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United Nations Conference on Trade and Development and
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Key Words: Development, Inequality, Polarization, China, India

JEL Classification Numbers: C43, D63, O18

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"Journey of a thousand miles begins with a single step"

Chinese proverb

"We cannot command results, we can only strive"

Mahatma Gandhi

1. Introduction and motivation

This is a comparative study of China and India, two of the most populous countries of the world, and which combine to constitute nearly one-third of the world's population. Both India and China have undertaken fairly extensive economic reform policies during the past two decades.

Since the adoption of the economic reform policy in 1978, the economic growth performance of China has been truly dramatic, compared to any of the present day developed or developing countries. Similarly, in terms of social progress, welfare and poverty reduction, Chinese performance has been quite remarkable in the last two decades! On the other hand, in India, the second most populous country and largest democracy in the world, growth performance since the initiation of the economic reform policies in 1991, has been relatively modest; and falling behind on many fronts relative to the Chinese performance indicators. Figure 1 shows trends over the past decade of Chinese GDP per capita vis-à-vis India's as the improvement has been much faster than Indian GDP per capita.[1] It is evident that until 1990s, GDP per capita (PPP$ international) in China and India was at very similar levels, but since then China burst phenomenally leaving India far behind in the race![2]

Hence, the essential inspiration behind this paper is to compare and understand the differential level of development performance. I intend to discuss this issue at the national level policy changes since economic reform process; and further I investigate inter-regional performance so as to see how far they are contributing to the difference in their development dividend of reform.

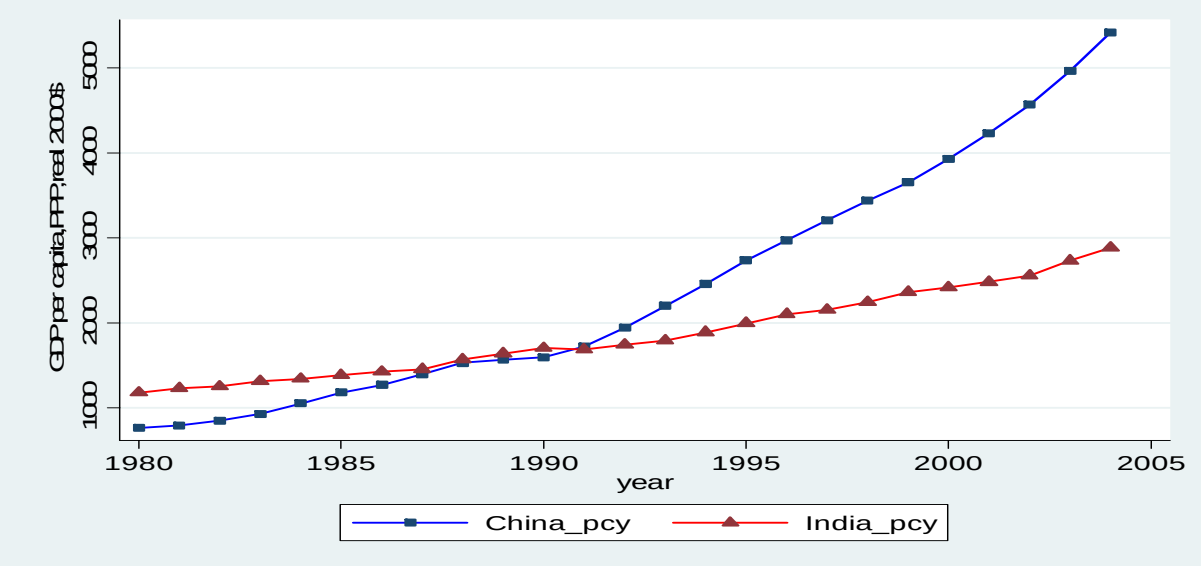
In order to recognize the plausible reasons for better Chinese development, I intend to explore the variation in terms of economic policy strategies that they adopted to accelerate

[1]Klein (2005) observed that "in recent years, we often approached such meetings with the thought that there was a main, sole locomotive for the World economy, but that situation has run its course, and the motive power presently comes from China and India".

[2] In 1979 it was recognised that the GDP per capita (PPP) was twice the India value. Irvine Kravis made the first careful estimates of China's GPP per capita (PPP) units. This study heightened world interest in Chinese production capability. He estimated China at 12.3% of the US value and India at 6.6%. See Report of the CSCPRC Economics, Washington, DC., NAS 1980, delegation to the People's Republic of China.

economic growth. However, national performance depends on the necessary inputs from the different regions at the sub-national level; hence I focus on inter-regional variations as well. This study is a modest attempt to indicate the dynamics of development within the canvas of Chinese and Indian economies, and to show how their respective new economic reform policies have helped raise the economic and social welfare of their citizens under two different institutional systems.

Figure 1: GDP per capita (in constant PPP$ international) trends in China and India



I argue that, although overall, both at the national and regional level, China achieved much better result, but a closer look at the regional analysis of development quality and its dimensions reveal widening gaps in China over the period of analysis. It is therefore crucial to look into the broadly based development strategy which should address regional and societal equity.

The paper is organised as follows: Section 2 draws on some comparative studies on China and India. I specify testable hypotheses of the paper. Section 3 describes the methodology to construct a development quality index (DQI). It describes database and present descriptive statistics therein. I examine the national level DQI on a time series scale in China and India. Afterwards, results are shown for regional level evolution of development quality. Finally, I report the polarization measures to indicate how over the study period the development quality and its dimension evolved in Section 4. Section 5 concludes the paper.

2. Compare China and India: An overview

In this section, I describe some related comparative studies on China and India, both at the national and regional level. There have been some significant studies over the years to understand the differences and similarities of economic performance and development strategies in China and India. Nowadays both countries are "darlings" of international media issue, as they are regularly holding discussions/talk-shows to understand their impact in the world economy. [3]

One of the salient features of the China and India comparison, apart from their economic growth story, rests on their different institutional framework. Many commentators on China and India have been arguing in favour of India's sustainability of economic growth, because of the democratic nature of Indian political system.[4] Klein (2004) described, "India is joining the high-growth club of nations, but in their own way, as a democratic nation. Politically and culturally, the two nations differ markedly, but economically they have some great similarities." This view was echoed by Sen (2005): "China has joined ─ and become a leader of ─ the world economy with stunning success, and from this India, like many other countries, has been learning a great deal, particularly in recent years. The insularity of the earlier Indian approach to economic development needed to be replaced and here the experience of China has been profoundly important…..But the role of democratic participation in India suggests that some learning and understanding may go in the other direction as well." This identifies that political institution ─ democracy─ can hold the key to sustainability of development.[5] I intend to show that good economic policy-making should conform adequately to the institutional arrangements to raise social-dimensions and keep up development quality, otherwise it might indeed suffer. Desai (2003) viewed "India will remain a soft state, a consensual polity, and it will not be capable of sustained growth at the sort of rates which China has attained. …But there will not be growth convergence between China and India …. China will again become a viable Great Power; India may become just a Great Democracy." (See Malenbaum 1959, Kuitenbrouwer 1973, Guha 1993, Bajpai, Jian and Sachs 1997, Khanna and Huang 2003, Srinivasan 2004, Basu, Klein and Nagar 2005, and Bardhan 2006).

[3] International media mainly focussed on the recent poverty rate decline over the decades in China and India. According to China Human Development Report (2005) that headcount poverty ratio declined drastically from 31% in 1978 to 2.8% in 2004, and in India ratio declined from about 60% in 1950s to 23% in 2003 (Latest Planning Commission estimates suggest that poverty is expected to be 19.7% in 2007).

[4] India's gross domestic product (GDP) grew 9.1 percent between April and September in 2006; and China continues to grow at an average of 9% to 10%.

[5] See Dreze and Sen (1997) for comparison between China and India.

Researchers have put forward several reasons of inter-regional differences in China and India. In Chinese case, scholars have argued that the differential level of development across regions could come from different sources, such as geography (coastal provinces), climate and economic policies. Aziz and Duenwald (2001), OECD (2001), and Démurger et al. (2002) provided the above route for discussions of the inter-regional disparities. Kanbur and Zhang (2005) demonstrated that the regional inequality could be explained by factors like, openness and decentralization.[6] (See Bils 2005 for a survey of the literature on "what determined regional inequality in China") Similarly, in Indian case, Scholars demonstrated that economic policies, geographic and institutional factors at the state levels could explain differential level of economic growth performance.[7] (See Nagaraj et al 2000, Sachs et al 2002, Aghion et al 2003, Krishna 2004, Veeramani and Goldar 2005, Agarwal and Basu 2005, Virmani 2006, and Basu 2006a)

By looking at the polarization measures to understand coastal-inland, rural-urban disparities, some recent empirical studies raised the concern of rising inter-regional inequality in China. Zhang and Kanbur (2005) presented the evolution of spatial inequalities in education and healthcare provision in China. The paper concluded that of a substantial rising inequality since reform in China. Similarly, Basu, Fan and Zhang (2006b) provided some further comparison of the regional differences in China and India. All these observations have one thing is common, that is, that of effective economic policy-making has to be coupled with robust institutional arrangements to sustain economic growth, but also help spur social-development and equity.

