that affect the level of poverty in India, directly and indirectly. In this connection it should be noted that the estimation of the degree of openness is done for each state *vis-à-vis* rest of the world and not 'between' states in India, since it was difficult to have access to inter-state trade data. This means that even if one of the states produces an important intermediate commodity and another state processes it in favour of manufacturing an export commodity, the latter should be deemed more open to external trade as compared to the former.

Tracing the vertical (and in cases, horizontal) linkages in production and trade may therefore provides another possible method of capturing the degree of openness for each state *vis-à-vis* world trade. The construction of the present regional openness index within the geographic boundaries of a nation state is novel in the economic literature, and applications of this index in the Indian context provides new insights into several issues in growth and development, which has not been attempted so far.

Albeit the starting point in this analysis is the construction of the openness index as briefly described above, the main focus is in providing an account of the trade-poverty linkage in the Indian context. The poverty issue is in itself a subject of infinite interest and the purpose here is to evaluate the poverty situations in different states in India between 1980 and 2003 with the aid of the openness index. The broad purpose is to observe if state level trade openness, in the manner the concept is developed in this study, has any implications for the corresponding levels of poverty.

A major contribution of this project has been to construct and refine the index of regional or state-specific openness index in India typically because it is well known that international trade data for sub-national levels is not available. This is particularly a problem for countries that are large in size and have heterogeneous regions. Thus a starting hypothesis is the fact that opening up to international trade affects different regions within the same country disparately, depending upon their production matrix. In the absence of state level trade data, the study devises a proxy index, which allows it to rank states over time in terms of their exposure to trade. This index is potentially time variant and therefore is amenable to time series analytics. It is observed that the relative income of a region is closely related to the extent of openness and that such relationship gets stronger over time. It demonstrate that trade openness has contributed significantly to divergent income patterns across states in India.

The aftermath of trade liberalisation in India provides an ideal ground for applying these thoughtful experiments to practice with a focus on the three delicately inter-linked issues: the state of inter-regional disparity; the evolving employment patterns across industries; and the state level poverty dynamics. However, for the sake of comprehensiveness, the study dwells upon the evidence starting from 1980s, leaving ample ground for any relevant comparison between the pre- and post-reform years. The unifying thread between the first two issues, other than the openness index acting as a facilitator for all three, is the industrial classifications of different commodities produced in India and the changes at the industrial level – both in terms of output and employment. The methodology developed for this study is fairly general and may find similar applications in countries other than India.

1
Introduction

Traditional trade theories argue that the removal of trade barriers have impact on the industrial dynamics of a country depending on the factor intensities of these industries. As a country engages more and more in international trade, its factors of production will enter increasingly into the export sector, where their return is higher, compared to the import competing sector. The same thing can be envisaged at the regional level. Consequently, the states, which can attune their production structure to international demands, should earn higher than other states. Hence, the relative income of a region depends on the extent of openness to trade.

This study aims to examine how much 'open' Indian states are with respect to international trade and then assesses to characterise three related aspects: (1) trade openness and incidence, depth and severity of poverty at the state level (rural and urban); trade openness and income inequality at the state level (rural and urban); (2) trade openness and industrial employment across industry types (workers and employees); and (3) trade openness and regional disparity. It should be noted that this study focuses primarily on finding the inter-linkage between trade openness at the state level and its implications for poverty. However, the precursor for this and other related issues is the construction of trade openness index on which a substantial portion of the study is devoted.

Thus, construction of a workable openness index at the regional or state level becomes rather demanding since it is well recognised that international trade data are not easily available at the sub-national level. This is particularly a problem for countries that are large in size and have diverse heterogeneous regions. The methodology developed for this study is not only applicable to the Indian scenario but should also be useful for many countries where state level trade data are not available. The study devises a proxy, which allows it to rank states over time in terms of their exposure to trade. In other words, the level of openness existing in each state stands *vis-à-vis* the rest of the world and not in comparison to another state within the same nation.

Though the study discusses the effects of trade openness on poverty, inequality and employment at length, there is need to justify why it takes up the issue on regional disparity basis. For geographically large developing countries having disparate regions, it is essential to understand whether trade has an equalising impact or not. Unfortunately, there are not many papers that deal with intra-national inequality as dictated by the volume and nature of international trade. Available work on European Union (EU) where

countries are treated as regions is not as problematic as the one this study deals with, since in EU trade data is readily available for each nation.

The closest paper related to this study and dealing with the EU is by Egger, Huber and Pfaffermayr (2005), which extends the empirical literature on the effects of trade liberalisation on regional disparities within a country. In their study on the case of the Central and Eastern European countries, the authors found significant convergence of real wages in Poland and Bulgaria only. Furthermore, countries with faster growing export openness in the period 1991 experienced larger increases in their regional disparities. Despite apparent similarity with the issue in the present study, it should be noted that this paper *does not* use intra-national trade data, which consequently allows substantial differences in both idea and approach as developed here.

This study essentially focuses on the case where sub-national database is invoked to shed light on the state of regional disparity within the country in question. The sub-national openness index is used to find some relationship with inter-state variations in income – both at levels and as percentage changes. While the study does not intend to do any causality analysis, it aims to build up a case for such an analysis by looking at the correlation between an analytically constructed index and state level income measures.

This study is structured in a following manner while section I introduces the study, Section 2 provides a coherent literature survey on the close connections between economic or trade reform and poverty in India on trade and employment and finally on trade and regional disparity. Section 3 discusses two theoretical papers, which provide the backbone to the statistical methodology devised in this paper. Section 4 provides the data, detailed methodology and the openness index. Section 5 examines the relationship between the index and inter-regional income disparity. Section 6 discusses the use of regional Trade Openness Index (TOI) on observing growth of industrial jobs classified by industrial categories. Section 7 deals with the focal issue, i.e. the relationship between TOI and various estimates of poverty and inequality, while Section 8 provides conclusion.

2
Review of Literature

2.1 Economic Reforms and Poverty in India

Debates loomed large throughout the post-independence decades regarding the measures to capture the incidence and depth of income poverty in India and the policies most appropriate in lowering them thus measured. While the discourse reached some consensus in identifying the problems and the possible cures, however ambitious, the onset of the economic reforms in the early 1990s added a completely new dimension to the entire debate. The reforms clearly marked an important watershed in the economic history of the country, and which proliferated renewed interests in measuring poverty and inequality in the post-reform era. And yet, the causality between 'trade openness' in India and the measures of poverty seems relatively under-explored except for a few reliable studies produced in recent times.

High rates of gross domestic product (GDP) growth in the recent years have encouraged economists and policy makers to explore whether such growth has contributed to the reduction in poverty across states. Although rates of poverty in urban and rural areas have shown declining trends in general, the outcome varies considerably across states. Topalova (2005) argues that tariff reduction on importable commodities has not been effective in reducing the incidence and depth of poverty across districts in India with concentration of import-competing activities. Using a specific factor model of trade the study shows that in the presence of limited factor mobility, trade liberalisation caused to increase the extent of rural poverty in India. However, the increase in rural poverty was less striking in states that had more flexible labour market institutions. In a similar vein (also considering product and labour market deregulations) and in connection with the effect of trade on poverty in India, Hasan, Mitra and Ural (2006) provide contradictory evidence to the impact of trade reform on poverty which is actually shown more visible in states with relatively 'flexible' labour market conditions.

Moreover, this is consistent with the position of Besley and Burgess (2004) though flexible labour market characteristics do have some exceptions. According to their results, Maharastra and Gujarat despite being not so flexible in terms of the conditions set out in this paper have shown impressive improvements. But more generally, studies on poverty in India categorically speak of various measures of poverty, of the connection between economic growth and poverty, of redistribution and poverty, of poverty and inequality and more recently – as this survey focuses on – of economic reforms and poverty. Since

the existing literature on each of these areas is extensive, the study would bypass all in favour of concentrating exclusively on the economic reforms and poverty related issues.

There is little doubt that the economic reforms since early 1990s have had significant impacts on the income and poverty levels in both rural and urban India. A number of recent empirical studies show that the percentage of poverty has declined both at the all-India and regional (States/UTs) levels.[1] The causes underlying such changes are diverse. Not surprisingly, the evolving relationships between poverty and inequality too have numerous interpretations, of which a notable contribution is available in Dreze and Sen (2002). Using an international poverty line of around US$1 per day at 1993 Purchasing Power Parity (PPP), it is estimated that about one third of the poor in the mid-1990s lived in India (Datt and Ravallion, 2002a). Therefore, what happens to the incidence of absolute poverty in India is quantitatively important to the world's overall progress in fighting absolute poverty.

In India, the decadal average growth rates for 1960s and 1970s were around 3.4 percent, implying per capita growth rates of about one percent. The growth rates in national output since the mid-1980s and in particular since 1993 have been appreciably higher on average than in the 1960s and 1970s. The growth rate in net national product per capita was 4.8 percent per annum between 1993-94 and 1999-00. It is widely believed that the reforms of the 1990s were instrumental in achieving higher growth. However, it is not clear how much India's poor have shared in those gains.

Before focusing on the 1990s and to the connection between economic reforms and poverty, a quick glance on the broader trends of growth rates and the incidence of poverty between 1960-2000, as presented in Datt and Ravallion (2002a, Table 1) seems relevant. They show that the poverty level has gone down considerably although the stagnation in the rural poverty level has in fact increased the rural-urban poverty ratio during these years. While this may be considered as a partisan look at the larger debate, other notions that also prevail strong are considered next. Essentially, a survey of some of the existing studies is meant to see if a consensus emerges regarding the direction and magnitude of changes in poverty as well as inequality estimates in the 1990s and the extent to which such changes can be attributed to the major policy elements of reforms in India.[2]

In fact, the general picture in the 1990s was quite contentious. This stands firmly in contrast to the broader consensus prevailing in the 1980s that poverty rates had fallen appreciably during the decade. In general, two visibly polar notions about the impact of reform on poverty dominate the literature, although there are also some studies that do not find clear evidence on the influence of economic reforms on poverty. One group strongly claims that poverty reduction in India in the decade of the 1990s have been summarily dismal. This group includes Ninan (1994, 2000), Dev (1995), Tendulkar and Jain (1995), Tendulkar and Jain (1995) and others. Ninan (2000) provides a re-estimate (following an initial estimate in 1994) of rural, urban and national level poverty trends in India.

It is claimed that, while rural, urban and overall national poverty levels in India recorded a significant decline during the pre-reform periods (1969-70 to 1990-91), during the post-

reform period (1991-92 to 1993-94), these negative trends have weakened or got reversed in terms of one or more poverty indicators – namely, Head Count Ratio (HCR), Poverty Gap Index (PGI) or Squared Poverty Gap Index (SPGI). Furthermore, majority of the 15 larger states in India that contributed positively towards overall poverty reduction in the pre-reform decades reported statistically insignificant poverty reduction rates in the post-reform period – Punjab and Haryana even reporting an actual increase in rural poverty.

A few other contemporary studies (Dev, 1995; Gupta, 1995; Tendulkar and Jain, 1995 and others), which might have been somewhat pre-mature in assessing the role of economic reforms on poverty, also note increases in both rural and urban poverty rates. Dev (1995) reports an increase in poverty rates during the 'first 18 months', after economic reforms were initiated in India. Tendulkar and Jain (1995) claim a sharp increase in rural poverty rates with a moderate rise in urban poverty rates during 1991-95, although the reforms were only 'indirectly' responsible for such a trend. Gupta (1995) believes that the losses incurred due to the emancipation of the traditional Indian economy has been moderate compared to the experiences of other developing countries, but the 'social' costs of such reforms were large enough to demand a 'corrective course'.

Later studies re-address the issue of effect of economic reform on poverty and find that in the second half of the 1990s rate of poverty reduction was significant, especially in the urban areas. Datt (1999), for example, shows that overall poverty reduction has been moderate despite significant reductions in urban poverty, mainly due to the stagnation in rural poverty rates. Datt and Ravallion (2002a,b) make more general observations that states with 'higher literacy, higher farm productivity, higher rural living standards, lower landlessness, and lower infant mortality' (2002 a, pp. 381) have gained relatively more from the pro-poor non-farm economic growth in India, compared to states without these attributes. Datt, Kozel and Ravallion (2003), further show estimates towards decline in poverty rates between 1994-2000 was reduced from 39 to 34 percent.

Sundaram and Tendulkar (2003b) provide a re-estimate of their earlier study (2003a) to observe that a clear and unambiguous decline in poverty between 1993-94 and 1999-00 tends to hold good, although the magnitude gets dampened by 7 to 10 percentage points, depending on the indicator and the population segment considered. Nonetheless, there is a stronger claim that the average annual reduction in poverty in India during the later half of the 1990s had been higher than that recorded during the ten-and-a-half years prior to 1993-94. However, within rural and urban areas, there could still be high incidences of poverty depending on the social groups under consideration. Sundaram and Tendlkar (2003c) report that during the decade of 1990s Scheduled Castes (SCs), agricultural labour (rural) and casual labour (urban) experienced declining trends in income poverty although Scheduled Tribe (ST) households continued to suffer.

A few other studies, notably by Deaton and Dreze (2002) find no support for sweeping claims that the 1990s have been a period of 'unprecedented improvement' or 'widespread impoverishment'. Nonetheless, they draw a number of lessons from their re-examination of the evidence on poverty and inequality in the nineties. First, they find consistent evidence of continuing poverty decline in the 1990s, in terms of the 'headcount ratio'. In view of the methodological changes that took place between the 50th and 55th Rounds of

the National Sample Survey, they discussed alternative estimates, based on comparable data from the two surveys and concluded that that a large part of the poverty decline associated with official figures is 'real', rather than driven by methodological changes. They argued for wider adoption of alternative poverty indexes such as the poverty-gap index and find that this refinement does not, after all, make much difference in this particular context.[3]

2.2 Economic Reforms and Formal Employment in India

One of the most interesting questions in the face of economic liberalisation in India has been the downward flexibility of formal wages and its implications for the level of employment. It is simple to understand that if the fall in labour supply in response to wage decline outweighs the increase in the demand for labour due to falling wages, then the level of employment must fall. It is possible in agglomeration economies that some regions display a situation where the downsizing of the formal sector and loss of productivity actually translates into job losses or wage cuts or both. It may also be the case that, in some other pockets there might be a strong inducement towards higher employment and higher wages, leading to prevalence of wide disparities both in the labour market and in the economy in general. In fact, Mitra (2006) in a crisp construction of the present concerns in the labuor market argues that there may even be another case, where Total Factor Productivity (TFP) growth leads to simultaneous improvements in the growth elements, real wages and employment in some regions of the country.

Mitra (2006) also estimates the growth rates in wages and employment by selecting two sub-periods in the pre and post-reform decades in India: 1979-80 to 1990-91 and 1990-91 to 1997-98. He measures the exponential growth patterns by fitting a semi-logarithmic trend equation to each variable (gross value added/employee, wage/worker, fixed capital/employee, gross fixed capital formation, man hours, etc., as available from the Annual Survey of Industries (ASI) across industry classification ranging between categories 20-21 and 38, and found that the rate of growth of workers the all-India level corresponding to the ASI sector increased in the second period compared to the first except for industry types 29 (leather), and 32 (non-metallic).