I postulate that new measure of development quality intend to provide some further explanations of development differentials both in China and India, as they are pursuing similar sets of economic policies with varying degrees of intensity, in the backdrop of different institutional settings. [8] Therefore, the testable hypothesis of this paper is:

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[6] Fan and Zhang (2004) for Chinese provinces and Nagar and Basu (2002) for Indian states highlighted the role of infrastructure in regional economic development.

[7] Rodrik and Subramanian (2005) argued, "India's productivity surge around 1980, more than a decade before serious economic reforms were initiated. Trade liberalization, expansionary demand, a favorable external environment, and improved agricultural performance did not play a role. We find evidence that the trigger may have been an attitudinal shift by the government in the early 1980s that, unlike the reforms of the 1990s, was probusiness rather than promarket in character, favoring the interests of existing businesses rather than new entrants or consumers." According to Aghion et al (2003), benefits from economic liberalization in different states differed because of initial level of technology and institutional factors.

[8] Sen (2004) observed that "The idea of development is a complex one: it is not surprising that people think that the way development is defined could be improved. When the subject began in the 1940s it was primarily driven by the progress in economic growth theory that had occurred through the preceding period in the 1930s as well the 1940s. It was dominated by the basic vision that poor countries are just low-income countries, and the focus was simply on transcending the problems of underdevelopment through economic growth, increasing GNP and

Hypothesis:

Given increasingly converging economic policies in China and India, how much do institutions matter to raising quality of development and reducing inter-regional polarization?

The economic policies and geographical factors could play better roles if they are coupled with effective institutional framework which would help to raise development quality and simultaneously reduce inequalities and polarization across regions. It is inevitable that economic reform policies and opening up of the market would favour some regions and areas, but the success would only be realised if that were to get distributed in lagging regions and areas during the process of economic prosperity. The discussions of results from China and India indicate that by going beyond aggregate and national level- analysis can provide many insights into the dynamics of economic policy-making and the key role of institutional settings.

3. A new measure of development: Development Quality Index (DQI)

In this section, I propose a new measure of development quality. I followed a methodology as described in Nagar and Basu (2002) to construct a composite index based on multivariate statistical technique of principal component analysis.[9] The key advantage of this methodology is the possibility to define a composite measure that is able to account for interactions and interdependence between the identified set of dimensions and variables to construct the DQI. In Basu, Klein and Nagar (2005a), we discussed time-series samples for constructing quality of life in China and India. This type of analysis helps to identify the year-to-year change in development, and provides an estimate of growth rate of development quality in any particular country. The changes in economic policies and/or other changes, in totality, are reflected in the change of development quality in a time series setting. By fixing the base year, say, 1980=100, the development quality index estimates the annual changes for both countries over the period, and their trend helps to estimate the annual average percentage change of the index. In a cross-section type of analysis of an Index, we can obtain only the profile and/or relative standings of countries over the others. By time series profile, we look at the individual country, and trace out its own performance in comparison to the base period.

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so on. That proved to be a not very good way of thinking about development, which has to be concerned with advancing human well-being and human freedom. Income is one of the factors that contribute to welfare and freedom, but not the only factor. The process of economic growth is a rather poor basis for judging the progress of a country; it is not, of course, irrelevant but it is only one factor among many." See www.asiasource.org

[9] See Klein and Ozmurcur (2002/2003) and UNCTAD (2005) for application of this methodology.

3.1 Computational method of DQI

I postulate DQI is, in fact, a **latent variable**, which cannot be measured directly in a straightforward manner. However, I assume that it is linearly determined by many exogenous variables say, $X_1,.....,X_K$.

Let $Y = \alpha + \beta_1 X_1 + ... + \beta_K X_K + e$ --------(1)

where $X_1,.....,X_K$, measured over countries is a set of total number of variables that are used to capture Y (DQI). For normalisation, the maximum and minimum values of these indicators are taken from world sample, so that I can trace out their relative rise over the period at the national level. In the case of regional level analysis, the maximum and minimum values are taken from countries own sample during the period under study.

Following normalization of exogenous variables, I construct principal components of $X_1,.....,X_K$, which have the property that the first principal component (P_1) accounts for the largest proportion of total variation in all development quality variables, the second principal component (P_2) accounts for the second largest proportion of total variation in all development quality variables, and so on. If we compute as many principal components as the number of development quality variables, the total variation in all of them is accounted for by all principal components together. It is worthwhile to note that the principal components are mutually orthogonal. It is worthwhile to note that the Development Quality Index (DQI) is a weighted sum of a normalized version of these selected variables, where respective weights are obtained from the analysis of principal components.

The DQI is can be shown as

$$DQI = \frac{\lambda_1 P_1 + \cdots + \lambda_K P_K}{\lambda_1 + \cdots + \lambda_K} \quad \text{--------(2)}$$

Here weights are the **eigenvalues** of the correlation matrix of exogenous normalised variables. I have arranged them in descending order of magnitude as $Var\ P_1 = \lambda_1, \ \cdots, Var\ P_K = \lambda_K$. Moreover, I assign largest weight $\lambda_1 / \sum \lambda_i$ to P_1 because it accounts for the largest proportion of total variation in all development quality variables. Similarly P_2 has been assigned the second largest weight $\lambda_2 / \sum \lambda_i$ because it accounts for the second largest proportion of the total variation in all the development quality variables, and so on.

In this paper, DQI has three dimensions: economic, health and knowledge, in line with above methodology. Once, I obtain three indices, and then again I am able to obtain a composite measure of development -DQI. For the national level computation of DQI, I have to make use of different indicators in a time-series; and for regional level DQI, the estimation is based on several time periods of cross-section samples. Regional DQI for both China and India have two dimensions, instead of three at the National level. Because of data availability, I grouped knowledge and health dimensions together, and then economic DQI is the other dimension. The higher values of both indices indicate higher levels of development quality.[10]

3.2 Data and descriptive statistics

This paper is based on national and regional level data over the period 1980 - 2004. The national level DQI computation is based on time-series data, which are taken from different sources (See Appendix Table A1 for indicator details and their sources respectively). The DQI is based on 15 indicators, and are grouped into three dimensions, viz., knowledge, health and economic. This means that at the national level, I have 25 observations to do the analysis. This is a fairly long time series data to understand the changes in both countries over the period.

Similarly, regional level analysis is based on 29 Chinese provinces and 16 major Indian states over the period 1980-2004.[11] (See Appendix Table A2 and A3 for list of Chinese provinces and Indian states) For the regional level analysis, I compute DQI for five different time points: 1980-1984, 1985-1989, 1990-1994, 1995-1999 and 2000-2004.[12] However, DQI at the regional level is based on nine indicators, which could be grouped into three dimensions. (See Appendix Table A4 and A5 for regional level indicator details and their sources respectively)

Before, I discuss the results; let me briefly go through the descriptive statistics and correlation matrices, both at the national and regional level. Firstly, a correlation matrix is reported for both China and India at the national level (See Appendix Table A6). And then, summary statistics are reported, averaging over the period, of 15 indicators of DQI. In all

[10] See Nagar and Basu (2004) for the statistical properties of composite index as an estimator of a single latent variable.

[11] Among 28 states and 7 Union territories, the 16 major States are used here for consistent data availability for all the years and variables in our analysis. These 16 states cover more than 95 per cent of India's total population in the 2001 Census of India.

[12] On many occasions, because of availability of data for the specific period, I had to obtain data from the nearest available time points.

three dimensions, it seems that absolute values of these indicators are higher in China as compared to India (See Appendix Table A7).

At the regional level, the data are then averaged over the period for 29 Chinese provinces, and 16 Indian states, to obtain correlation between indicators (See Appendix Table A8). The descriptive statistics also conform to results at the national level (See Appendix Table A9).[13]

4. Empirical results

This section discusses results of evolution and growth rates of development quality indexes (DQI). In section 4.1, initially, I discuss results from national-level trends of DQI. It shows year-to-year change in development quality, and their respective growth rates. In section 4.2, I discuss results from regional-level analysis both for China and India in five different time periods. The results on a polarization measure are presented in Section 4.3.