Nagaraj (1994) earlier observed that the earnings per worker grew faster than per capita income in the 1980s mainly due to an increase in the number of man days/worker. More recently, Tendulakar (2004) notes that the organised labour market in India is under a state of churning, especially during the reform period, as the formal rules incorporated in the protective labour legislation continue to persist, despite its inability to protect employment in the face of growing domestic and foreign competition. It comes as no surprise that the cross-currents of protective schemes and the constant search by the employers to switch to cost saving techniques, including resorting to flexible labour allocation modes and outsourcing to sectors where the labour laws are less stringent, creates a state of redundancy (see Datta, 2003 for more on social costs of unemployment, etc).

Mitra (2006) further shows that the rate of increase of fixed capital and employment across the industry types previously mentioned are positively correlated (though modestly), implying that the technical advancements that brought in faster capital

accumulation did not do so necessarily at the cost of employment. The brief venture so far, clearly establishes that the case of the labour market cannot be treated in isolation and that the legal aspects along with proper institutional arrangements must be factored in so as to produce any meaningful estimate of the contemporaneous or future conditions.

In fact, for the benefit of labour productivity to percolate to the workers, it is imperative that the social security network, health benefits, old-age benefits, unemployment benefits or employment insurance must be serious agendas in the issue of labour market reform. Mitra (2006) argues that the presence of labour contractors complicates the situation even more, who regularly draw a section of the workers' pay or other benefits receivable as rents. The reform agendas, as is discussed in the next section, takes no cognizance of these issue in asymmetric information and moral hazard problems prevalent in the labour market and hindering a smooth functioning of the same.

2.3 Economic Reforms and Regional Disparity in India

A subsequent and yet interesting aspect that comes out of this study is that the growth patterns in the 1990s reveal major regional imbalances.[4] The western and southern states (Andhra Pradesh excluded) have tended to do comparatively well. The low growth states form a large contiguous region in the north and east. The northern and eastern regions were poorer to start with. The National Sample Survey data suggest a strong pattern of inter-regional divergence in average per capita expenditure between 1993-94 and 1999-2000.[5] Some of the poorer states, notably Assam and Orissa, reported virtually zero growth of average per capita expenditure (and very little reduction, if any, in rural poverty) between 1993-94 and 1999-2000.

Two other aspects of increasing economic inequality in the 1990s are rising rural-urban disparities in per capita expenditure, and rising inequality of per capita expenditure within urban areas in most states. Further, the real wages of agricultural labourers have increased more slowly than per capita GDP, and conversely with public sector employees, suggesting some intensification of economic inequality between occupation groups. In this context, Deaton and Dreze (2002) have argued for assessing changes in living standards in a broader perspective, going beyond the standard focus on expenditure-based indicators.

In that broader perspective, a more diverse picture emerges, with areas of accelerated progress in the 1990s as well as slowdown in other fields. For instance, there is evidence of rapid progress in the field of elementary education, but the rate of decline of infant mortality has slowed down. While expenditure-based data suggest rising disparities in the 1990s, the same need not apply to other social indicators. For instance, while economic disparities between rural and urban areas have increased in the 1990s, there has been some narrowing of the rural-urban gap in terms of life expectancy and school participation. Finally, Singh, Bhandari, Chen and Khare (2003) assert that increasing inequality of State Domestic Products (SDP) is certainly a concern if it sharpens political tensions, especially in a diverse federal polity such as India's.

On the other hand, the evidence for increasing inequality of per capita SDP across states is of limited consequences if there is no clear statistical evidence of long run

divergence (Deaton and Dreze, 2002, find divergence only in the 1990s). The study provides test for absolute and conditional regional convergence using Human Development Index (HDI), per-capital credit levels etc. (see Tables 6, 7 and 8 in Singh *et al.*) and concludes that there is no evidence of absolute divergence as are indicated by output and consumption measures. Further, in a study of 20 Indian states over the period 1960-90 by Dholakia (1994) finds a tendency of convergence of long-term SDP growth rates. A revised study (Dholakia, 2003) concludes that regional disparity in terms of human development has been decreasing but the regional disparity of income has been almost constant over the past two decades.

Marjit and Mitra (1996) study the issue of regional convergence in 24 Indian states (over the period 1961-62 to 1989-90). On the basis of Real Per Capita Net State Domestic Product (PCNSDP), they find no evidence in favour of convergence of PCNSDP among Indian states (see Table 6 & 7. Subsequently, Ghosh, Marjit and Neogi (1997) and Kurian (2000) find the same indications towards regional divergence across states over time. Dasgupta, Maiti, Mukherjee, Sarkar and Chakravorty (2000) also report a clear tendency of divergence in terms of per capita SDP for Indian states, although they find convergence of sectoral shares of SDP.

A study by Krishna (2004) shows that while in the 1980s all states improved their growth performance relative to the previous two decades, the performance in the 1990s is quite uneven. States that could take advantage of the reforms of the 1990s, which allowed much scope in policy making at the state level, seem to have performed better. In a recent paper, Lall and Chakravorty (2006) observe spatial inequality of industrialisation in India due to cost saving for individual firms. Moreover, private industry seeks promising locations whereas state industries traditionally attach much less importance to ideal location factor. Thus, the special pattern of industrialisation that emerged lately is predominantly led by investments mainly by the private sector.

Given the range of studies presented above, this paper deals with a totally new concept. As already elucidated, the construction of trade openness index at the sub-national level has not been attempted so far, and consequently, it is easy to admit that there is no literature, which deals with such indices and applications thereof. However, one may start off with a brief discussion of how the literature on trade and growth has evolved focusing on the relative disparity among nations. Again, this is not directly related to the problem in hand. But some information should help in putting things in proper perspective.

The other part is to discuss various openness indices available so far. All these indices presume that explicit data on exports and imports are available to the researcher. If such information is not available to start with, what kind of proxies one can use seems to be no concern to the existing literature. Thus, the literature on the relationship between openness and economic performance mainly focuses on the impact of trade orientation on productivity and this relationship has long been a subject of intense debate amongst economists. Grossman and Helpman (1991) show that whether or not a country grows more from openness to trade depends on a number of factors, including its comparative advantage *vis-à-vis* the rest of the world. Buffie (1992) contends that whether an export

boom acts as an engine of growth depends on the structural characteristics of the economy.

Levine and Renelt (1992) note that increasing openness raises long-run growth only when it provides greater access to investment goods. Batra (1992), Batra and Slottje (1993), and Leamer (1995) go further by suggesting that free trade can be a primary source of economic downturn as trade liberalisation and openness may make imports more attractive than domestic production, and hence the domestic economy may suffer a loss.

Benefits of trade openness have received an enormous amount of interest since the times of David Ricardo, and includes many seminal studies by, for example, Scitovsky (1954), Keesing (1967), Bhagwati (1978), Krueger (1978), Liu *et al*. (1997) etc., which broadly argue that openness exposes countries to the most advanced new ideas and methods of production dictated by international competitive behaviour, and thus it enhances efficiency. There are also a number of contributions that highlight the positive impact that trade openness can impart on economic growth of a country, such as, Romer (1986, 1992), Lucas (1988), Barro and Sala-I-Martin (1995), etc.

However, all these studies on the impact of openness on economic performance deal with how a country, as a whole, benefits from international trade. How regions within a country get affected when the country engages in international trade has found scant attention in trade literature. The Hecksher-Ohlin model predicted that with introduction of international trade, there would be a shift in factor employment in different industries, which will ultimately lead to factor price equalisation across countries. The same thing can be foreseen at the regional level. Without considering factor price equalisation here, looking at the first part it is quite possible that as a state engages more in international trade its factors of production will shift from the import competing sector, where their returns gets lower and enter more into the export sector. This results in greater development of those states, which can attune their production structure to international demands.

It is not a drastic conjecture that different regions will be affected in different ways as a country opens up to trade or embarks on a trade liberalisation process. Thus, their interregional income differences can be explained through such openness to trade. The main aim of this exercise is to bridge up the methodological gap in the existing literature to measure how 'open' a particular region/state within a country would be as far as international trade in goods is concerned and how this 'openness' can be employed to understand the character of regional disparity in income.

The pioneering work trying to link economic geography with international trade is found in Krugman (1991) where he builds up an economic geography model. Elizondo and Krugman (1992) later use this model to demonstrate that the protectionist economic policies adopted by Mexico have led to the growth of large metropolises in the country. A consequence of Elizondo and Krugman (1992) argument is that liberal trade policies should disperse economic activities, across locations and thus reduce regional disparity within a country. The reason is that liberal trade policies will break the influence of the 'home market' and activities should disperse. For example, the North American Free

Trade Agreement (NAFTA) involving the US, Mexico and Canada have resulted in the shifting of economic activities from Mexico City towards border towns near the US [for more discussions on this, see Krugman (1995) and Fujita, Krugman and Venables (1999)].

Greater equality across Europe in productivity and income has been one of the central goals for the European Community since the early days of European economic integration. And for a long time this was achieved. If one looks at the country level, it appears to be a tendency towards long-run convergence in productivity and income levels in EU. However, this tendency shows important differences across regions of the same country. In fact, for most countries, there is either little change in regional dispersion, or a tendency towards divergence (Cappelen-Fagerberg-Verspagen, 1999).

On the other hand, one could also argue that if trade becomes really important, activities will get concentrated around 'ports', in case shipping is a significant means of commodity transportation. In that case, regional disparity may increase and will hamper overall regional development. Again, increase in trade should improve real income of the regions producing exportable and reduce the real income of the regions producing import competing goods. Gains from trade make sure that the overall welfare effect is positive. But nonetheless, income is redistributed from the import competing to the exporting regions (Marjit and Beladi 2005). Again there is a chance of an increase in regional disparity.

There are a number of rich studies on regional disparity in the Indian sub-continent, using the existing measurement of regional convergence or divergence, albeit these studies do not bring in the connection between trade openness and regional disparity. Nevertheless, a brief account of these studies may be useful to reflect on the larger issue of regional disparity and to further emphasise the purpose of this paper. Unavailability of any study that investigates the connection between trade openness and regional disparity at a country level has left a void in the general topic, which this study intends to cover. Now, in order to see how openness affects poverty and inequality, employment levels and regional disparity, first this paper measures 'openness'.

Although the term openness is widely used in the related literature on international economics and economic growth, there is no consensus on how to measure it. In the existing empirical studies, various measures have been attempted. These include trade dependency ratios and the rate of export growth (Balassa, 1982); the trade orientation indices which are defined as the distance between actual trade and the trade predicted by the 'true' model in the absence of distortion (Leamer, 1988; Wolf, 1993); the World Bank's outward orientation index which classifies countries into four categories according to their perceived degree of openness (World Bank, 1987); the composite openness index which is based on such trade-related indicators as tariffs, quotas coverage; black market premia, social organisation and the existence of export marketing boards (Sachs and Warner, 1995), and the Heritage Foundation index of trade policy which classifies countries into five categories according to the level of tariffs and other perceived distortions (Johnson and Sheehy, 1996, cited in Liu-Liu-Wei, 2001). However, all these indices use data at the national level. To find trade openness at the state or regional level, there is need to construct a regional openness index, where a substantial amount of ingenuity is required in order to make it sensible and practicable.

Endnotes

1 For example, Datt (1999), Datt and Ravallion (2002 a), Sundaram and Tendulkar (2003 a, b, c) etc. .

2 See Bardhan (2002) for a list of such reform or liberalization policy instruments.

3 See tables, 2a, 2b and 5 and figure 1 in Deaton and Dreze (2002).

4 A number of other studies consider the convergence-divergence issue among Indian states. See Singh *et al* (2003) for a brief survey of these papers.

5 Lal *et al*. (2002) provide a study of two comparable databases that can be used to measure poverty and inequality since the inception of economic reforms in India.

3
Theoretical Background

The statistical methodology used in this paper rests on a simple theoretical and rather conventional idea drawn from a variant of Ricardian and Heckscher-Ohlin-Samuelson frameworks. At the very outset, it must be mentioned that this paper talks about a case where only the nation engages in trade with the rest of the world as a sovereign entity and the regions trade via the nation. So it is not the case that West Bengal and Punjab are directly trading with US. This is very different when two countries within EU trade with the rest of the world. Punjab may have huge agricultural resources, but India as a whole imports agricultural goods. If Punjab was a separate nation it could just export agricultural products and import industrial goods. If industrial prices increase in the rest of the world, India as a whole has a terms of trade gain, but Punjab is likely to lose. Thus nation's interest and the state's interest do not necessarily converge and that is likely to be the case if regions are quite heterogeneous.

India's overall factor endowments, among other things, will determine India's pattern of trade and those states whose endowments match well with the national characteristics will have their production papers roughly matching with the national basket and therefore will have similar trade pattern. But it does not say anything about what would have happened if each state could directly trade with the rest of the world. Also one must remember that the production patterns across states are very much conditioned by active government policies and therefore actual trade may not reflect the nature driven comparative advantage of regions. It is not suggested here what the states should export or import. Given the national trade and production patterns how much of it is replicated at a particular state level, the paper turns towards theoretical predictions.[1]

As regions open up for trade, the exporting regions should gain and import competing regions should lose. Therefore, if initially, the exporting regions were relatively well off, trade is going to increase inter-regional disparity. Trade does not necessarily lead to unequal outcomes at the regional level if the import competing regions were rich to start with. Trade also reallocates resources towards the export sectors and therefore those regions, which were on the borderline of being identified as the import competing region, should switch first to being an exporting region. Eventually, there will be more states which will emerge as exporters. With full mobility of factors across states, it is difficult to predict interstate variations of income, except if there is some specific factor such as land. However, initial distribution of income is very important for determining whether trade leads to further disparity. This is extensively discussed in terms of a continuum

Ricardian model in Marjit and Beladi (2005). Now look at some predictions of this model in the subsequent analyses.

In a multi-commodity Heckscher-Ohlin structure the interpretation of the theorem related to the pattern of trade can yield interesting results. For example, one may observe a country to export both relatively capital intensive as well as labour intensive goods depending on the relative endowment position of the trading partner. Thus, issues such as Leontieff paradox become inconsequential. A general interpretation of the neo-classical trade model in that set up is provided in Jones, Beladi and Marjit (1999). In a multi-commodity setting one could suggest that the production bundle of the country should be consistent with the endowment bundle. In other words, countries which are relatively capital abundant will produce greater volume of capital-intensive goods. Such consistency can accommodate the fact that India will produce more capital-intensive goods than, for example, Ghana but less compared to US.

Since there is no export-import data for each region, it is argued that if a state's production bundle matches closely with the national export bundle, i.e. the state produces more of prominent exportable, the state is likely to be export oriented. The regional production bundle in this case matches with the national trade bundle, which should match the national endowment vector.

Endnote

1 We are greatly indebted to the anonymous referee for encouraging such a discussion. Also, note that, perfect factor mobility implies that all states are identical and hence there should be no difference in their production or trade patterns. However, we do not use this as an assumption and instead argue that states, as the case is for all practical purposes in India, are different, with no further implications for what would be the ideal state-specific trade pattern with the rest of the world if they were trading independently. Tapalova (2005) further shows that trade liberalisation is responsible for increased incidence and depth in poverty in many districts of India, mainly because the factors were extremely limited in mobility across regions and states in the country.

4
Data, Methodology and Results

For a specific state, the level of output (including industrial and agricultural) has been linked to all-India trade figures to get an approximate indicator of how much 'open' it is. If most of the production is concentrated in the items, which at all India level, contribute largely to export value, then it is reasonable to conclude that a particular state is attuned to exports. For example, agro-based output, such as food, beverage, tobacco and textiles have traditionally been prime export earners of India. If a state has very high production share of these items, it can be inferred that this state is contributing more to exports than others.

Correspondingly if a state has high production value of import substitutes then it must be relying less on imports and hence is not so 'open'. For example, machinery and equipments figure largely in India's non-oil imports. If a state is producing much of this then it's import of the same is likely to be less than other states and hence it is considered to be less 'open' in this study. Thus, in our analysis for a state to be 'open' requires consistency of its production structure with the trade pattern of the country, i.e. more important commodities in state's production basket would be the exportable, and/or less important contributors would be the major import-competing goods. After calculating how much 'open' a state is to trade, it is compared with its per capita net state domestic product to find out the link between 'openness' and regional income disparity.[1]

Before going to construct openness index, it should be mentioned that frequent changes in the classification of industries and product group creates a lot of problem to get a consistent panel data. Although the paper tries to tally the classification for the entire period at the 3-digit classification of industry and product groups, it is unable to cope with change, if any, below the 3-digit. So, this is the major limitation of the study. For the analysis, the first step involves the finding of Gross Value Added (GVA) of each industry (at the 2-digit level of National Industrial Classification (NIC) for 15 major Indian states from 1980-81 to 2002-03.

The paper ignores small states because 15 states are sufficient to explain 70 to 80 percent production share for each goods. It takes only the manufacturing goods based on NIC reclassification of industries in 1998 and that requires transformation of industrial classification in order of NIC 1998. Since Indian states depend to a large extent on agriculture, agriculture is also added to the agriculture related industry, i.e. NIC 15-16. Share of value added contributed by each industrial group for all the states for all these

years are calculated. These data are collected from ASI, various issues. For a particular state the share of value added by an industrial group is calculated by the following formula:

$$s_{it}^{k} = \frac{GVA_{it}^{k} \ (= NVA_{it}^{k} + DP_{it}^{k})}{TVA_{it}^{k} (= \sum_{i=15-16}^{34-35} GVA_{it}^{k})}, t = 1980-81,..,2002-03, \quad (1)$$

where, S_{it}^{k} = production share of i[th] industry in k[th] state at time period t;

GVA^{k}_{it} = Gross Value Added of i[th] industry in k[th] state at time period t;

NVA^{k}_{it} = Net Value Added of industry producing in k[th] state at time period t;

DP^{k}_{it} = Depreciation of industry producing in k[th] state at time period t;

TVA_{it}^{k} = Total of all gross value added of industries[2] 15-16 to 34-35

The second step is to find out how these goods fared with the export profile of India for each year under consideration. Since export data classification is different from NIC, we take trade data and then club or disaggregate certain portions to make it tally with the new industrial groups under consideration. The way trade data is classified in Directorate General of Commercial Intelligence and Statistics (DGCI&S) publications, it is easier to tally it with the ASI data at hand compared to other sources. So, the authors od this paper took trade data from DGCI&S publications.

Both NIC and trade classification of DGCI&S have undergone changes in the study period under consideration. So, we regroup all industrial data as per NIC 1998 classification (see Table A in Annexure). From April 1987, DGCI&S data classification has been changed to the Harmonised System of trade classification (i.e., H.S.). Thus, to tally trade classification with NIC we construct different groupings prior to 1987 (see Table B in Annexure). For the purpose of this study, we have taken export data in such a fashion so as to include the agricultural exports in Food, Beverages & Tobacco (see Table B under Annexure).

After collecting trade data and classifying them in this way, we calculated the share of the products under consideration in total exports of India in the following manner:

$$x_{it} = \frac{X_{it}}{X_{t}}, \quad (2)$$

where, x_{it} is share of i[th] industry in total exports in the t[th] period;

X_{it} is the export value of the i[th] industry in the t[th] period;

X_{t} is the total export value of India in the t[th] period,

Similar to export share, import share is derived following manner:

$$m_{it} = \frac{M_{it}}{M_t} \tag{3}$$

m_{it} = import share of i-th industry to total import in India at t-th period

M_{it} = import of i-th industry at t-th period

M_t = Total import in India at t-th period

The export shares (x_{it}) and the imports shares (m_{it}) are represented in Table C and Table D (see Annexure) respectively. Third, for a particular year the export and import shares of the goods at the all India level and the gross value added shares of the same at the state level are calculated. The next step is to correlate x_{it} with s_{it}^k and m_{it} with s_{it}^k. These correlation coefficients will clarify how the production structure of the states is in tune with the export and import structures of India. We calculate this for the entire period under consideration. Thus, over the twenty-three year period and for fifteen major states in India we arrive at correlation coefficients between their production share and the export-import profile at the national level separately. These correlation coefficients are now ranked such that R_{mt}^k, $R_{xt}^k \in (1,2,...15)$, where R_{mt}^k and R_{xt}^k provides rank of the correlation between import and export shares respectively with production shares of state k at the t^{th} period.

We assign the rank of 1 to the state with highest correlation and the rank of 15 to the state with lowest correlation. For example, in 2002-03 Gujarat shows the highest correlation in exports and is ranked 1 (implying it has highest export performance), whereas Bihar shows the lowest correlation in exports (implying it is least export oriented) and is given the rank of 15. These ranks can be seen as indicative of export and import performances of the states over the years (see Tables 1&2).

The final stage of the analysis involves finding a trade openness index. This index is constructed using R_{xt}^k (the export performance rank) and the inverse of R_{mt}^k (the import competing performance rank) which is denoted by $\tilde{R}_{mt}^k$. In case of import, inverse ranking is followed, which represents the inverse rank of the correlation coefficient between m_{it} and s_{it}^k. Thus, in case of imports those states are ranked higher which import higher or contribute less to import substituting production, e.g., in 2002-03 Gujarat shows the highest import correlation (implying it is the most import competing state for that year), and is given a rank of 15, whereas Orissa has lowest correlation coefficient value and is ranked 1 (implying it was the least import competing state) (see Table 3).

Now, we assign a weight of half to each of these ranks (see Table 1 and 3) in order to construct the openness index.

Table 1: Ranks of Correlation Coefficients between Export Share and GVA Share of Industries in Various States											
	1980-81	**1981-82**	**1982-83**	**1983-84**	**1984-85**	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**
Andhra Pradesh	7.5	8	6	4.5	6.5	5.5	4	8	9	9	10
Assam	11.5	12.5	10	11	9	13	14	13	11.5	13	13
Bihar	15	15	15	15	15	15	15	15	15	15	15
Gujarat	1.5	1	1	2	1	1	2	1	2	2	2
Haryana	7.5	4	10	9	6.5	12	12.5	11.5	11.5	12	12
Karnataka	5	8	10	7.5	10	8	6.5	10	8	11	8.5
Kerala	10	10.5	4	3	3	7	10	9	7	7.5	7
Madhya Pradesh	11.5	14	13	12	13	10	5	11.5	13	10	11
Maharashtra	13	10.5	3	1	2	4	11	3	3	3	3
Orissa	14	12.5	14	13	12	11	12.5	14	14	14	14
Punjab	7.5	5.5	5	10	11	5.5	6.5	4	4	4	4.5
Rajasthan	4	3	7	6	5	3	3	5	6	5	4.5
Tamil Nadu	1.5	2	2	4.5	4	2	1	2	1	1	1
Uttar Pradesh	7.5	5.5	8	7.5	8	9	9	7	10	7.5	8.5
West Bengal	3	8	12	14	14	14	8	6	5	6	6

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	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Andhra Pradesh	12	9	9	12	9.5	12	11	10	11	12	10	10
Assam	13	13	14	14	14	13	13.5	14	14	13.5	15	12
Bihar	15	15	15	15	15	15	15	13	13	13.5	14	15
Gujarat	2	2	2	2	2	3.5	2	2	2	2	1	1
Haryana	11	11.5	11	10.5	12	10	13.5	12	12	10	12.5	14
Karnataka	9	10	6	7	7	8	5	6	8	7.5	4	4
Kerala	10	11.5	12	9	9.5	11	9.5	11	9	9	9	9
Madhya Pradesh	7.5	8	8	8	8	7	4	8	6.5	4	8	6
Maharashtra	3	4	3	3	5	3.5	3	3	4	3	3	3
Orissa	14	14	13	13	13	14	12	15	15	15	12.5	13
Punjab	4	6	5	5	4	3.5	6	5	3	6	6	8
Rajasthan	5	3	4	4	3	3.5	8	4	5	5	5	5
Tamil Nadu	1	1	1	1	1	1	1	1	1	1	2	2
Uttar Pradesh	7.5	7	10	10.5	11	9	9.5	9	10	11	11	11
West Bengal	6	5	7	6	6	6	7	7	6.5	7.5	7	7

Note: The state with highest correlation is assigned rank 1 and vice-versa.

Table 2: Ranks of Correlation Coefficients between Import Share and GVA Share Of Industries in Various States											
	1980-81	**1981-82**	**1982-83**	**1983-84**	**1984-85**	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**
Andhra Pradesh	7	9.5	9	4	6	6.5	6	11	9	13	12
Assam	15	11	13	14	12.5	9.5	13	15	14	5	4
Bihar	13	9.5	5.5	12	9	14	8	3.5	4	3	2
Gujarat	2	2	1	2	1	1	2	1	1	4	3
Haryana	9	5	5.5	6.5	5	6.5	5	5	10	8.5	11
Karnataka	5.5	8	7	6.5	11	5	4	7	7	8.5	9.5
Kerala	4	3.5	4	5	4	4	9.5	6	5.5	2	5
Madhya Pradesh	8	6.5	12	10.5	7.5	12	7	9	5.5	10	13
Maharashtra	1	1	2	1	2	2	1	2	2	1	1
Orissa	12	15	15	15	15	15	14	13	8	6	9.5
Punjab	5.5	6.5	8	10.5	12.5	9.5	15	14	13	14	15
Rajasthan	14	14	14	13	10	11	11.5	12	15	15	14
Tamil Nadu	3	3.5	3	3	3	3	3	3.5	3	7	6
Uttar Pradesh	10.5	13	11	8.5	7.5	8	11.5	8	11	11	7
West Bengal	10.5	12	10	8.5	14	13	9.5	10	12	12	8

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	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Andhra Pradesh	9.5	9	10	9	9	11	9	7.5	8.5	8	6	6
Assam	3	4	3	5	5	4	4	10	4	4	7	3
Bihar	5	5	5	4	6.5	7.5	10	12	6	6	10	8
Gujarat	2	1	1	1	1	1	2	2	1	2	1	1
Haryana	11	13	9	15	13	9	8	3	11	8	12	11
Karnataka	8	10	11	7	6.5	5	5	4	10	5	4	5
Kerala	4	3	4	10	4	7.5	3	5	3	3	3	4
Madhya Pradesh	15	12	12	11	10.5	12	11	11	7	10.5	8	7
Maharashtra	1	2	2	2	2	2	1	1	2	1	2	2
Orissa	12	11	13	12	12	10	13	15	15	15	15	15
Punjab	13	15	15	13.5	14	14	15	13.5	12	12	14	14
Rajasthan	14	14	14	13.5	15	15	14	13.5	13	10.5	12	10
Tamil Nadu	6	6	6	3	3	3	7	6	5	13	5	13
Uttar Pradesh	7	8	7	6	8	6	6	7.5	8.5	8	9	9
West Bengal	9.5	7	8	8	10.5	13	12	9	14	14	12	12

Note: The state with highest correlation is assigned rank 1 and vice-versa.

Table 3: Inverse Ranks of Correlation Coefficients between Import Share and GVA Share Of Industries in Various States											
	1980-81	**1981-82**	**1982-83**	**1983-84**	**1984-85**	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**
Andhra Pradesh	9	6.5	7	12	10	9.5	10	5	7	3	4
Assam	1	5	3	2	3.5	6.5	3	1	2	11	12
Bihar	3	6.5	10.5	4	7	2	8	12.5	12	13	14
Gujarat	14	14	15	14	15	15	14	15	15	12	13
Haryana	7	11	10.5	9.5	11	9.5	11	11	6	7.5	5
Karnataka	10.5	8	9	9.5	5	11	12	9	9	7.5	6.5
Kerala	12	12.5	12	11	12	12	6.5	10	10.5	14	11
Madhya Pradesh	8	9.5	4	5.5	8.5	4	9	7	10.5	6	3
Maharashtra	15	15	14	15	14	14	15	14	14	15	15
Orissa	4	1	1	1	1	1	2	3	8	10	6.5
Punjab	10.5	9.5	8	5.5	3.5	6.5	1	2	3	2	1
Rajasthan	2	2	2	3	6	5	4.5	4	1	1	2
Tamil Nadu	13	12.5	13	13	13	13	13	12.5	13	9	10
Uttar Pradesh	5.5	3	5	7.5	8.5	8	4.5	8	5	5	9
West Bengal	5.5	4	6	7.5	2	3	6.5	6	4	4	8

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	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Andhra Pradesh	6.5	7	6	7	7	5	7	8.5	7.5	8	10	10
Assam	13	12	13	11	11	12	12	6	12	12	9	13
Bihar	11	11	11	12	9.5	8.5	6	4	10	10	6	8
Gujarat	14	15	15	15	15	15	14	14	15	14	15	15
Haryana	5	3	7	1	3	7	8	13	5	8	4	5
Karnataka	8	6	5	9	9.5	11	11	12	6	11	12	11
Kerala	12	13	12	6	12	8.5	13	11	13	13	13	12
Madhya Pradesh	1	4	4	5	5.5	4	5	5	9	5.5	8	9
Maharashtra	15	14	14	14	14	14	15	15	14	15	14	14
Orissa	4	5	3	4	4	6	3	1	1	1	1	1
Punjab	3	1	1	2.5	2	2	1	2.5	4	4	2	2
Rajasthan	2	2	2	2.5	1	1	2	2.5	3	5.5	4	6
Tamil Nadu	10	10	10	13	13	13	9	10	11	3	11	3
Uttar Pradesh	9	8	9	10	8	10	10	8.5	7.5	8	7	7
West Bengal	6.5	9	8	8	5.5	3	4	7	2	2	4	4

Note: The state with lowest correlation is assigned rank 1 and vice-versa.

$$O_t^k = \frac{1}{2}(R_{xt}^k + \tilde{R}_{mt}^k) \quad (4)$$

We then rank the openness index giving lowest rank to the highest score, e.g., Tamil Nadu has second highest export performance in 2002-03 (rank 2) and it is also not much import competitive (see Table 3). Its openness index, thus, is $\frac{1}{2}*(2)+\frac{1}{2}*(3)=2.5$. Since its export performance rank is high and inverse import competing performance rank is low (the way we have assigned ranks), implies that it is involved with more exportable production and less import substitute production. Hence this state is more open. For 2002-03, Tamil Nadu has lowest value of openness index among other states and it is ranked 1. Similarly, a state having highest value of openness index is given the lowest rank of 15. In 2002-03, Assam is the least open state as per this specification. The values of openness index are given in Table 4 and the ranks following from them in Table 5. Note that lower value of index implies greater openness.