4.1 Trends in National Development

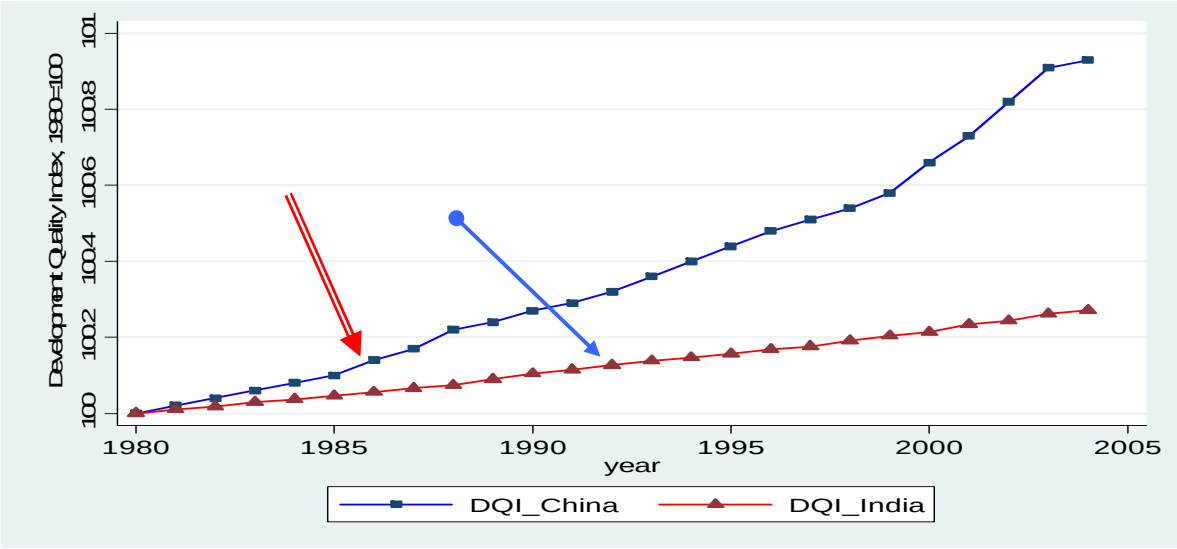
Here, I propose to estimate a development quality index (DQI) for China and India respectively over the period 1980-2004. With fixed maximum and minimum values for normalization, the computation of Chinese and Indian DQI figures do show some interesting features of the trends and compositions of DQI dimensions. The DQI of China and India are obtained with the methodology described above (See Appendix Table A10). The results of this year-to-year change of DQI are informative, as one can trace associationships of the rise of DQI with the changes in economic reform policies and other institutional changes. [14]

A careful look at the DQI figure definitely corresponds to the turning points of these two economies. From 1980-1984, Chinese DQI figure was less than 1.000 in the estimation, and then after with the change of economic policies, the DQI figure made a substantial improvement and exceeded the 1.000 value of the index. Similarly, at the end of 1990s (1999), with another set of reform policies in China, the DQI figure crossed 1.500 , and continued to increases in the rest of the sample time period. (Figure 2)

[13] For some definitional and data availability issues, the figures at national level and regional level may not necessarily match in China and India. The national level statistics are obtained from international data sources, and regional level figures are from National statistical agencies. I attempt to obtain data which covers aspects similar to each other.

[14] See Basu, Klein and Nagar (2005a) for some results on quality of life comparison between China and India.

Figure 2: Development Quality Index (DQI) in China and India (1980=100)



In a very similar fashion, India DQI figures have shown correspondence with changes in economic policy regimes. Since the economic reform measures (so-called new economic policies-NEP) of 1991, DQI figures recorded for the first time a value of more than 1.000 in 1992. The results can also be discussed, if we take separately, three dimensions of DQI.

Now, I convert these DQI scores into a form of index number with a common base of 1980=100. This procedure helps to look into the speed of improvements of DQI over time. Another advantage of converting them into an index number is that of estimating the rate of annual average change of DQI and its dimension. By taking the logarithmic values of DQI of China and India from a semilog-linear regressions on chronological time (time=1980 to 2004, 25 observations, i.e., time=1,2,…25). The trend coefficient in the regressions estimate gives annual average rate of growth of DQI for China and India respectively, which take the following form:

$$\log(DQI) = \alpha + \beta * (time) + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Now by running equation for China, I obtain β=0.00036. So, $e^{0.00036}$=1.000365=1+g. So, the annual average rate of growth (%) over the 25-year period for China is g=*0.036%*. For India, the g=*0.012%*.[15] This indicates that on an average DQI grew three times faster in China as compared to India over the same time period.

Then, I compute the growth rates of knowledge, health and economic dimensions of DQI. I find that annual average growth rates of knowledge DQI has been identical in both countries, however, the health DQI grew three times faster in India as compared to China.

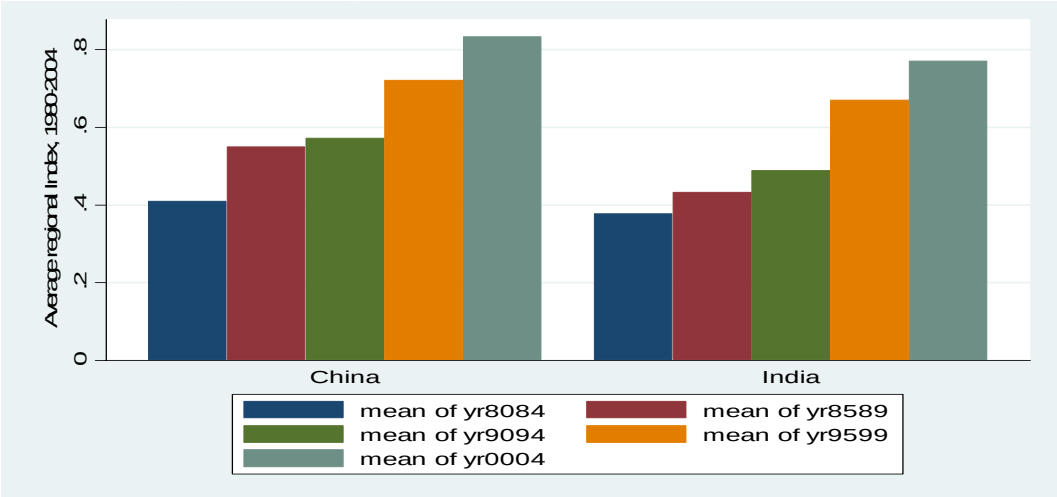
[15] These regressions are both serially correlated. The main objective of this equation is to estimate the annual average growth rates of DQI and its three dimensions.

According to Sen (2005): "the rate of extension of life expectancy in India has been about three times as fast, on the average, as that in China, since 1979." So, even with health DQI, which included indicators, such as life expectancy, infant mortality, health infrastructure, access to drinking water and CO2 emissions, the findings are remarkably similar. This also validates findings of DQI. However, as one could imagine, growth of economic DQI has been outstanding in China. The average annual economic DQI grew in China seven times faster. So, actually I can conclude that DQI growth rate between China and India is mostly driven by economic DQI differential in the two countries. The social gap is actually reducing rapidly between them when compared with the 1980 base year (See Appendix Table A11 for growth rates of DQI, dimensions and relative improvement ratio of DQI and its dimensions in China to India).

4.2 Trends in Regional Development

I present here the results of DQI at the regional level for both countries. The analysis consists of 29 Chinese provinces and 16 major Indian states over the period 1980-2004.[16] By looking at the average values of DQI computed for each period across provinces/states (Figure 3), there has been a continuous improvement of development quality at the regional level. A similar pattern can be found in three dimensions of DQI. They are intended to show relative performance of regions in regard to their own country performance during the period under study.

Figure 3: Regional Development Quality Index (DQI) in China and India

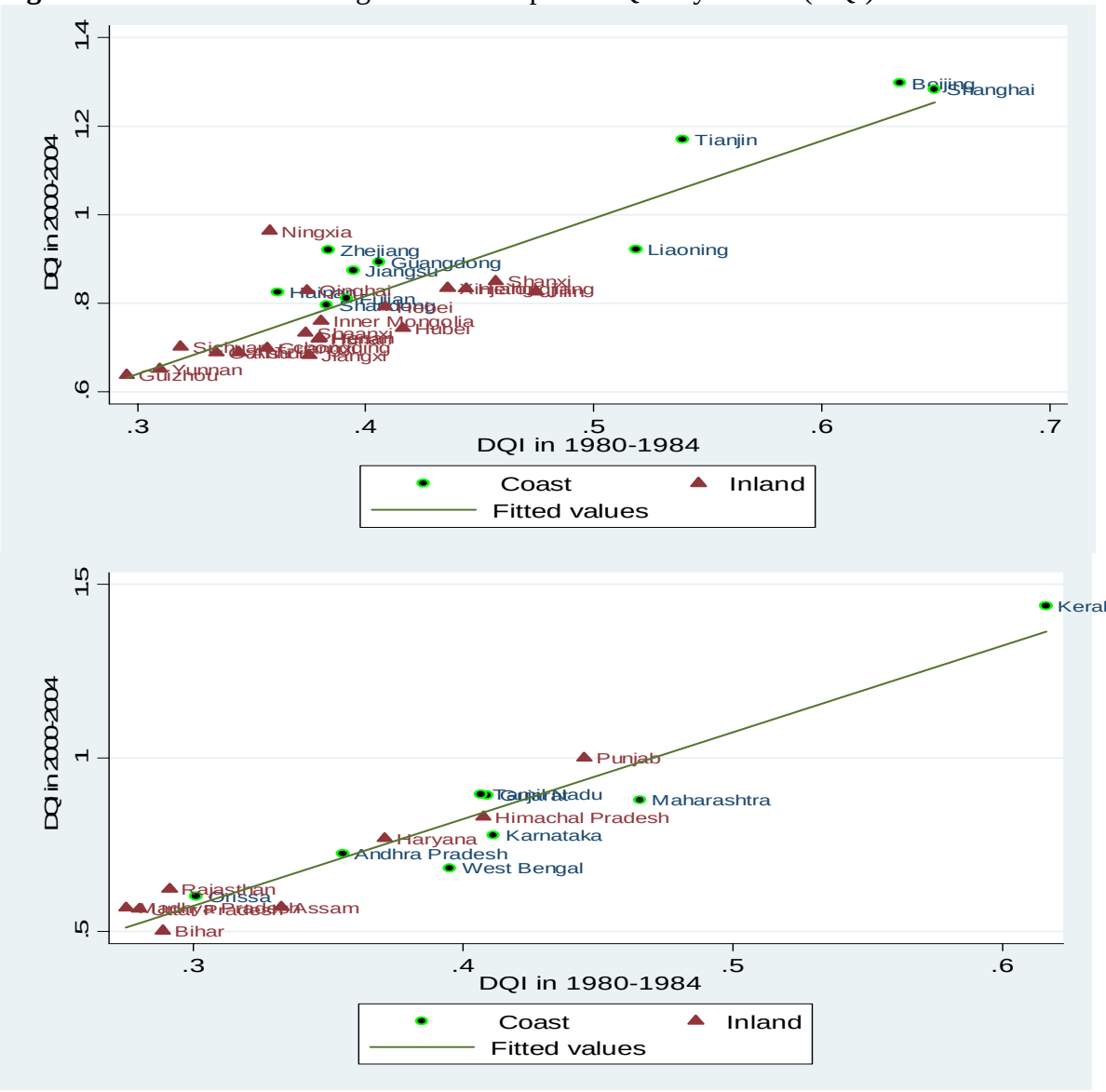


[16] The maximum and minimum values of each country are obtained from its own sample. This implies that relative improvements of Chinese provinces and India states are in comparison to the other provinces and states in both countries.

Another point to note here is that of persistence of development quality across provinces and states in China and India respectively. In Figure 4, I plot the scatter of DQI in1980-84 against DQI of 2000-2004. In China, three provinces, Beijing, Shanghai and Tianjin are consistently doing well over the period, while province Guizhou, Yunnan, and Gansu are at the bottom.

One may also observe that coastal provinces have outperformed the inland provinces (the figures separately mark coastal and inland regions). It is evident from scatter plots that many of the Chinese inland provinces are trapped at a very low level of DQI.

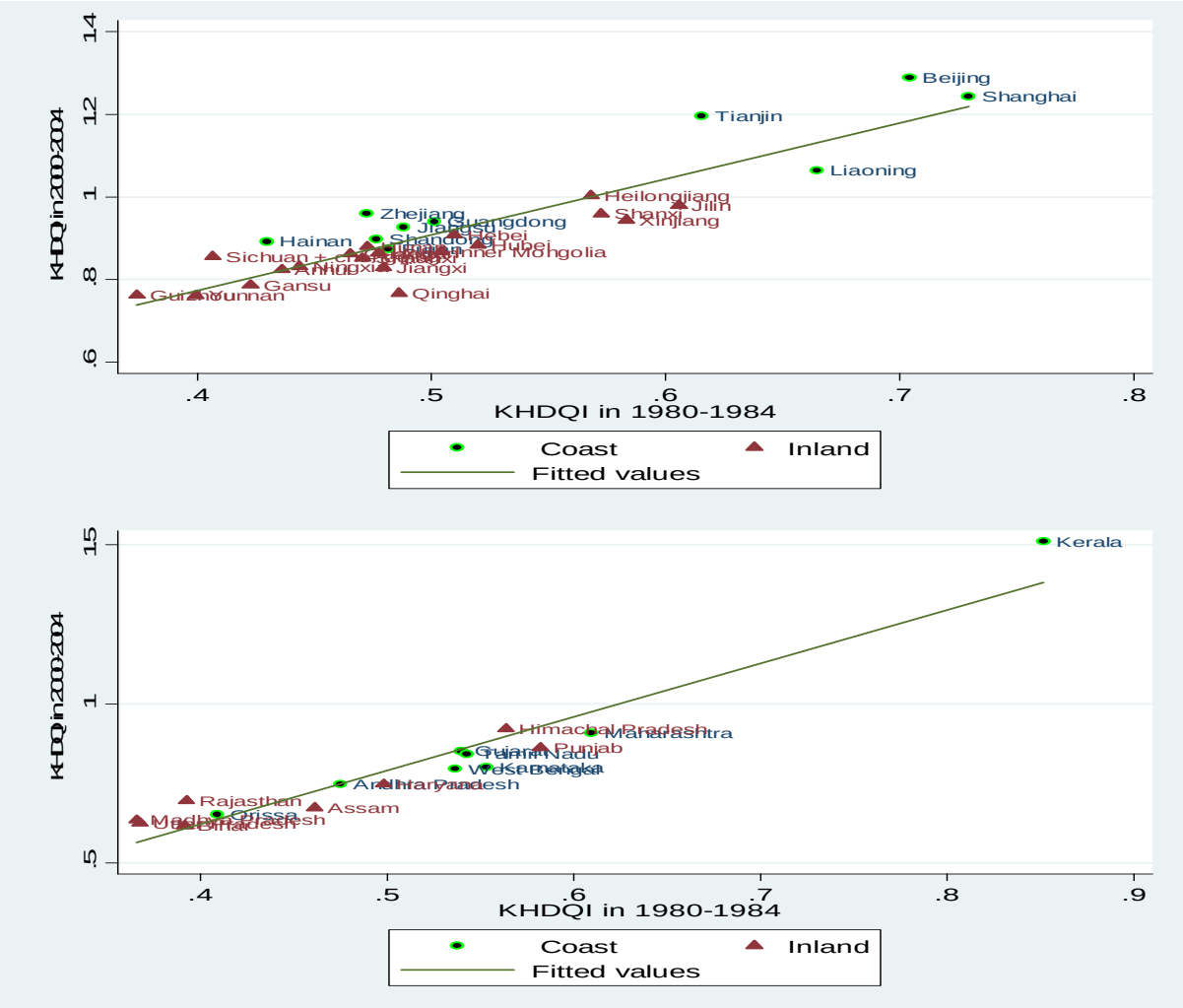
Figure 4: Persistence of Regional Development Quality Index (DQI) in China and India



In one of the latest reports on human development status in China, China Human Development Report: Development with Equity (2005) raised some of the concerns regarding

inequality, as it is evident in this paper. To that end, this report points that human development and social equity are both the goals of a society; and should therefore be looked at as an interdependent and inseparable part of the development agenda. The DQI specifically points to this critical need in China at the regional level.