It should be useful at this point to briefly discuss the properties of the indices that we construct. First, the index is rudimentary and yet novel, and may be subject to future refinement either with the same data or with applications on other countries. Second, we have used 0.5 as the weights for export production and import production at each state level. This is once again amenable to alterations, where exact weights may be assigned for each state. Let us provide an example. Suppose (and in reality, it is) India produces and exports large amount of tea and that Assam and West Bengal are the prime locations where tea is grown.

Thus, the method we develop next argues that these provinces have high share of exportable production (if the case may be so) and should rank high in terms of their export potential. However, it is also possible that, the volume of the export products is only a small part of the total production bundle in the state, which also produces large shares of importable (say, soda ash). Given the production shares and the appropriate weights we then measure the level of openness for these states, which in turn offers the weighted rank. In this case, the weights will be different from 0.5.

Even if, this alters the overall ranking a bit and hence the subsequent correlation coefficients, the methodology of index construction shall not vary. Also, individual rankings in terms of export orientation and import competition are not altered. It is only a concern of how one combines them. Third, the re-construction of the index with differing weights may also be useful to construct a panel where many other issues can be looked into in further detail.

Endnotes

1 See Annexure for detailed description of the data and classifications.

2 The value of agricultural output for each state is added to the industrial group 15-16 (Food, Beverages & Tobacco industry), as it is the agriculture related industry. We get agricultural value added data from the Central Statistical Organisation website/publication.

Table 4: Yearly Openness Index Values of Indian States											
	1980-81	**1981-82**	**1982-83**	**1983-84**	**1984-85**	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**
Andhra Pradesh	8.25	7.25	6.5	8.25	8.25	7.5	7	6.5	8	6	7
Assam	6.25	8.75	6.5	6.5	6.25	9.75	8.5	7	6.75	12	12.5
Bihar	9	10.75	12.75	9.5	11	8.5	11.5	13.75	13.5	14	14.5
Gujarat	7.75	7.5	8	8	8	8	8	8	8.5	7	7.5
Haryana	7.25	7.5	10.25	9.25	8.75	10.75	11.75	11.25	8.75	9.75	8.5
Karnataka	7.75	8	9.5	8.5	7.5	9.5	9.25	9.5	8.5	9.25	7.5
Kerala	11	11.5	8	7	7.5	9.5	8.25	9.5	8.75	10.75	9
Madhya Pradesh	9.75	11.75	8.5	8.75	10.75	7	7	9.25	11.75	8	7
Maharashtra	14	12.75	8.5	8	8	9	13	8.5	8.5	9	9
Orissa	9	6.75	7.5	7	6.5	6	7.25	8.5	11	12	10.25
Punjab	9	7.5	6.5	7.75	7.25	6	3.75	3	3.5	3	2.75
Rajasthan	3	2.5	4.5	4.5	5.5	4	3.75	4.5	3.5	3	3.25
Tamil Nadu	7.25	7.25	7.5	8.75	8.5	7.5	7	7.25	7	5	5.5
Uttar Pradesh	6.5	4.25	6.5	7.5	8.25	8.5	6.75	7.5	7.5	6.25	8.75
West Bengal	4.25	6	9	10.75	8	8.5	7.25	6	4.5	5	7

Continue.....

	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Andhra Pradesh	9.25	8	7.5	9.5	8.25	8.5	9	9.25	9.25	10	10	10
Assam	13	12.5	13.5	12.5	12.5	12.5	12.75	10	13	12.75	12	12.5
Bihar	13	13	13	13.5	12.25	11.75	10.5	8.5	11.5	11.75	10	11.5
Gujarat	8	8.5	8.5	8.5	8.5	9.25	8	8	8.5	8	8	8
Haryana	8	7.25	9	5.75	7.5	8.5	10.75	12.5	8.5	9	8.25	9.5
Karnataka	8.5	8	5.5	8	8.25	9.5	8	9	7	9.25	8	7.5
Kerala	11	12.25	12	7.5	10.75	9.75	11.25	11	11	11	11	10.5
Madhya Pradesh	4.25	6	6	6.5	6.75	5.5	4.5	6.5	7.75	4.75	8	7.5
Maharashtra	9	9	8.5	8.5	9.5	8.75	9	9	9	9	8.5	8.5
Orissa	9	9.5	8	8.5	8.5	10	7.5	8	8	8	6.75	7
Punjab	3.5	3.5	3	3.75	3	2.75	3.5	3.75	3.5	5	4	5
Rajasthan	3.5	2.5	3	3.25	2	2.25	5	3.25	4	5.25	4.5	5.5
Tamil Nadu	5.5	5.5	5.5	7	7	7	5	5.5	6	2	6.5	2.5
Uttar Pradesh	8.25	7.5	9.5	10.25	9.5	9.5	9.75	8.75	8.75	9.5	9	9
West Bengal	6.25	7	7.5	7	5.75	4.5	5.5	7	4.25	4.75	5.5	5.5

Table 5: Yearly Openness Index Ranks of Indian States											
	1980-81	**1981-82**	**1982-83**	**1983-84**	**1984-85**	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**
Andhra Pradesh	9	5.5	3.5	9	10.5	5.5	5	4	7	5	5
Assam	3	11	3.5	2	2	14	11	5	4	13.5	14
Bihar	11	12	15	14	15	9	13	15	15	15	15
Gujarat	7.5	8	8.5	7.5	8	7	9	8	9	7	7.5
Haryana	5.5	8	14	13	13	15	14	14	11.5	11	9
Karnataka	7.5	10	13	10	5.5	12.5	12	12.5	9	10	7.5
Kerala	14	13	8.5	3.5	5.5	12.5	10	12.5	11.5	12	11.5
Madhya Pradesh	13	14	10.5	11.5	14	4	5	11	14	8	5
Maharashtra	15	15	10.5	7.5	8	11	15	9.5	9	9	11.5
Orissa	11	4	6.5	3.5	3	2.5	7.5	9.5	13	13.5	13
Punjab	11	8	3.5	6	4	2.5	1.5	1	1.5	1.5	1
Rajasthan	1	1	1	1	1	1	1.5	2	1.5	1.5	2
Tamil Nadu	5.5	5.5	6.5	11.5	12	5.5	5	6	5	3.5	3
Uttar Pradesh	4	2	3.5	5	10.5	9	3	7	6	6	10
West Bengal	2	3	12	15	8	9	7.5	3	3	3.5	5

Continue.....

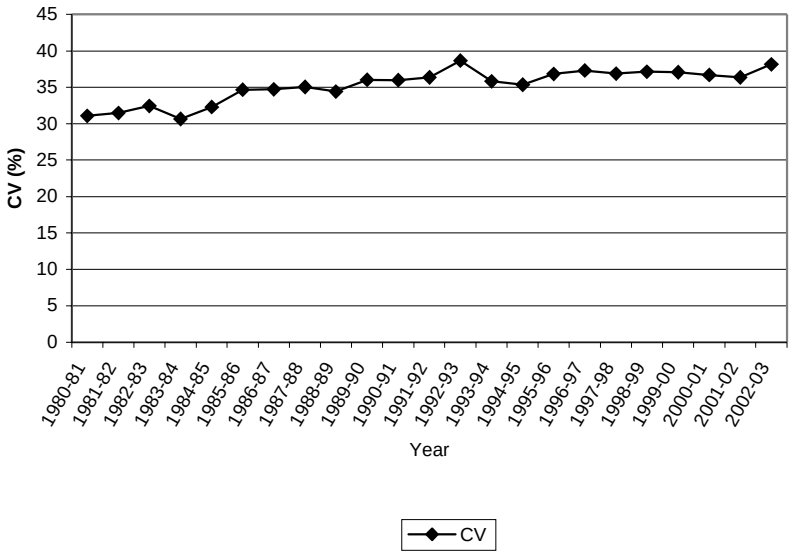
	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Andhra Pradesh	12	8.5	6.5	12	7.5	6.5	9.5	12	12	12	12.5	12
Assam	14.5	14	15	14	15	15	15	13	15	15	15	15
Bihar	14.5	15	14	15	14	14	12	8	14	14	12.5	14
Gujarat	6.5	10	9.5	10	9.5	9	7.5	6.5	8.5	6.5	7	8
Haryana	6.5	6	11	3	6	6.5	13	15	8.5	8.5	9	11
Karnataka	9	8.5	3.5	8	7.5	10.5	7.5	10.5	5	10	7	6.5
Kerala	13	13	13	7	13	12	14	14	13	13	14	13
Madhya Pradesh	3	4	5	4	4	4	2	4	6	2.5	7	6.5
Maharashtra	10.5	11	9.5	10	11.5	8	9.5	10.5	11	8.5	10	9
Orissa	10.5	12	8	10	9.5	13	6	6.5	7	6.5	5	5
Punjab	1.5	2	1.5	2	2	2	1	2	1	4	1	2
Rajasthan	1.5	1	1.5	1	1	1	3.5	1	2	5	2	3.5
Tamil Nadu	4	3	3.5	5.5	5	5	3.5	3	4	1	4	1
Uttar Pradesh	8	7	12	13	11.5	10.5	11	9	10	11	11	10
West Bengal	5	5	6.5	5.5	3	3	5	5	3	2.5	3	3.5

Note: The state with lowest openness index value is assigned rank 1 and vice-versa.

5
Relationship between Openness and Inter-regional Income Disparity

Attempts have been made in this section to relate the openness at the state level with their income pattern over time and it is worked out in three different ways. Before doing that, however, we observe the income disparity among the 15 major states over time in terms of the coefficients of variation in PCNSDP. If one looks into the income variation among the major states in India, it reveals an increasing trend over time as between 1980 and 2003. Figure 1 shows that the coefficient of variation (standard deviation divided by mean) in income among major states has increased from 31.09 percent in 1980-81 to 38.16 percent in 2002-03. In other words, regional disparity has increased by about 25 percent during the given period. This encourages us to examine if there is any relationship between interregional income disparity and trade openness for the Indian states between 1980-81 and 2002-03.

Figure 1: Trend of Coefficient of Variation of PCNSDP across Major States in India, 1980-81 to 2002-03



5.1 Relation between Openness and PCNSDP of the States

At first, the states are ranked according to their PCNSDP such that. We get the data on PCNSDP of these states from the Central Statistical Organisation (CSO). However, this data is divided into two series. The old series is based in 1980-81 prices, whereas, the new series is based on 1993-94 prices. To make the two series compatible the old series have been converted to 1993-94 prices and subsequently, we ranked the states according to their PCNSDP from 1980-81 to 2002-03. We rank states having higher PCNSDP with higher ranks, for e.g., in 2002-03 Maharashtra has the highest PCNSDP (Rs. 15,466) among the 15 states. So, it is ranked at 1. For the same year, Bihar has lowest PCNSDP (Rs. 4,448) and is given the rank of 15. These ranks for all the years are shown in Table 6.

Table 6: Coefficient of Variation of PCNSDP across Major States in India

Year	Coefficient of variation of PCNSDP
1980-81	31.09
1981-82	31.45
1982-83	32.44
1983-84	30.66
1984-85	32.28
1985-86	34.64
1986-87	34.72
1987-88	35.05
1988-89	34.43
1989-90	36.03
1990-91	35.99
1991-92	36.37
1992-93	38.65
1993-94	35.81
1994-95	35.37
1995-96	36.82
1996-97	37.32
1997-98	36.88
1998-99	37.15
1999-00	37.07
2000-01	36.66
2001-02	36.36
2002-03	38.16

Source: Handbook of Statistics on Indian Economy, 2003-04, RBI

Table 7: Ranks of States According to PCNSDP											
	1980-81	**1981-82**	**1982-83**	**1983-84**	**1984-85**	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**
Andhra Pradesh	11	7	8	11	10	11	10	9	7	6	7
Assam	10	10	9	9.5	9	7	9	11	12	12	12
Bihar	15	15	15	15	15	15	15	15	15	15	15
Gujarat	4	4	4	3	3	4	4	4	3	4	4
Haryana	2	2	2	2	2	2	2	2	2	2	2
Karnataka	9	8	10	6	6	9	6	6	6	7	9
Kerala	5	6	5	9.5	7	6	7	8	9	8	6
Madhya Pradesh	7	9	7	7	11	10	12	10	11	11	10
Maharashtra	3	3	3	4	4	3	3	3	4	3	3
Orissa	13	13	14	13	14	13	13	14	13	13	14
Punjab	1	1	1	1	1	1	1	1	1	1	1
Rajasthan	12	12	12	8	12	12	11	12	8	9	8
Tamil Nadu	6	5	6	5	5	5	5	5	5	5	5
Uttar Pradesh	14	14	13	14	13	14	14	13	14	14	13
West Bengal	8	11	11	12	8	8	8	7	10	10	11

Continue.....

	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Andhra Pradesh	7	9	8	8	8	8	10	8	8	8	8	9
Assam	12	12	12	12	12	12	12	12	12	12	12	12
Bihar	15	15	15	15	15	15	15	15	15	15	15	15
Gujarat	5	4	4	4	3	3	3	3	4	5	4	4
Haryana	2	3	3	3	4	4	4	4	3	3	3	3
Karnataka	6	6	7	7	7	6	6	6	6	6	6	6
Kerala	8	7	6	6	6	7	7	7	7	7	7	7
Madhya Pradesh	11	11	10	11	11	11	11	11	11	11	11	11
Maharashtra	3	2	2	2	1	2	1	2	1	2	2	1
Orissa	14	14	14	14	14	14	14	13	13	14	13	13
Punjab	1	1	1	1	2	1	2	1	2	1	1	2
Rajasthan	10	8	11	9	10	10	8	10	10	10	10	10
Tamil Nadu	4	5	5	5	5	5	5	5	5	4	5	5
Uttar Pradesh	13	13	13	13	13	13	13	14	14	13	14	14
West Bengal	9	10	9	10	9	9	9	9	9	9	9	8

Note: The state with highest PCNSDP is assigned rank 1 and vice-versa.

Source: Handbook of Statistics on Indian Economy, 2003-04, RBI

These two sets of ranks (see in Table 1 and 3) are ultimately correlated and the presented in a scatter-plot in Figure 2 to find out the dynamics of export-led regional development. This figure clearly shows that the trend for the correlation coefficients is increasing over time, which directly implies that the interregional disparity as explained by export performance of the states is on the rise. We also find that the values of the correlation coefficients are higher after the reform period than before it.

Figure 2: Correlation Coefficients and Trend Line between Export Performance and PCNSDP Ranks across States (1980-81 to 2002-03)

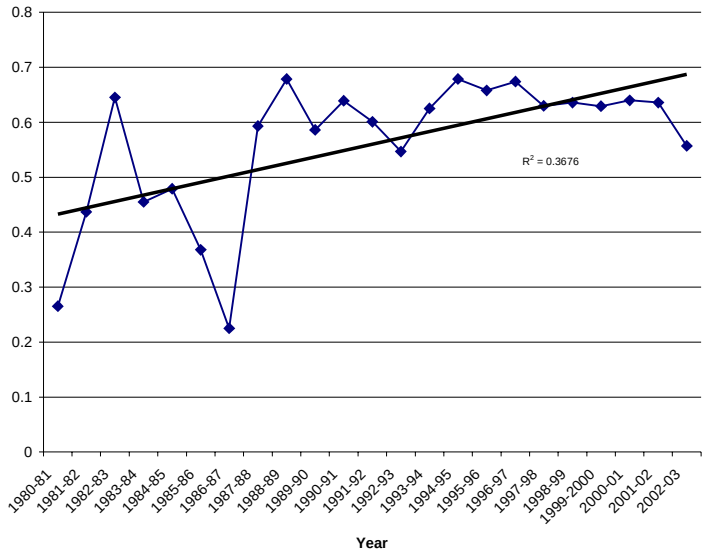
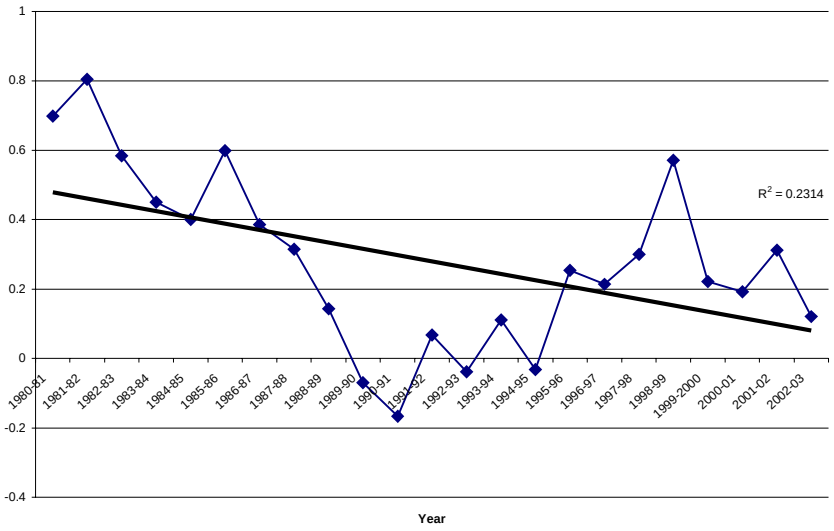


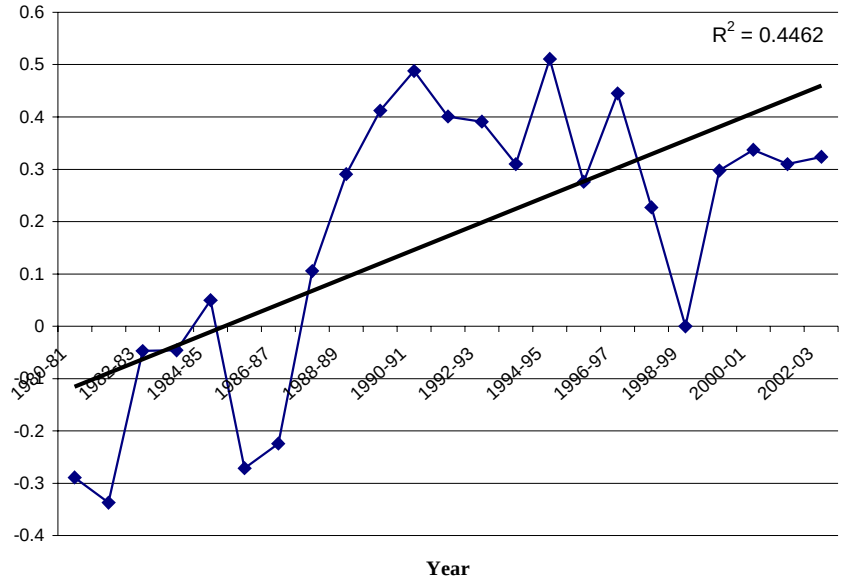
Figure 3: Correlation Coefficients and Trend Line between Import Competing Performance and PCNSDP Ranks across States (1980-81 to 2002-03)



R^k_{mt} and R^k_t are correlated and the correlation coefficients are presented in the scatter plot in Figure 3. We find that the correlations are positive and the linear trend attached to it is downward sloping, i.e., with time the correlations are becoming weaker. Studying Figures 2 and 3 it can be said that more export oriented and less import competing states gain in terms of Income over time.

At last to link states' openness to trade with their PCNSDP we correlate O^k_t with R^k_t. The final correlation coefficients are plotted in a scatter diagram (see Figure 4). Figure 4 also shows that the linear trend attached to the final correlation coefficients is upward rising. This implies that with time the extent of regional income has found gradually strong positive relationship with the trade openness of that region.

Figure 4: Correlation Coefficients and Trend Line between Openness Index and PCNSDP Ranks across States (1980-81 to 2002-03)



5.2 Relation between Openness and Dispersion of PCNSDP

In order to examine the nexus between trade openness and regional disparity in another way, first we look at the dispersion of income calculating trend of coefficient of variation across states and try to correlate dispersion of the state with its openness. We have derived indices of 'regional disparity', viz. relative mean deviation in PCNSDP (σ^k_t), to find out relative position of k-th state with respect to mean income at t-th period. Higher the value of relative mean deviation in PCNSDP (σ^k_t with sign), the state should be considered richer on average. It should be noted that sign of σ^k_t will take positive of k-th state if PCNSDP is higher than the mean otherwise negative. Then we have ranked each state on the basis of the principle: 'state with highest value for σ^k_t receives rank 1 and *vice versa*' and it is reported in Table 7.

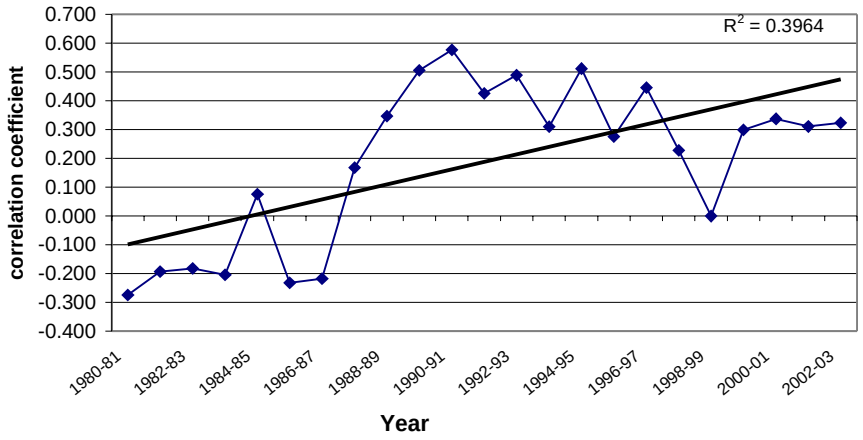
$$\sigma_t^k = \frac{\left(x_t^k - \bar{x}\right)*100}{\bar{x}},\ k = 1,..,15, t = 1980-81,..,2002-03 \qquad (5)$$

x_t^k = PCNSDP for k^{th} state in t^{th} period.

$\bar{x}$ = Mean of the PCNSDP among states in a give period

Correlation coefficient between rank of states based on σ_t^k and rank of states based on openness Index is calculated (R_t^c) and presented in Fig. 5. The figure shows a positive relationship between the rank of states based on σ_{st} and the rank of states based on openness index. This suggests that a state, which is being more 'open', is also becoming more 'wealthy' compared to the other states.

Figure 5: Correlation Coefficient between Openness Index Rank & Rank of Relative Mean Deviation based on PCNSDP (1980-82 to 2002-03)



5.3 Relation between Openness and PCNSDP Growth of the States

The growth rate of PCNSDP $\left(\gamma_t^k\right)$ is defined by the percentage change of PCNSDP with respect to pervious year.

$$\gamma_t^k = \frac{\left(x_t^k - x_{t-1}^k\right)*100}{x_{t-1}^k},\ k = 1,...,15, t = 1980-81,..,2002-03 \qquad (6)$$

x_t^k = PCNSDP for k^{th} state in t^{th} period.

We have calculated the value of γ_t^k for each state, for each year and then ranked each state on the basis of γ_t^k using the same principle (see Table 8). As the definition suggests, γ_t^k can be considered as a measure of wealthy state compared to the other states in t^{th} period. Correlation coefficient between rank of states based on γ_t^k and rank of state Openness Index is also calculated (see Figure 6). The same conclusion can be drawn from Figure 6, which portrays a positive relationship, although trend of this correlation do not show sharp rising trend.

Therefore, all three measures of inter-regional income disparity of states are found to be gradually more correlated with the openness of the states over the years. We would like to emphasise on the fact that this analysis focuses only on the connection between exportable/importable production and PCNSDP ranks, ranks of relative mean deviation and ranks of growth of states while controlling for policy changes like trade promotion schemes, foreign exchange regime changes etc., which are introduced ever since the reform period. This might have influenced trade performance and PCNSDP (see Table 9). Nevertheless, the analysis provides ample support in favour of the initial hypothesis that increases in regional disparity in Indian states has some correlation with their trade openness over the years.

Figure 6: Correlation Coefficient between Rank of PCNSDP Growth & Rank of Openness Index (1981-82 to 2002-03)

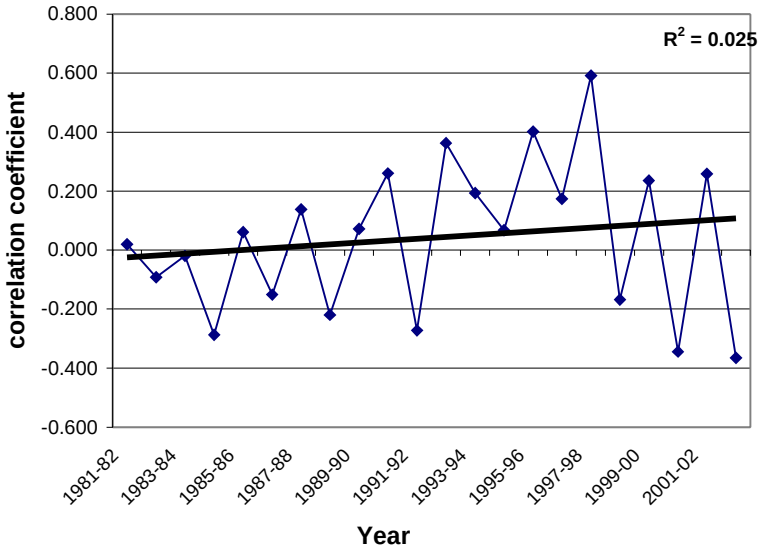


Table 8: Rank of States on Relative Mean Deviation of States' Income												
	1980-81	**1981-82**	**1982-83**	**1983-84**	**1984-85**	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**	**1991-92**
Andhra Pradesh	9	8	7	7	8	8	8	8	8	8	7	8
Assam	12	10	10	10	10	9	10	10	14	14	13	12
Bihar	15	15	15	15	15	15	15	15	15	15	15	15
Gujarat	4	4	4	4	4	4	4	5	4	4	4	4
Haryana	3	3	2	3	3	2	2	3	2	3	2	2
Karnataka	6	7	6	6	7	7	6	6	7	7	8	7
Kerala	7	9	9	13	9	10	9	9	11	10	10	9
Madhya Pradesh	10	11	11	11	13	12	14	11	13	13	11	13
Maharashtra	2	2	3	2	2	3	3	2	3	2	3	3
Orissa	11	12	14	12	14	11	11	13	10	11	14	14
Punjab	1	1	1	1	1	1	1	1	1	1	1	1
Rajasthan	14	13	13	9	11	14	12	14	9	9	9	10
Tamil Nadu	8	6	8	8	6	6	7	7	6	5	5	5
Uttar Pradesh	13	14	12	14	12	13	13	12	12	12	12	11
West Bengal	5	5	5	5	5	5	5	4	5	6	6	6

Continue.....

	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Andhra Pradesh	8	8	8	8	8	10	8	8	8	8	9
Assam	13	12	12	12	12	12	12	12	12	12	12
Bihar	15	15	15	15	15	15	15	15	15	15	15
Gujarat	4	4	4	3	3	3	3	4	5	4	4
Haryana	3	3	3	4	4	4	4	3	3	3	3
Karnataka	7	7	7	7	6	6	6	6	6	6	6
Kerala	10	6	6	6	7	7	7	7	7	7	7
Madhya Pradesh	11	10	11	11	11	11	11	11	11	11	11
Maharashtra	2	2	2	1	2	1	2	1	2	2	1
Orissa	14	14	14	14	14	14	13	13	14	13	13
Punjab	1	1	1	2	1	2	1	2	1	1	2
Rajasthan	9	11	9	10	10	8	10	10	10	10	10
Tamil Nadu	5	5	5	5	5	5	5	5	4	5	5
Uttar Pradesh	12	13	13	13	13	13	14	14	13	14	14
West Bengal	6	9	10	9	9	9	9	9	9	9	8

Note: The state with highest value of relative mean deviation is assigned rank 1 and vice-versa.

Source: Handbook of Statistics on Indian Economy, 2003-04, RBI

Table 9: Rank of States on Growth Rate of PCNSDP											
	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92
Andhra Pradesh	1	10	10	12	6	13	1	5	3	9	5
Assam	3	4	9	10	5	14	9	15	5	10	7
Bihar	8	12	5	2	11	3	13	8	14	4	12
Gujarat	5	13	3	11	14	5	15	2	13	12	15
Haryana	10	3	13	7	1	10	11	3	12	3	10
Karnataka	7	9	6	5	15	1	4	11	7	13	2
Kerala	14	7	15	6	7	12	10	9	2	6	9
Madhya Pradesh	11	5	8	14	3	15	2	12	11	2	13
Maharashtra	9	2	14	4	12	4	3	6	8	14	1
Orissa	13	15	2	13	2	9	12	4	6	15	3
Punjab	4	8	12	3	4	8	6	13	1	11	6
Rajasthan	6	11	1	15	13	2	14	1	15	1	14
Tamil Nadu	2	14	7	1	8	11	5	10	4	5	8
Uttar Pradesh	12	1	11	9	10	6	8	7	10	7	11
West Bengal	15	6	4	8	9	7	7	14	9	8	4
	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03
Andhra Pradesh	14	1	9	2	7	14	2	10	3	7	10
Assam	11	10	14	13	14	10	15	12	9	10	6
Bihar	15	12	4	15	1	15	9	11	1	15	1
Gujarat	1	14	1	11	2	11	5	14	14	3	2
Haryana	12	9	8	14	3	12	11	6	6	8	5
Karnataka	9	4	10	4	6	5	1	8	2	14	7
Kerala	4	2	6	6	13	8	4	2	7	11	3
Madhya Pradesh	5	3	15	3	10	6	7	1	15	1	13
Maharashtra	3	13	5	8	11	7	3	15	8	6	15
Orissa	13	7	11	5	15	1	13	5	12	2	12
Punjab	7	8	13	9	8	9	8	9	10	12	9
Rajasthan	2	15	2	10	4	2	12	13	13	5	14
Tamil Nadu	6	5	3	7	12	3	10	4	4	13	8
Uttar Pradesh	10	11	12	12	5	13	14	7	11	9	11
West Bengal	8	6	7	1	9	4	6	3	5	4	4

Note: The state with highest growth rate is assigned rank 1 and vice-versa.