Figure 5: Persistence of Regional Knowledge and Health DQI in China and India



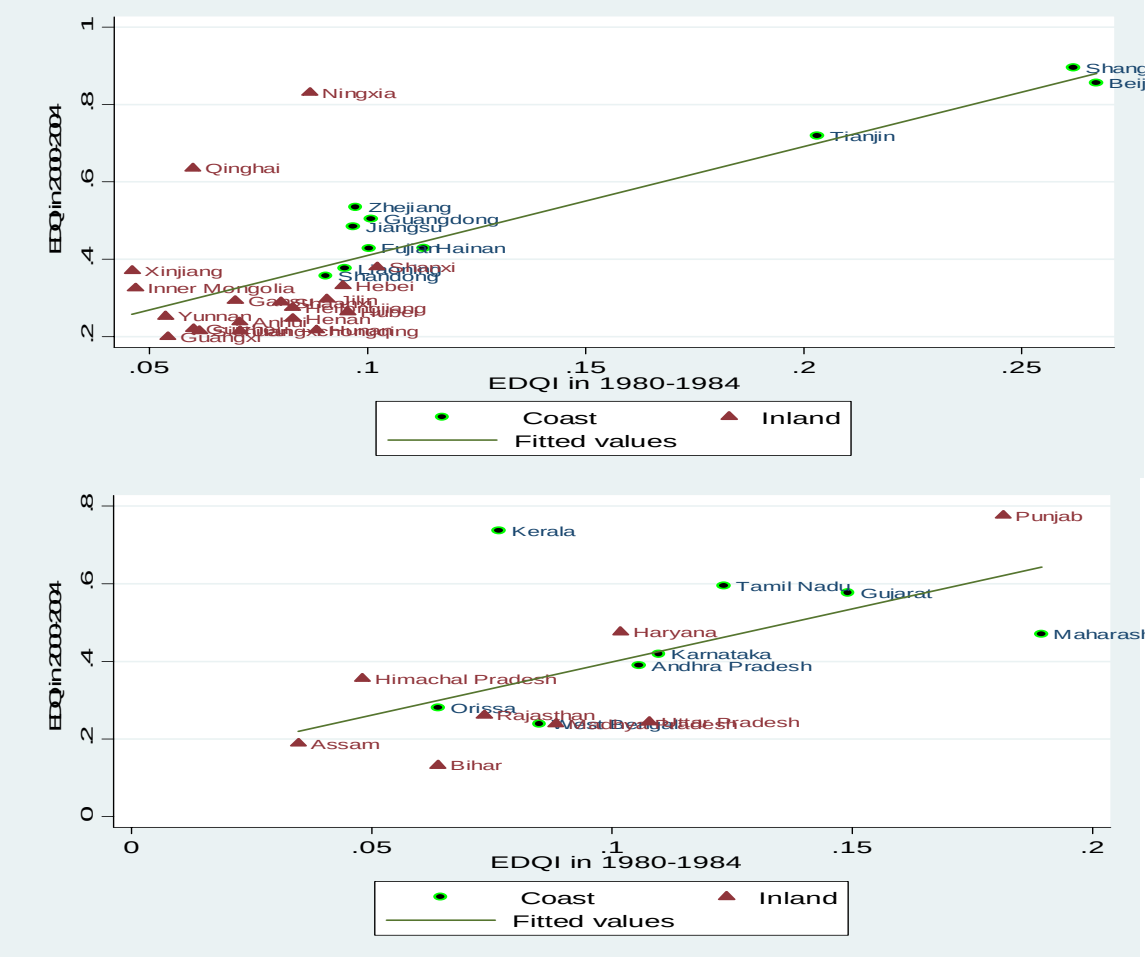
What do we find among Indian states? The scatter plot for Indian states (right-hand side figure) shows some appealing features. Kerala is the state, which has absolutely out performed the rest of Indian states, and performance is persistent over the period.[17] Some other states, like, Punjab, Tamil Nadu, Maharastra, and Gujrat performed quite well over the period. Furthermore, likewise in China, the Indian states, such as, Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh, and Orissa, (these are so-called BIMARU and Orissa States. I now

[17] Sen (2005) repeatedly noted that Kerala's development performance is actually better than most of the Chinese provinces and that of many developing countries.

call this as BIMARUO) are consistently lagging behind in DQI.[18] In India also there is some evidence to suggest that coastal states have relatively performed well as compared to Inland states of India, except Orissa.[19]

Similarly, by looking separately at two dimensions of DQI, I also notice that in knowledge and health dimensions of DQI, Chinese provinces have shown overall similar trends as in DQI. In the case of Indian states, I find differences amongst states are narrowing down slowly over the period (Figure 5).

Figure 6: Persistence of Regional Economic DQI in China and India



I report in Figure 6, the persistence of economic DQI. The fast growing Chinese provinces kept their speed over the period, such as, Beijing, Shanghai, and others; while in Indian states have also shown persistence of their performance, such as Punjab, Maharashtra, and others over the period (See Appendix Tables A12 to A17 for rankings of results).[20]

[18] BIMARU comes from the word 'Bimaar' in Hindi which means 'sick'. I added also Orissa, which could be acronymed as BIMARUO.

[19] See National Human Development Report 2001(2002) for further discussions on some of the key issues of human development at the regional level in India.

[20] The values of DQI and other indices can be obtained upon request.

The discussion of results provides some interesting insights into the relative performance of provinces/states in China and India over the period 1980-2004. I present evidence to suggest that there are some extreme cases in both countries in terms of the development quality. In China, Beijing, Shanghai and Tianjin are far ahead of many other Chinese provinces, and while in India, Kerala has outperformed all the states in overall level of development quality. However, these findings raise some further concerns about the inter-regional disparity and/or tendency of polarization across provinces/states in both countries.

4.3 Is inter-regional polarization rising in China and India?

Therefore, some of the above findings motivated me to look more closely at polarization measures to find out inter-regional disparity. By dividing regions into coast-inland or north-south etc, it's possible to understand the process of change (either convergence or divergence) at the regional level. To address this issues, I follow the methodology as discussed in Zhang and Kanbur (2001), Kanbur and Zhang (2005), and Basu, Fan and Zhang (2006). I construct two measures of inequality: (i) the standard Gini coefficient of inequality and (ii) a measure from the decomposable generalized entropy class (GE) of inequality measures (Shorrocks, 1980, 1984). I mostly follow the above papers to discuss the GE class of inequality measures as it helps to allow inequality across groups to be broken down into *within group* inequality and *between group* inequality.

By following Kanbur and Zhang (2005), I define the ratio of the between group inequality in total inequality (within group inequality + between group inequality) as a *polarization index*. Therefore, it measures the contribution of the between group inequality. In this section, I construct a polarization index of development quality index, and its dimensions for China and India.

For both China and India, I present inequality and polarization measures by taking 29 Chinese provinces and 16 major Indian states. By using Development Quality Index (DQI), I analyze inter-regional inequality of DQI in China and India. I report DQI results for Chinese provinces in fiver different time points (See Appendix Table A18), and similarly I report Indian states inequality (See Appendix Table A19). I report results for Gini and Theil-Generalized Entropy (GE) as measures of inequality.

Inter-regional inequality of DQI in China for both Gini inequality and Theil-GE measure has been stable with some rise during 1990s. However, economic DQI has shown steady increase in inequality level since 1990s. The knowledge and health DQI inequality has

shown a decline over the period. While in the Indian case, the Gini inequality figures of DQI has shown some sort of rise in early 1980s, with a decline just during the period of economic reform policies of early 1990s, and later on regional inequality of DQI has gone up by a couple of percentage points. Similar, findings are reported by considering Theil-GE measures. The knowledge and health; and economic DQI figures have shown similar pattern as in Chinese provinces. [21] I further look into the coefficients of inequality; they indicate that in China, both Gini and Theil measures have lower inequality figures in DQI and two other dimensions. The economic DQI inequality measures in recent years show a similar trend, and their figures are not very different.

Before, I discuss the polarization measures; it may be interesting to point out the contribution of between and within groups to total regional inequality both in China and India over the period of five different time points.[22] DQI statistics show that (See Appendix Table A18 for China and Table A19 for India) at the beginning of 1980s, the regional inequality mainly contributed by within groups, but over the years the gap has reduced slowly and steadily. In recent years, half of the coastal and inland differences of inequality in DQI are due to between groups differences. Similar findings are also reported for economic DQI. However, if we look at the knowledge and health DQI, the within group contribution is still very large as compared to between coastal and inland provinces.

In the Indian case, the story is very different, the overall contribution of inequality between group is decreasing over time, while the within groups contribution to total regional inequality is rising in DQI. The knowledge and health of the DQI dimension also follows the overall DQI pattern. However, in the case of economic DQI, the results indicate that between coastal and inland differences contribute slowly in greater proportion to total regional inequality. But, the magnitude of their differences in economic DQI for India is almost half that of China.

[21] I also ran the similar exercise for North-South divides, and results indicate widening up in China and some sort of closing the gap among Indian states.