Source: Handbook of Statistics on Indian Economy, 2003-04

6
Openness Index and Industrial Jobs

As discussed above, the openness at the state level is responsible for substantial divergence of net state domestic product in India. It is clearly established that the states with traditional emphasis on production of commodities that are intrinsically import competing in nature have suffered an income loss over these years. On the other hand, provinces that retained larger share of production in the export category faced improvement in their PCNSDP. It is, however, not clear from the above results whether industrial employment or unemployment is affected by the openness in trade.

Theoretically, it is expected that as trade barriers crumble, i.e. the economy becomes more open to imports from the rest of the world the import-competing industries must suffer. Output and employment in these industries are expected to contract. On the other hand, an increase in exports, or at least the potential of it, must imply higher output and employment in those industries, which are either direct producers of export commodities or are somehow linked to it as, viz. suppliers of intermediate commodities.

This particular section takes up this exercise where we link trade openness to annual growth in employees and annual growth in workers across various industries in India as classified by the SIC. The results given in Tables 10 and 11 display that across industry types (SIC 20-21 to SIC 37) the correlation coefficient between regional openness index and growth of workers (blue-collared jobs in the factories earning 'wages', as categorized by the Annual Survey of Industries) and that of employees (white-collared jobs in respective industry types, earning 'salaries', ASI) fluctuates around the zero value and some of these are statistically significant. The procedure is as follows: first we calculate the state specific growth rate of employees and workers for each industry type between 1981-82 and 1997-98.

Second, we find the correlation of such growth rates (over these years) with that of trade openness across states and come up with a value. So, in Table 10 for example, the correlation coefficient between TOI and growth of employees across states for the industry type 20-21 and for the year 1981-82 is (–0.041). All other values are similarly calculated and reported in Tables 10 and 11 (also see figures 7 and 8).

Table 10: Correlation between Growth of Workers and TOI across Industries												
Years	**SIC20-21**	**SIC22**	**SIC23**	**SIC25**	**SIC26**	**SIC27**	**SIC28**	**SIC29**	**SIC30**	**SIC33**	**SIC35-36**	**SIC37**
1981-82	-0.062	0.286	-0.094	-0.039	-0.153	-0.103	0.069	-0.085	-0.199	-0.097	0.083	-0.265
1982-83	0.111	-0.381	0.254	0.114	0.399	0.238	-0.228	0.216	-0.222	0.254	0.273	0.357
1983-84	-0.263	0.066	-0.14	-0.221	-0.26	-0.122	-0.205	-0.507	-0.276	-0.137	-0.46	0.13
1984-85	-0.462	-0.054	0.019	-0.047	0.217	-0.059	0.132	-0.109	0.338	0.301	-0.027	-0.388
1985-86	0.314	0.103	-0.447	0.254	-0.721	0.198	0.195	0.019	-0.636	0.022	-0.217	0.224
1986-87	-0.076	-0.491	0.189	0.258	0.06	-0.439	0.013	0.107	-0.278	0.071	-0.026	0.065
1987-88	-0.38	0.737	-0.231	-0.15	-0.365	0.409	-0.085	-0.128	0.054	-0.305	0.449	0.065
1988-89	-0.1	-0.446	0.457	0.539	0.309	0.143	-0.111	-0.359	0.088	0.47	-0.319	0.121
1989-90	0.186	0.191	-0.479	-0.364	-0.298	-0.205	-0.293	0.22	0.032	-0.246	-0.434	-0.35
1990-91	0.363	0.276	-0.294	-0.227	0.522	-0.075	0.421	-0.113	-0.327	-0.099	-0.151	0.023
1991-92	-0.194	-0.62	0.442	0.002	0.157	-0.211	0.543	-0.536	0.365	0.318	0.028	-0.214
1992-93	0.243	-0.035	-0.069	-0.132	-0.151	-0.062	-0.024	-0.004	0.347	-0.241	-0.568	0.393
1993-94	-0.434	0.446	-0.426	-0.277	-0.07	-0.07	0.066	-0.097	-0.313	-0.406	-0.259	-0.254
1994-95	0.191	-0.432	-0.307	0.37	0.354	-0.218	-0.077	0.026	0.293	0	0.318	0.436
1995-96	-0.132	-0.137	0.428	0.026	-0.697	-0.169	0.152	-0.033	0.072	0.221	0.068	0.026
1996-97	-0.128	-0.033	-0.528	0.272	-0.242	-0.568	-0.149	-0.386	-0.526	0.066	-0.186	0.02
1997-98	-0.261	-0.101	-0.16	-0.527	0.417	0.337	0.284	0.186	0.275	0.125	-0.343	0.143

Table 11: Correlation between TOI and Growth of Employees across Industries (SIC)												
Years	**SIC20-21**	**SIC22**	**SIC23**	**SIC25**	**SIC26**	**SIC27**	**SIC28**	**SIC29**	**SIC30**	**SIC33**	**SIC35-36**	**SIC37**
1981-82	-0.041	0.357	0.464	-0.022	-0.169	-0.46	0.012	-0.114	-0.319	-0.445	0.032	-0.243
1982-83	0.007	-0.329	0.294	0.134	0.401	0.347	-0.157	0.265	-0.206	0.285	0.255	0.345
1983-84	0.001	0.041	-0.086	-0.199	-0.279	-0.329	-0.09	-0.505	-0.281	-0.301	-0.557	0.155
1984-85	-0.505	-0.045	-0.022	-0.108	0.167	-0.03	0.143	-0.057	0.345	0.489	-0.444	-0.391
1985-86	0.151	0.157	-0.451	0.272	-0.706	0.21	0.247	-0.064	-0.631	-0.055	-0.233	0.236
1986-87	-0.035	-0.49	0.251	0.243	0.06	-0.461	-0.034	0.035	-0.355	-0.08	0.093	0.04
1987-88	-0.344	0.706	-0.341	-0.134	-0.363	0.425	-0.089	-0.145	0.051	-0.259	0.283	0.051
1988-89	-0.012	-0.494	0.468	0.533	0.35	0.173	-0.111	-0.362	0.154	0.468	-0.228	0.149
1989-90	0.218	0.238	-0.469	-0.365	-0.279	-0.224	-0.3	0.257	-0.027	-0.219	-0.519	-0.378
1990-91	0.371	0.212	-0.293	-0.195	0.53	-0.101	0.403	-0.088	-0.386	-0.101	-0.057	-0.005
1991-92	-0.197	-0.636	0.456	0.001	0.035	-0.153	0.59	-0.551	0.278	0.274	-0.011	-0.259
1992-93	0.222	-0.079	-0.145	-0.25	-0.043	-0.172	0	-0.004	0.343	-0.055	-0.521	0.389
1993-94	-0.377	0.458	-0.398	-0.233	-0.162	0.128	0.029	-0.046	-0.295	-0.098	-0.259	-0.218
1994-95	0.262	-0.44	-0.324	0.369	0.352	-0.305	-0.043	-0.009	0.301	0.03	0.319	0.441
1995-96	-0.142	-0.193	0.428	0.021	-0.664	-0.212	0.178	0.07	0.114	0.184	0.183	-0.027
1996-97	-0.196	-0.065	-0.629	0.281	-0.149	-0.564	-0.235	-0.441	-0.362	0.111	0.011	-0.028
1997-98	-0.254	-0.07	-0.109	-0.191	0.055	0.375	0.147	0.077	0.074	0.041	-0.295	0.205

Figure 7: Correlation between Regional TOI and Growth of Workers across Industries (SIC)

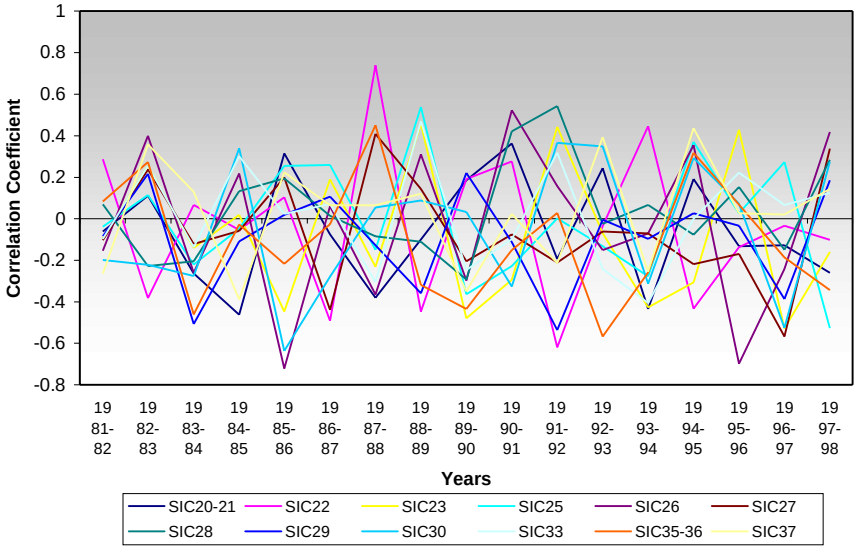
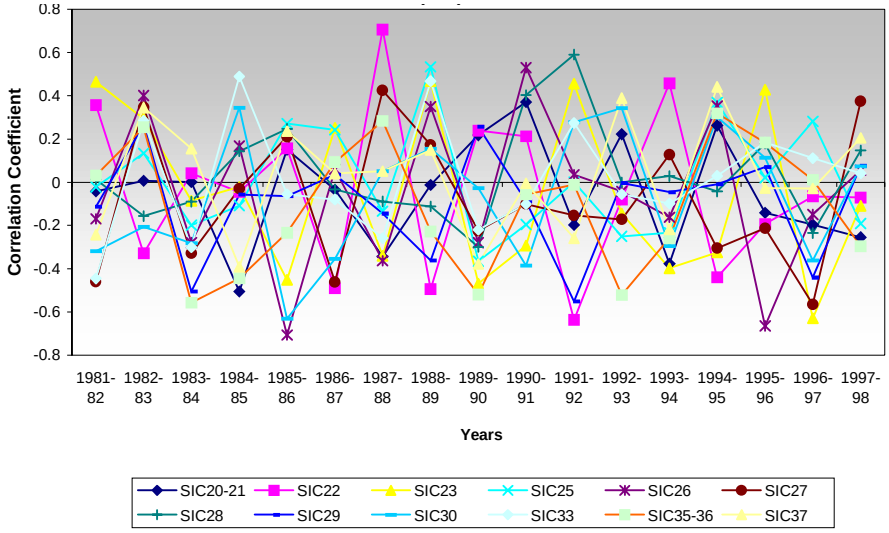


Figure 8: Correlation between TOI and Growth of Employees across Industries (SIC)



Clearly, the correlation coefficients show that there is no uniform and monotonic relation between the growth rates of employees and workers and the TOI. However, fitting second-order polynomials to the evolving patterns in the correlation coefficient reveals that in most cases the relationship inverted U-shaped (or at best concave), in that, it is increasing till the immediate pre-reform period after which it falls at an increasing rate. In other words, the trade openness (or lack of it) may have significantly affected the

growth of employment in general. There is a sharp contrast nevertheless between growth of employees and growth of workers, the latter (second-order polynomial) trend never crosses the zero correlation bound despite increasing and decreasing patterns that roughly match the trend in employment growth in this particular industry.

Once again, this implies that trade openness across the states may have caused a reduction in the growth of both industrial workers and employees for most industry types, but the effect is dissimilar. It also clearly establishes that relatively skilled individuals (employees) have suffered less due to such visible drop in the growth of jobs, as compared to relatively unskilled individuals (workers). Figures 9 and 10 demonstrate the claims made here (for SIC 20-21), and although we do not report the case for each industry type, the general patterns is quite similar.

Figure 9: Correlation Coefficients between Growth Rate of Workers and TOI for SIC 20-21

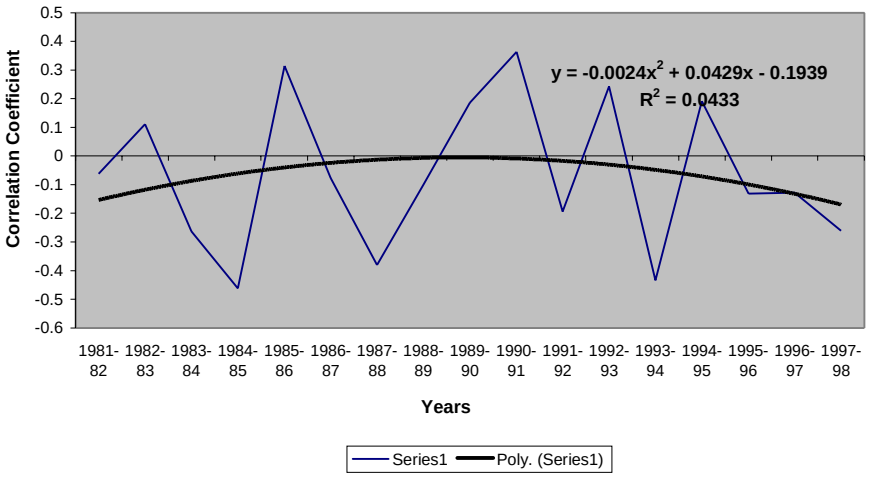
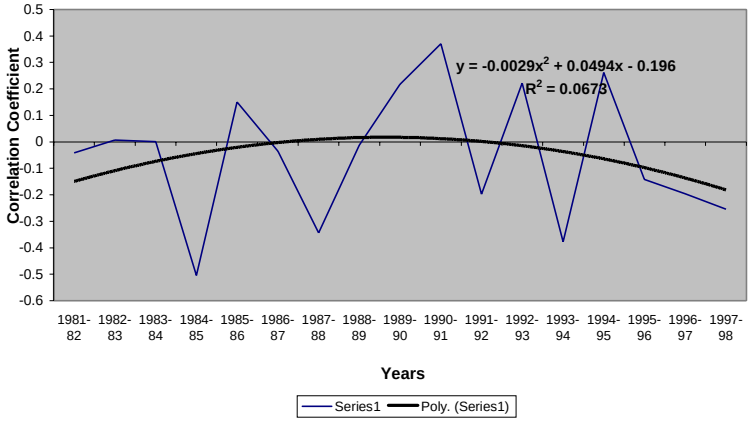


Figure 10: Correlation Coefficients between Growth Rate of Employees and TOI for SIC 20-21



7
Openness Index and Poverty across States in India

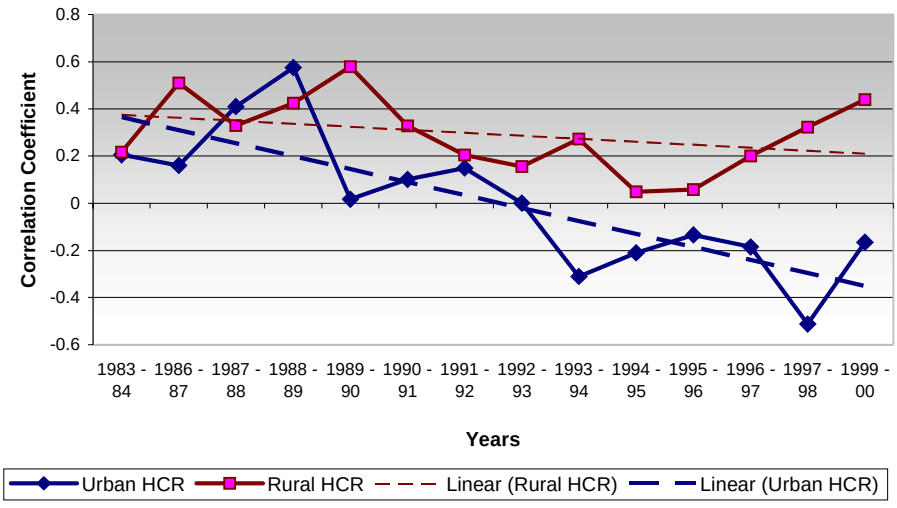
This section forms the core of the entire analysis and aims at understanding the relationship between various indices of poverty in the states of India and the corresponding level of trade openness. It is well known that poverty measurements in India are fraught with numerous problems and that the data is not available on a continuous basis. Therefore, the estimates of poverty that we work with are limited to only a few entries within the overall time frame we are concerned with. Nevertheless, the available data on HCR, Poverty Gap Index (PGI), SPGI and Gini coefficient, may be considered sufficient to obtain an overall understanding of the relationship between each of these measures and the state level TOI in India. Methodologically, therefore, we begin by obtaining the data on the said measures of poverty and inequality (Planning Commission, India) at the state level for the specific time periods during which they were collected. The data on say, HCR for a particular year and across states is then used to obtain the correlation coefficient with that of the TOI for that particular year and across states.