[22] In other words, if all provinces/states had the same DQI, the Theil index would be equal to zero. The Theil index compares the DQI share of a province/state with its population share. The Theil-GE index is easily decomposable and can identify contribution of these sub-groups of provinces/states to overall inequality and is also addititive for the components attributable to between- and within-group differentials as shown above in mathematical form.

In India, the development status of BIMARUO states is of great concern.[23] It may be noted that the current population share in these five states of India constitutes about 44% of India's total population. So, their overall improvement is of great importance for India's national development. I report the results for India on two groups of states, viz., BIMARUO states (5 states of India) and the rest (See Appendix Table A20). Here again, I find that between regions contribution to total regional inequality is decreasing in DQI over the period, so are knowledge and health DQI. However, the economic DQI has an opposite story to signal.

This result for BIMARUO states is very encouraging in the case of overall DQI and in knowledge and health dimension of DQI. India's overall development strategies since Independence has been directed toward reduction in overall development disparities of these five Indian states (most populous and poor states). It seems that the systematic targeting of these states to raise their level of development has been paying off lately. Moreover, over the years, due to India's growing tendency to have coalition governments at the centre, consisting of several regional parties, and different interest groups have influenced the allocation of resources more equitably in these states of India. The national planning commission has definitely been able to cause closing down of gaps between two groups of Indian states.

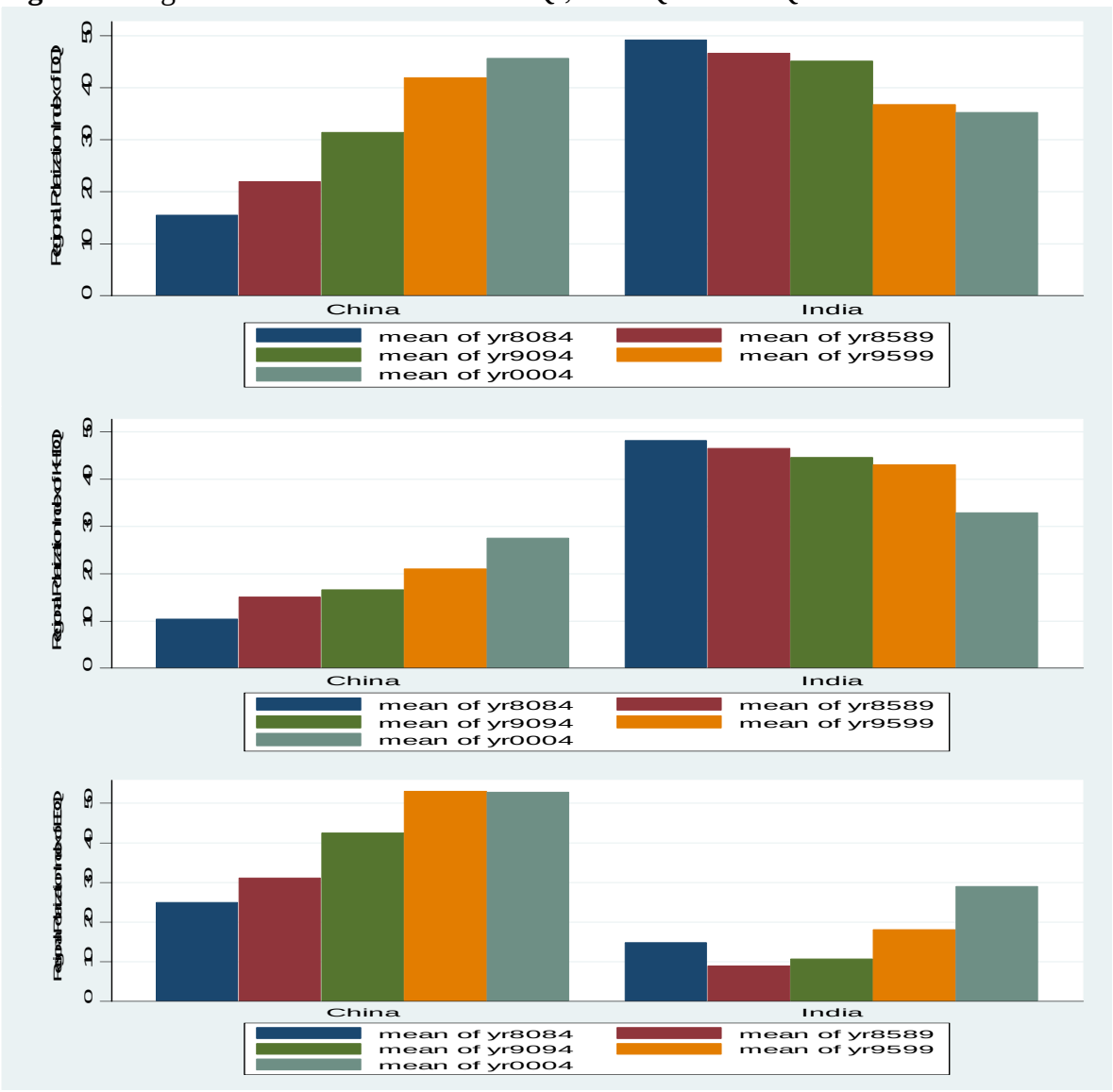
So, the preliminary results indicate that between regions inequality in DQI has been rising in China over the years, and reversing in India. By looking at knowledge and health dimension of DQI, I find the trend has been decreasing in India, while there has been a tendency to increase among Chinese provinces. All of these mean that apart from economic DQI, in China there has been no sign of convergence between coastal and inland provinces; while in India the story is promising from the equity angle. This result may have some important policy implications that I intend to draw up in concluding remarks.

By using within-inequality and between-inequality, I compute the polarization index as described previously. The last rows of tables (See Appendix Table A18, A19 and A20 for each of the panels) indicate that coastal and inland areas became increasingly polarized since the 1980s in China (from 15.49% in 1980-1984 to 45.57% in 2000-2004), while there has been a clear indication of decline in India over the same period (from 49.18 % to 35.25%) in

[23] Due to lack of consistent data availability since 1980s, I could not take into consideration eight states of north-eastern India, namely, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. Over the decades, lack of investment and other facilities have pushed the states to a low-growth pole in Indian economy. Indian planning process should be directed to adequately take their economic under-development into account, so as to main stream their economies, and provide them with much needed resources. Recently, Government of India set up the Ministry of Development of North Eastern Region in September 2001 "to act as the nodal Department of the Central Government to deal with matters pertaining to socio-economic development of the eight States of North East". See http://northeast.nic.in

DQI. Then, analysing knowledge and health DQI, I find the similar pattern as in DQI. But, the polarization index shows much faster rise both in China and India in economic DQI dimension. These tend to point out that economic growth is not equitably percolating to all sections and groups of the society during this period of economic policy reforms in India. A closer look at the tables reveals that actually from mid-1980s until mid-1990s there has been a tendency of decline in the polarization index in India, which was not the case of China.

Figure 7: Regional Polarization Index on DQI, KHDQI and EDQI in China and India



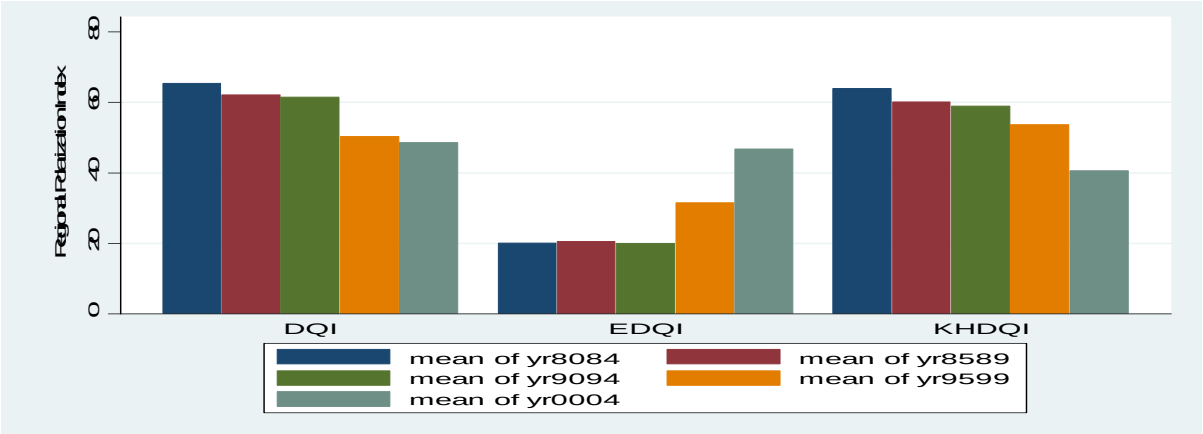
In Figure 7, I plot the polarization index of coastal and inland provinces/states of China/India for all of five time points separately. The figure (first from the top) illustrates that in the beginning of 1980s, just when China initiated its economic reform policies, the polarizations between coastal and inland provinces were not pronounced. But with the deepening of the economic reform process in China, the government initiated the so-called

preferential policies for the coastal provinces, and that is evident in divergence of DQI's. The gap between coastal provinces and inland provinces has dramatically increased over the last 25-years of Chinese development planning history. While in India, in the beginning of 1980s, there was clearly a wide gap between coastal and inland provinces. But, then central government in a democratic setting introduced economic policies that were made to be equitable, and resources were made available across regions/states. This has helped two groups of regions to close their development-gap over the period.