In Table 12 for example, the correlation coefficient between TOI and Urban HCR for the year 1983-84 is (0.206) and statistically significant, whereas, the correlation coefficient between TOI and rural HCR is 0.217. Figure 11 clearly demonstrates how the correlation coefficients have changed over time and the trend lines associated with each of the rural and urban HCR and TOI interaction show a declining trend. In other words, the state specific trade openness and urban HCR show a trend of negative correlations, i.e., higher the level of openness lower is the urban HCR or vice versa.

Interestingly, although the rural HCR and TOI coefficients also show a downward movement, the slope is rather flat, implying that the negativity of the correlation is not strong enough. In other words, the TOI does not significantly lower the rural HCR across states in India, reinforcing the previous conjectures that trade did help the urban skilled population and other factors of production more than proportionately to their rural counterpart, which in effect has either directly or by spillovers reduced urban poverty more effectively. This again reinforces our primary conjectures on interregional disparity owing to greater exposure to international trade in the wake of the process of liberalisation in India.

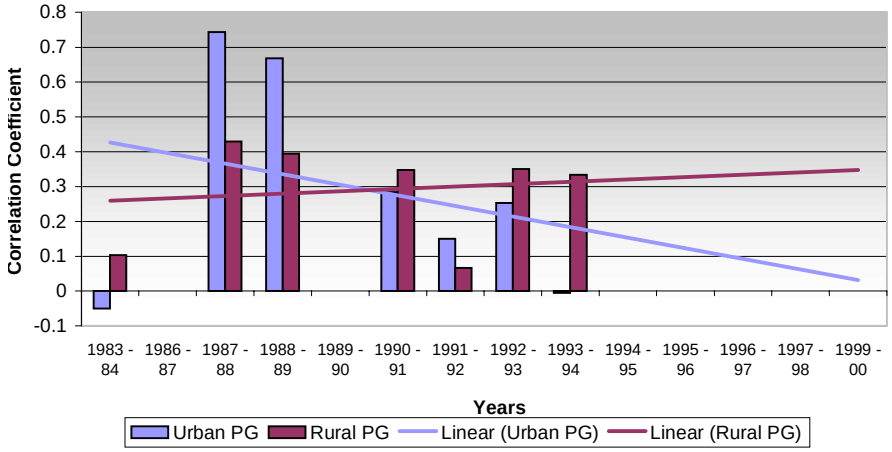
Table 12: Correlation between TOI and Urban and Rural HCR, Urban and Rural PG, Urban and Rural SPG and Urban and Rural GINI								
Year	Urban HCR	Rural HCR	Urban PG	Rural PG	Urban SPG	Rural SPG	Urban GINI	Rural GINI
1983 - 84	0.206	0.217	-0.05	0.103	-0.048	0.118	0.128	-0.153
1986 - 87	0.161	0.511						
1987 - 88	0.41	0.33	0.744	0.429	0.744	0.359	0.321	-0.088
1988 - 89	0.576	0.425	0.668	0.394	0.668	0.308	-0.016	-0.243
1989 - 90	0.017	0.579						
1990 - 91	0.101	0.328	0.284	0.347	0.284	0.221	0.155	-0.434
1991 - 92	0.149	0.205	0.15	0.067	0.15	-0.07	0.132	-0.569
1992 - 93	0.001	0.156	0.253	0.35	0.253	0.322	0.229	-0.299
1993 - 94	-0.31	0.273	-0.005	0.334	-0.005	0.275	0.209	-0.427
1994 - 95	-0.21	0.048					-0.101	-0.035
1995 - 96	-0.134	0.058					0.236	0.552
1996 - 97	-0.185	0.2					0.18	0.477
1997 - 98	-0.512	0.323						
1999 - 00	-0.165	0.439						

Figure 11: Correlation Coefficient between Urban and Rural HCR and TOI



When it comes to investigating the relationship between urban poverty gap and TOI, the working hypothesis would be that trade lowers the depth of poverty in urban locations, which can potentially gain most out of increased trade in goods and services simply owing to the larger concentration of such activities in the cities. Figure 12 directly establishes that when the correlation trend in rural poverty gap and TOI is increasing though marginally, the urban trend line is negatively sloped, but less steep compared to that between urban HCR and TOI.

Figure 12: Correlation between TOI and Urban and Rural Poverty Gap



This means that with increased openness the depth of poverty has gone up in the rural areas, i.e., trade exacerbated the poverty problem, in comparison to that in the cities where trade has eased the situation in deep pockets of poverty. In fact, in a separate venture, Marjit and Kar (2007) show that in the poet-reform period the marginalised informal workers employed in urban non-directory manufacturing enterprises register an average increase of 10 percent in their real wages across different states in India. This certainly has direct implications for poverty reduction in each state with consequent impact on the depth of poverty.

Finally, Figures 13 and 14 provide observations on the conditions of the severity of poverty (squared poverty gap) and the extent of inequality (Gini coefficient) in rural and urban locations across states in India. Once again, not surprisingly, the impact of greater trade openness on the urban squared poverty gap is negatively sloped, though even less steep compared to the previous case, implying that the positive effects of trade slowly tapers off as one goes deeper down the poverty measurements.

The impact on rural SPGI is almost constant, which is to say, that annual variations in the degree of openness did not affect the rural SPGI at all. The evidence completely turns around when one considers the relationship between TOI and Gini coefficients, where the level of inequality within urban locations remains constant despite significant variations in the state TOI over the years. Interestingly, the same correlation returns a positively sloping curve for the rural counterpart, i.e. the level of rural inequality unambiguously increased between 1983-84 and 1999-00, as explained by its correlation with the state level TOI. To sum up therefore, the directional uniformity in all of the

above results indicate that the urban locations in India unambiguously benefited from the exposure to increased trade in goods and services as compared to the rural counterparts, which suffered not only from an increase in the extent and depth of poverty, but also from a higher level of inequality.

Figure 13: Correlation between TOI and Urban and Rural Squared Poverty Gap

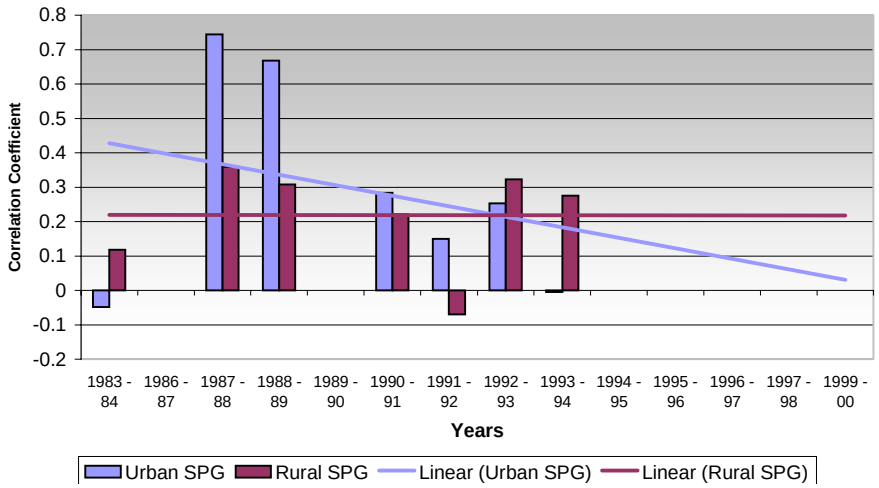
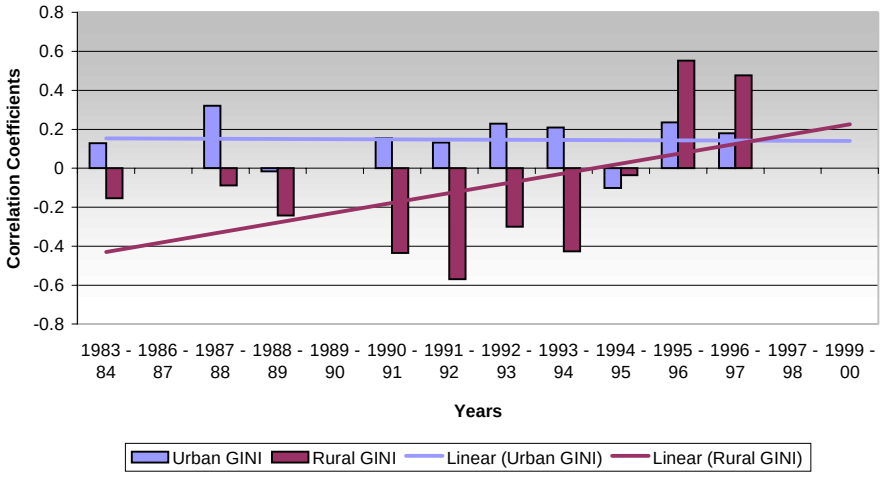


Figure 14: Correlation between TOI and Urban and Rural Gini



8
Concluding Remarks

Our objective has been to devise an openness index and develop a ranking of the Indian states according to their exposure to international trade. This is a proxy measure since trade data are not available at the regional level. This paper established that states with relatively high levels of income are also the states with greater exposure to trade and such relationship has grown stronger over time. This amounts to the suggestion that if we pick a relatively affluent state now, the chances that it is fairly open are higher than what would be in early 1980s. We do not establish any causal link between regional prosperity and trade, which is an important future research agenda. In the process, we reconfirm general theoretical intuition that exporting states are getting richer over the years and the import competing states are falling behind. Also a state generates higher PCNSDP by switching their production from import competing sectors to the export sectors.

The openness index thus constructed is applied to two other issues that assume enormous importance under the present circumstances in India. In section 5, we show that across various industries trade openness led to significant decline in the rate of growth of employees and workers, where the negative impact on workers is stronger compared to their white collared counterparts. The skill based technological changes and the overwhelming contribution of service sector in the country's GDP have unambiguously led to an increased demand for skilled workforce, unlike in the industrial sector in general, where exposure to foreign competition has reduced (slow/negative growth) employment opportunities significantly. Consideration of all these factors mentioned here may be taken up for further explanations in a similar vein. The other issue, which forms the core of all the preceding exercises, is the effect of state level trade openness on the extent and depth of poverty in India. Here, we find evidences in support of a lower incidence and depth of poverty for urban locations as compared to rural areas, much to the conformity of other independent studies on economic reforms and poverty. Furthermore, there is clear evidence in support of increasing inequality in the rural areas when the level of inequality is correlated with the state level openness index.

One caveat is warranted at the final stage. Our openness is related to export items, which command significant share of total exports, and not those which are outgrowing others but remains less significant in terms of overall share. This does not allow us to look at, for example, software related exports. Also it is impossible to find a constant state-wise data set over time. One could make a separate ranking based on the 'growth' in export, which we do not attempt here.

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Annexure

Table A: NIC 1987 and 1998 classifications		
Industry	**1987 code**	**1998 code**
FOOD, BEVERAGES & TOBACCO	20-22	15-16
TEXTILES	23-26	17-18
WOOD	27	20
PAPER	28	21-22
LEATHER	29	19
CHEMICAL	30	24
RUBBER PLASTICS & PETROLEUM	31	23,25
NONMETAL	32	26
BASIC-METALS	33	27
METAL PRODUCTS	34	28
MACHINARY & EQUIPMENT	35-36	29-33,36
TRANSPORT	37-38	34-35
Source: Summary Statistics, ASI (1997, 1998)		

Table B: DGCI&S Trade Classifications Tallied with ASI Data			
ASI	**NIC code**	***DGCI&S (1980-81 to 1987-88)***	***DGCI&S (1987-88 to 2002-03)***
RS LAKHS		*RS THOUSAND*	*RS LAKH*
FOOD, BEVERAGES & TOBACCO	15-16	Section (0+1+4)	Chapter 1-24
TEXTILES	17-18	Division (26+65+84)	Chapter 50-63
WOOD	20	Division (24+63)	Chapter 44-46
PAPER	21-22	Division (25+64+892)	Chapter 47-49
LEATHER	19	Division 61	Chapter 41-43
CHEMICAL	24	Section 5-Division 58	Chapter 28-38
RUBBER, PLASTICS & PETROLEUM	23,25	Section 3+ Division (23+58+62)	Chapter 27+ Chapter 39-40
NONMETAL	26	Division 66	Chapter 68-70
BASE-METALS	27	Division (67+68)	Chapter 72-81
METAL- PRODUCTS	28	Division 69	Chapter 82-83
MACHINERY & EQUIPMENTS	29-33,36	Section7+ Division (87+88)- Division 78	Chapter 84-85 + Chapter 90-92
TRANSPORT	34-35	Division 78	Chapter 86-89
Note: All data in this analysis has been converted to Rs lakh before further analysis.			