By exploring the polarization index, the latest figures indicate that regional gap as measured by the coast-inland divide, is higher in China as compared to India. In knowledge and health dimension of DQI the results show a growing gap in China, while in India there has been a process of convergence between the two groups. However, for economic DQI, the polarization is increasing in both countries, but the magnitude of polarization in China is dramatically rising. This is now a big-thing in China as the latest China Human Development Report calls for "development with equity". The similar concern has been aired in Indian too.

Once again, by looking at the polarization index of BIMARUO states with the rest, in overall DQI and knowledge and health dimension, I find a declining gap between these two groups of regions, but reverse order in inequality of economic DQI. Figure 8 presents the gap in DQI between these two sets of regions was very high in 1980s (65.42%) and declined to

Figure 8 Regional Polarization Index of BIMARUO states in India



48.51% in the latest period. The knowledge and health DQI polarization index figure was 63.99% in 1980s, and declined to 40.53% in the latest period. However, polarization index between BIMARUO states on economic DQI has been stable until mid-1990s, and thereafter it has started picking up. This definitely indicates that since economic reform of the early 1990s, the economic performance (that includes income per capita) has been concentrating in

pockets of India's states/regions and with sections of population is gaining much from economic prosperity, leading to increasing inequality level higher over the period. [24]

A loser look illustrates that from the 2nd half of 1990s, because rising economic prosperity in many Indian states, such as Tamil Nadu, Maharasthra, Karnataka and others due to manifold rise in the service sector and other high-tech industries.[25]

Table 1

Summary of polarization measures in China and India (inter-regional analysis)

Polarization index			
Indices	Coastal-Inland Regions		BIMARUO States
	China	India	India
Development quality index (**DQI**)	↑***	↓***	↓***
Knowledge and Health Development Quality Index (**KHDQI**)	↑***	↓***	↓***
Economic Development Quality Index (**EDQI**)	↑***	↑**	↑***

Notes. As compared to first year for the specific indicator: ↑ increase ↓ decrease. * Change from the base year to current year is > 5% to <10% points, ** > 10% and < 15%, and *** >15% and above. Inequality measures are computed using population weights in China and India at provincial and state level respectively. Polarization is defined as the ratio of between to between and within GE.
Source. See Appendix Tables A18 to A20.

In Table 1 above, I sum up the main findings on polarization indices both for China and India. In Chinese provinces, the coastal-inland gap has been on rise as compared to the 1980s figures in DQI and the two of its dimensions; while in India the gap could be observed in the economic dimension of DQI, but at a much smaller scale. After looking at the evidence of special groups of Indian states, BIMARUO, traditionally very slow growing states in terms of GDP per capita, I find declining polarization as in the case of the coastal and inland divide.

[24] See Basu and Krishnakumar (2005b) for discussion of spatial distribution of development across not only among Indian states, but also among different socio-economic groups in rural and urban areas in the post economic policy reform era.

[25] In India over the past few years, services sector has largely been growing due to IT and IT-enabled services and more recently business process outsourcing (BPOs). This sector has now become the main driver of export earnings in India. Recent global statistics show that India has captured 65% of the global offshore IT market and 45% of the BPO market. In 2003 figures indicate that India's exports of commercial services other than travel, transportation, and finance amounted to US$18.9 billion, while China's figures stood at US$20.6 billion. Service sector accounts for 51% of India's GDP as compared to the 32% share of this sector in China's GDP.

5. Conclusions

In recent years there has been tremendous amount of media attention on China and India as they predict that these two countries would together dominate world economic conditions.[26] But often, the analysis is too simplistic, and does not go into understanding the dynamics of development and its constituents not only at the national level, but also in these disaggregated terms at the regional level.

The preliminary findings show that the development quality index (DQI), a broad measure of socio-economic development of a country, grew three times faster in China at the national level over the period of 1980-2004. However, the results are just reversed once I look at the health dimension of DQI. The better Indian performance could be characterized by democratic setting of India as declared by many analysts, including Sen (2005).

Similarly, the inter-regional analysis of DQI and its dimension point to the fact that there have been secular improvements in development, and they are linked to changes in economic policy reforms in both countries. But, polarization measures between different regions in China have shown a clear sign of divergence, while Indian states have shown a tendency of convergence. The above illustrations of results indicate that even India's poorest states have shown a catching up process with the richer states over the period of study.

This may have some very important policy conclusions. A democratic framework of government activities and other institutional settings have affected Indian government in New Delhi to step up equitable development packages across the country; otherwise the coalition government would fail to continue to remain in power. In China, the widening of this gap between regions is of great rising concern. The communist party leaders in Beijing, it seems, have not done enough to spread the fruits of economic successes to achieve social equity as well. Political pluralism in India appears to be significant for India's success in increasing social development quality and reducing inter-regional polarization. But this alone may not be enough to catch up to China's the economic growth frontier.

[26] By looking at the long-term growth projections of BRICs (Brazil, Russia, India and China) countries, India seems to win the race, as they predicted that "Growth for the BRICs is likely to slow significantly toward the end of the period, with only India seeing growth rates significantly above 3 per cent by 2050." Goldman Sachs (2003)

Appendix Tables

Table A1

Sources of Indicators for China and India at National level

Knowledge DQI	**Health DQI**	**Economic DQI**
Literacy rate, adult total (% of people ages 15 and above) (ALR)	Life expectancy at birth, total (years) (LE)	GDP per capita (PPP, $ international 2000) (PCY)
Enrolment, primary, secondary and tertiary (% gross) (GER)	Mortality rate, infant (per 1,000 live births) (IMR)	Telephone mainlines (per 1,000 people) (TEL)
Total number of years in schools (YSC)[1]	Physicians (per 1,000 people) (PHY)	Electric power consumption (kwh per capita) (ELEC)
	Hospital beds (per 1,000 people) (PHB)	Television sets (per 1,000 people) (TV)
	Improved water source (% of population with access) (WAT)	Energy use (kg of oil equivalent per capita) (ENG)
	CO2 emissions (metric tons per capita) (CO2)	Motor vehicles in use -commercial vehicles per 1000 people (MV) [2]

Notes. [1]Barro-Lee database (2000), [2]National Statistical Agencies of China and India. Rest of the indicators are mostly from the World Bank WDI 2006, and is supplemented by national level statistics.

Table A2

List of Chinese Provinces in sample

Province	Coastal provinces (=1, 0 otherwise)	Northern provinces (=1, 0 otherwise)	Eastern provinces (=1, 0 otherwise)
Beijing	1	1	1
Tianjin	1	1	1
Hebei	0	1	1
Shanxi	0	1	0
Inner Mongolia	0	1	0
Liaoning	1	1	1
Jilin	0	1	0
Heilongjiang	0	1	1
Shanghai	1	0	1
Jiangsu	1	0	1
Zhejiang	1	0	1
Anhui	0	0	0
Fujian	1	0	1
Jiangxi	0	0	0
Shandong	1	1	1
Henan	0	1	0
Hubei	0	0	0
Hunan	0	0	0
Guangdong	1	0	1
Guangxi	0	0	1
Hainan	1	0	1
Sichuan and Chongqing	0	0	0
Guizhou	0	0	0
Yunnan	0	0	0
Shaanxi	0	1	0
Gansu	0	1	0
Qinghai	0	1	0
Ningxia	0	1	0
Xinjiang	0	1	0

Table A3
List of Indian States in sample

state	Coastal states (=1, 0 otherwise)	Northern provinces (=1, 0 otherwise)	Eastern provinces (=1, 0 otherwise)	BIMARUO States (=1, 0 otherwise)
Andhra Pradesh	1	0	0	0
Assam	0	0	1	0
Bihar	0	0	1	1
Gujarat	1	0	0	0
Haryana	0	1	0	0
Himachal Pradesh	0	1	0	0
Karnataka	1	0	0	0
Kerala	1	0	0	0
Madhya Pradesh	0	1	0	1
Maharashtra	1	0	0	0
Orissa	1	0	1	1
Punjab	0	1	0	0
Rajasthan	0	0	0	1
Tamil Nadu	1	0	0	0
Uttar Pradesh	0	1	5	1
West Bengal	1	0	1	0