Table C: Shares of Export Commodities in Total Exports of India over the Years												
Industrial groups	***1980-81***	***1981-82***	***1982-83***	***1983-84***	***1984-85***	***1985-86***	***1986-87***	***1987-88***	***1988-89***	***1989-90***	***1990-91***	
FOOD, BEVERAGES & TOBACCO	0.2780	0.2787	0.2467	0.2350	0.2283	0.2504	0.2410	0.2165	0.1824	0.1769	0.1683	
TEXTILES & CLOTHING	0.1117	0.0919	0.0828	0.0262	0.0146	0.1088	0.1305	0.2649	0.2279	0.2399	0.2744	
WOOD	0.0028	0.0026	0.0018	0.0014	0.0013	0.0014	0.0015	0.0012	0.0010	0.0009	0.0008	
PAPER	0.0020	0.0029	0.0021	0.0020	0.0023	0.0024	0.0021	0.0021	0.0019	0.0019	0.0019	
LEATHER	0.0502	0.0473	0.0409	0.0439	0.0534	0.0594	0.0587	0.0558	0.0525	0.0507	0.0539	
CHEMICAL	0.0347	0.0477	0.0393	0.0333	0.0407	0.0356	0.0382	0.0470	0.0681	0.0840	0.0787	
RUBBER, PLASTICS & PETROLEUM	0.0084	0.0338	0.1467	0.1672	0.1619	0.0684	0.0413	0.0499	0.0340	0.0377	0.0413	
NON-METAL	0.0963	0.1039	0.1122	0.1280	0.1019	0.1334	0.1636	0.0031	0.0038	0.0038	0.0043	
BASE-METALS	0.0127	0.0118	0.0087	0.0072	0.0080	0.0090	0.0065	0.0179	0.0285	0.0330	0.0342	
METAL PRODUCTS	0.0277	0.0283	0.0223	0.0201	0.0170	0.0140	0.0132	0.0062	0.0070	0.0068	0.0067	
MACHINERY & EQUIPMENT	0.0562	0.0578	0.0509	0.0445	0.0446	0.0514	0.0548	0.0533	0.0589	0.0598	0.0570	
TRANSPORT EQUIPMENT	0.0292	0.0272	0.0208	0.0157	0.0162	0.0172	0.0162	0.0162	0.0180	0.0196	0.0222	
	1991-92	***1992-93***	***1993-94***	***1994-95***	***1995-96***	***1996-97***	***1997-98***	***1998-99***	***1999-00***	***2000-01***	***2001-02***	***2002-03***
FOOD, BEVERAGES & TOBACCO	0.1798	0.1727	0.1775	0.1639	0.1970	0.1974	0.1888	0.1853	0.1567	0.1388	0.1396	0.1308
TEXTILES & CLOTHING	0.2732	0.2760	0.2579	0.2731	0.2561	0.2742	0.2685	0.2721	0.2704	0.2597	0.2362	0.2249
WOOD	0.0009	0.0007	0.0023	0.0017	0.0012	0.0013	0.0010	0.0007	0.0008	0.0008	0.0008	0.0009
PAPER	0.0020	0.0025	0.0025	0.0038	0.0048	0.0043	0.0033	0.0038	0.0044	0.0054	0.0057	0.0061
LEATHER	0.0471	0.0491	0.0402	0.0429	0.0384	0.0326	0.0338	0.0346	0.0290	0.0314	0.0306	0.0252
CHEMICAL	0.0861	0.0684	0.0709	0.0784	0.0774	0.0856	0.0944	0.0906	0.0955	0.0951	0.0971	0.1024
RUBBER, PLASTICS & PETROLEUM	0.0350	0.0464	0.0455	0.0454	0.0412	0.0376	0.0321	0.0232	0.0221	0.0672	0.0762	0.0804
NON-METAL	0.0057	0.0071	0.0080	0.0099	0.0102	0.0098	0.0094	0.0091	0.0106	0.0118	0.0115	0.0118
BASE-METALS	0.0387	0.0519	0.0558	0.0481	0.0485	0.0513	0.0562	0.0469	0.0545	0.0602	0.0574	0.0734
METAL PRODUCTS	0.0069	0.0076	0.0077	0.0070	0.0073	0.0071	0.0069	0.0069	0.0081	0.0077	0.0079	0.0068
MACHINERY & EQUIPMENT	0.0524	0.0454	0.0475	0.0502	0.0538	0.0613	0.0627	0.0581	0.0572	0.0684	0.0728	0.0683
TRANSPORT EQUIPMENT	0.0277	0.0287	0.0266	0.0292	0.0291	0.0289	0.0266	0.0229	0.0221	0.0237	0.0233	0.0254

Table D: Share of Import Commodities in Total Imports of India over the Years												
Industrial groups	***1980-81***	***1981-82***	***1982-83***	***1983-84***	***1984-85***	***1985-86***	***1986-87***	***1987-88***	***1988-89***	***1989-90***	***1990-91***	
FOOD, BEVERAGES & TOBACCO	0.0868	0.1014	0.0762	0.1163	0.1017	0.0840	0.0701	0.0864	0.0824	0.0367	0.0342	
TEXTILES & CLOTHING	0.0178	0.0258	0.0180	0.0245	0.0202	0.0210	0.0188	0.0203	0.0244	0.0219	0.0208	
WOOD	0.0007	0.0012	0.0004	0.0004	0.0005	0.0006	0.0066	0.0108	0.0129	0.0113	0.0106	
PAPER	0.0177	0.0226	0.0157	0.0183	0.0241	0.0272	0.0264	0.0267	0.0246	0.0215	0.0241	
LEATHER	0.0001	0.0003	0.0002	0.0004	0.0006	0.0004	0.0008	0.0011	0.0018	0.0030	0.0045	
CHEMICAL	0.0959	0.0881	0.0596	0.0763	0.1289	0.1298	0.1096	0.0831	0.1098	0.1198	0.1087	
RUBBER, PLASTICS & PETROLEUM	0.4354	0.4008	0.4188	0.3269	0.3394	0.2891	0.1808	0.2263	0.2081	0.2325	0.3071	
NON-METAL	0.0442	0.0376	0.0591	0.0807	0.0650	0.0611	0.0805	0.0046	0.0057	0.0048	0.0047	
BASE-METALS	0.1060	0.1176	0.1061	0.0909	0.0790	0.0347	0.1032	0.1129	0.1257	0.1315	0.1096	
METAL PRODUCTS	0.0071	0.0085	0.0010	0.0094	0.0082	0.0103	0.0104	0.0027	0.0025	0.0025	0.0025	
MACHINERY & EQUIPMENT	0.1215	0.1379	0.1515	0.1921	0.1719	0.1981	0.2979	0.1976	0.1781	0.1729	0.1599	
TRANSPORT EQUIPMENT	0.0376	0.0224	0.0448	0.0282	0.0215	0.0289	0.0400	0.0342	0.0267	0.0422	0.0387	
	1991-92	***1992-93***	***1993-94***	***1994-95***	***1995-96***	***1996-97***	***1997-98***	***1998-99***	***1999-00***	***2000-01***	***2001-02***	***2002-03***
FOOD, BEVERAGES & TOBACCO	0.0287	0.0390	0.0327	0.0614	0.0439	0.0459	0.0516	0.0790	0.0655	0.0439	0.0548	0.0541
TEXTILES & CLOTHING	0.0173	0.0221	0.0232	0.0329	0.0266	0.0200	0.0202	0.0201	0.0227	0.0232	0.0298	0.0267
WOOD	0.0088	0.0091	0.0062	0.0079	0.0069	0.0070	0.0103	0.0091	0.0093	0.0098	0.0108	0.0068
PAPER	0.0185	0.0179	0.0192	0.0180	0.0229	0.0208	0.0224	0.0203	0.0169	0.0182	0.0187	0.0161
LEATHER	0.0040	0.0039	0.0050	0.0044	0.0038	0.0037	0.0037	0.0036	0.0032	0.0040	0.0044	0.0035
CHEMICAL	0.1341	0.1279	0.1151	0.1310	0.1366	0.1128	0.1222	0.1146	0.1075	0.0847	0.0946	0.0852
RUBBER, PLASTICS & PETROLEUM	0.3359	0.3217	0.2984	0.2679	0.2713	0.3213	0.2675	0.2136	0.3103	0.3658	0.3280	0.3408
NON-METAL	0.0046	0.0041	0.0038	0.0047	0.0041	0.0033	0.0036	0.0040	0.0035	0.0037	0.0046	0.0040
BASE-METALS	0.0840	0.0835	0.0748	0.0899	0.0860	0.0849	0.0752	0.0563	0.0442	0.0405	0.0470	0.0406
METAL PRODUCTS	0.0027	0.0026	0.0028	0.0029	0.0027	0.0031	0.0033	0.0037	0.0043	0.0029	0.0027	0.0028
MACHINERY & EQUIPMENT	0.1352	0.1408	0.1497	0.1681	0.1928	0.1651	0.1763	0.1630	0.1439	0.1565	0.1681	0.1886
TRANSPORT EQUIPMENT	0.0192	0.0211	0.0545	0.0389	0.0302	0.0380	0.0254	0.0189	0.0230	0.0189	0.0224	0.0309

Table E: Value of Relative Mean Deviation												
	1980-81	**1981-82**	**1982-83**	**1983-84**	**1984-85**	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**	**1991-92**
Andhra Pradesh	-15.410	-7.009	-7.449	-10.264	-0.151	-14.610	-18.797	-10.312	-8.450	-6.107	-6.570	-2.979
Assam	-21.295	-16.907	-14.910	-17.192	-0.188	-18.030	-22.052	-20.828	-30.545	-29.242	-29.973	-28.394
Bihar	-43.791	-43.874	-44.635	-43.499	-0.397	-41.698	-38.433	-43.372	-44.379	-47.946	-45.711	-49.762
Gujarat	18.916	23.513	18.901	31.985	0.287	18.667	23.459	7.108	31.464	23.325	19.780	8.250
Haryana	45.274	42.183	47.264	39.646	0.411	57.046	53.238	46.101	57.978	51.777	59.148	59.079
Karnataka	-6.828	-6.180	-6.087	-6.320	-0.018	-10.756	-4.314	-0.065	-4.992	-4.148	-7.523	2.840
Kerala	-7.564	-12.936	-12.068	-20.798	-0.173	-18.193	-21.184	-20.073	-22.476	-20.473	-17.682	-16.982
Madhya Pradesh	-16.759	-19.396	-17.811	-19.615	-0.255	-23.513	-28.670	-21.314	-26.559	-28.962	-23.079	-30.076
Maharashtra	49.258	44.672	46.850	45.279	0.436	46.841	44.614	49.984	44.097	59.240	57.969	54.533
Orissa	-19.456	-23.545	-29.477	-20.741	-0.261	-21.721	-22.106	-26.383	-22.044	-20.753	-37.275	-30.440
Punjab	63.908	70.394	72.075	63.587	0.725	76.372	79.113	83.907	69.362	73.979	69.171	73.901
Rajasthan	-25.095	-23.841	-24.443	-14.094	-0.226	-27.367	-22.540	-30.159	-13.974	-19.960	-11.922	-20.210
Tamil Nadu	-8.177	-2.801	-9.581	-10.883	-0.013	-2.396	-4.802	-0.928	-4.560	-2.329	1.457	3.204
Uttar Pradesh	-21.662	-24.375	-20.417	-23.164	-0.240	-25.358	-23.950	-22.716	-23.917	-25.697	-25.075	-26.030
West Bengal	8.680	0.103	1.788	6.073	0.062	4.716	6.426	9.050	-1.005	-2.702	-2.715	3.067
	1992-93	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	
Andhra Pradesh	-11.206	-4.228	-5.514	-3.305	-3.505	-9.121	-2.587	-2.901	3.860	5.603	3.636	
Assam	-32.196	-26.195	-29.702	-30.992	-34.344	-35.693	-39.660	-40.528	-39.456	-39.618	-39.372	
Bihar	-55.712	-60.780	-59.490	-67.317	-62.168	-65.605	-65.803	-66.270	-60.483	-64.623	-60.549	
Gujarat	34.606	26.508	41.343	39.561	49.672	44.435	46.322	36.709	27.230	31.713	41.693	
Haryana	48.977	43.077	42.115	38.315	42.702	37.456	35.595	36.812	40.810	41.160	43.203	
Karnataka	-0.798	1.222	-0.784	0.253	1.890	4.471	12.381	12.180	21.230	14.632	14.990	
Kerala	-15.866	2.513	4.350	4.806	1.856	0.732	2.474	4.634	7.069	6.599	10.994	
Madhya Pradesh	-29.540	-14.973	-19.740	-18.652	-19.656	-18.995	-18.812	-15.207	-26.702	-23.363	-31.634	
Mahara- shtra	67.092	57.334	48.977	58.395	52.597	54.498	50.594	56.037	44.773	45.858	50.727	
Orissa	-35.724	-36.772	-38.071	-37.653	-45.904	-40.287	-41.716	-41.042	-43.338	-41.002	-43.124	
Punjab	71.186	64.140	56.647	55.843	55.328	53.244	52.693	52.243	53.300	51.253	48.758	
Rajasthan	-13.993	-20.164	-12.584	-13.548	-10.895	-4.572	-6.741	-12.051	-17.441	-14.683	-25.855	
Tamil Nadu	2.903	15.647	21.701	21.567	18.448	24.930	23.493	25.226	32.609	26.587	25.125	
Uttar Pradesh	-29.670	-34.577	-36.172	-37.030	-35.330	-38.778	-42.132	-41.658	-43.256	-43.391	-45.327	
West Bengal	-0.058	-12.752	-13.074	-10.242	-10.691	-6.713	-6.102	-4.186	-0.204	3.274	6.735	

Appendix

We have taken data for the 15 major states of India over the period 1980-81 to 2003-2004 (in 1993-94 prices) for estimating the effect of openness- index on the growth-rate of the Indian States, taking into consideration some other factors. We have applied pooled regression method for the purpose. The result of the regression has been given in Table 1A.

It can be seen from the table-1 that the coefficient of the initial level of Per Capita Net State Domestic Product (PCNSDP) is negative implying that conditional convergence exists, because the lower is the initial level of PCNSDP, the higher is the growth- rate. Openness- index, total factor productivity growth, revenue- expenditure and per capita electricity consumption affects growth positively. The coefficient of opennes- index is negative, since openness index is defined in such a way that more open or trade oriented a state is, lesser is its corresponding openness- index compared to other states. Hence, openness affects growth positively but not significantly. Hence, it can be said that more open a state is the higher will be its growth- rate. Except total factor productivity growth none of the factors are statistically significant- this is quite possible, given the fact that there are some other important factors affecting growth.

Table 1A: Regression Results of Growth Rate of PCNSDP on the Following Regressors

Regressors	Coefficient	Standard Error	t	P>|t|
Constant	11.52158	7.374853	1.56	0.119
pcnsdp80	-0.0014912	0.0008334	-1.79	0.074
Openness- Index	-0.1705467	0.3871712	-0.44	0.660
Total Factor Productivity Growth	0.1420588	0.0425018	3.34*	0.001
RE/NSDP	0.0270154	0.2417794	0.11	0.911
Electricity consumption	0.0065689	0.0048961	1.34	0.181

**Significant at 10 percent confidence- interval*

In Table 1A, PCNSDP 80 stands for the Per capita net state domestic product in the year 1980-81, Total Factor Productivity growth of the states has been calculated by- (TFP-1)*100 taking 1 as the initial level of Total Factor Productivity (TFP) level of each state. RE/NSDP stands for the Revenue- Expenditure of each state as percentage of Net State Domestic Product (NSDP) of the corresponding state. Electricity consumption represents per capita electricity consumption of each state.

Besides this, we have found out the correlation- coefficient of Total Factor Productivity Growth (TFPG) and Opennes- Index (OI) and have found the correlation to be positive (see Table 2A). The coefficient is negative because the way opennes- index is defined (as explained above). It tells us that openness of a state and its total factor productivity growth are positively correlated, which means more open a state is compared to other states, its factor productivity will increase faster than others.

We have also run pooled regression of total factor productivity growth on openness-index (Table-3). It can be seen from the table-3 that openness- index affects total factor productivity growth positively though it is not statistically significant.

Table 2A: Correlation-Coefficient of Total Factor Productivity Growth and Openness Index

	OI	TFPG
OI	1.0000	-0.0225
TFPG	-0.0225	1.0000

Table 3A: Regression Results of Total Factor Productivity Growth (TFPG) on Openness Index (OI)

Regressors	Coefficient	Std Eror	t	P>|t|
Constant	0.7310572	4.058564	0.18	0.857
OI	-0.2034836	0.4878859	-0.42	0.677

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