Table A4
Sources of Chinese regional dataset

Indicators/variables	Units/period covered	Sources
Gross Domestic Product (PCY)	(in yuan), 1980-2004	State Statistical Bureau (various years), China Statistical Bureau (various years)
Population (POP)	(in persons), 1980-2004	China Statistical Bureau (various years)
Adult Literacy Rate (ALR)	(%), 1982, 1987, 1990, 1995, 1999	China Statistical Bureau (various years)
Infant mortality rate(IMR)	(per 1000), 1981, 1985, 1990, 1995, 2000	State Statistical Bureau (various years), Mortality data of Chinese Population (1995)
Life expectancy (LE)	(years),1981, 1985, 1990, 1995, 2000	Mortality data of Chinese Population (1995)
Population per hospital bed (PHB)	(number), 1985, 1990, 1995, 2000, 2004	State Statistical Bureau (various years), China Statistical Bureau (various years)
Per capita electricity consumption(PEC)	(kwh), 1986, 1990, 1995, 2000, 2004	China Statistical Bureau (various years)
Telephone lines (TEL)	(per 100000 population), 1985, 1990, 1995, 2001, 2004	China Statistical Bureau (various years)
Road length(ROAD)	(per 100 sq.km), 1985, 1990, 1995, 2000, 2004	China Statistical Bureau (various years)
Motor vehicles(MV)	(per 1000 people). 1985, 1992, 1995, 2000, 2004	China Statistical Bureau (various years)

Table A5

Sources of Indian Regional dataset

Indicators/variables	**Units/period covered**	**Sources**
State Gross Domestic Product (PCY)	(in Rs), 1980-2004	EPW, Economic survey (various years)
Population (POP)	(in persons), 1980-2004	Census of India, CMIE
Adult Literacy Rate (ALR)	(%), 1981, 1985, 1991,1995, 2001	Census of India, NHRD 2002
Infant mortality rate(IMR)	(per 1000), 1981,1985, 1991, 1996, 2002	CMIE, Economic survey (various years)
Life expectancy (LE)	(years),1985, 1988, 1992, 1996, 2002	Statistical Abstract of India CMIE(various issues)
Population per hospital bed (PHB)	(number), 1980, 1985, 1990,1995, 2002	Health Information of India, CMIE
Per capita electricity consumption(PEC)	(kwh), 1985, 1990, 1995, 2000, 2004	Statistical Abstract of India CMIE(various issues)
Telephone lines (TEL)	(per 100000 population), 1985, 1990, 1995, 2000, 2004	CMIE(various issues), GOI
Road length(ROAD)	(per 100 sq.km), 1980,1985, 1990, 1995, 2002	CMIE(various issues), GOI
Motor vehicles(MV)	(per 1000 people).1980, 1990, 1995, 2000, 2003	Statistical Abstract, GOI.

Table A6: Correlation matrix, China and India-national figures

	Indicators	alr	ger	ysc	le	imr	phy	hob	wat	co	pcy	tel	elec	tv	eng	mv
China	alr	1														
	ger	0.968	1													
	ysc	0.934	0.939	1												
	le	0.974	0.963	0.876	1											
	imr	-0.884	-0.817	-0.807	-0.840	1										
	phy	0.850	0.871	0.964	0.785	-0.699	1									
	hob	0.553	0.572	0.790	0.409	-0.470	0.844	1								
	wat	0.949	0.956	0.954	0.944	-0.770	0.908	0.613	1							
	co	0.869	0.905	0.922	0.835	-0.779	0.835	0.690	0.855	1						
	pcy	0.964	0.952	0.858	0.993	-0.847	0.752	0.377	0.925	0.844	1					
	tel	0.820	0.757	0.609	0.869	-0.748	0.468	0.042	0.716	0.634	0.901	1				
	elec	0.964	0.952	0.867	0.986	-0.832	0.761	0.401	0.922	0.864	0.995	0.904	1			
	tv	0.973	0.982	0.963	0.966	-0.813	0.895	0.613	0.981	0.919	0.957	0.762	0.961	1		
	eng	0.978	0.965	0.889	0.997	-0.848	0.803	0.444	0.950	0.838	0.989	0.848	0.979	0.970	1	
	mv	0.956	0.934	0.835	0.986	-0.837	0.724	0.342	0.905	0.830	0.996	0.930	0.997	0.942	0.977	1
India	alr	1														
	ger	0.949	1													
	ysc	0.988	0.941	1												
	le	0.987	0.954	0.998	1											
	imr	-0.964	-0.960	-0.981	-0.988	1										
	phy	0.920	0.837	0.897	0.887	-0.836	1									
	hob	0.902	0.770	0.913	0.901	-0.867	0.851	1								
	wat	0.962	0.936	0.979	0.982	-0.975	0.859	0.850	1							
	co	0.983	0.937	0.997	0.997	-0.982	0.891	0.919	0.974	1						
	pcy	0.987	0.913	0.978	0.973	-0.939	0.928	0.929	0.946	0.977	1					
	tel	0.876	0.762	0.816	0.804	-0.746	0.892	0.822	0.760	0.812	0.910	1				
	elec	0.977	0.941	0.993	0.997	-0.989	0.867	0.911	0.979	0.996	0.966	0.784	1			
	tv	0.968	0.893	0.981	0.979	-0.965	0.868	0.957	0.953	0.984	0.966	0.804	0.984	1		
	eng	0.978	0.896	0.959	0.953	-0.912	0.929	0.915	0.926	0.958	0.996	0.935	0.943	0.946	1	
	mv	0.977	0.891	0.960	0.954	-0.925	0.930	0.940	0.917	0.958	0.986	0.925	0.947	0.957	0.982	1

Note. See Appendix Table A1 for abbreviations.

Table A7

Descriptive statistics, China and India-national figures

		China				India			
Indicators	Obs	Mean	Std.Dev	Min	Max	Mean	Std.Dev	Min	Max
alr	25	79.9	7.6	67.1	92.0	51.2	6.5	41.0	62.0
ger	25	59.8	4.3	53.4	66.0	49.5	4.6	39.5	57.0
ysc	25	5.1	0.7	3.6	5.9	3.9	0.7	2.7	4.9
le	25	68.4	1.8	66.1	71.6	59.0	3.1	53.9	63.5
imr	25	36.4	4.9	26.0	49.0	83.4	16.4	61.6	113.0
phy	25	1.5	0.1	1.2	1.7	0.4	0.1	0.3	0.6
hob	25	2.5	0.1	2.2	2.6	0.8	0.1	0.7	0.9
wat	25	88.5	5.5	81.0	95.5	82.0	7.4	70.0	92.0
co	25	2.2	0.4	1.5	2.9	0.9	0.2	0.5	1.2
pcy	25	2414.1	1415.4	762.6	5418.9	1860.2	506.0	1178.5	2885.3
tel	25	82.2	132.8	2.2	425.0	18.2	20.9	3.1	72.0
elec	25	675.0	338.7	281.6	1380.0	298.8	99.4	141.8	439.0
tv	25	181.0	122.2	5.1	365.0	41.5	32.0	2.5	85.0
eng	25	2.8	1.2	1.3	4.7	4.1	0.6	3.3	5.5
mv	25	7.7	5.2	1.8	19.0	5.9	3.3	2.0	12.5

Note. See Appendix Table A1 for abbreviations.

Table A8

Correlation matrix, China and India-regional figures

Indicators	alr	le	imr	phb	pcy	tel	pec	road	mv
					China				
alr	1								
le	0.670	1							
imr	0.638	0.804	1						
phb	0.533	0.310	0.644	1					
pcy	0.185	0.332	0.569	0.680	1				
tel	0.576	0.744	0.886	0.713	0.718	1			
pec	0.256	0.461	0.677	0.721	0.888	0.782	1		
road	0.444	0.727	0.781	0.270	0.463	0.713	0.412	1	
mv	0.466	0.456	0.822	0.761	0.628	0.810	0.704	0.580	1
					India				
alr	1								
le	0.807	1							
imr	-0.625	-0.784	1						
phb	0.921	0.849	-0.706	1					
pcy	-0.036	0.006	-0.140	0.046	1				
tel	0.653	0.828	-0.475	0.689	-0.123	1			
pec	0.298	0.507	-0.167	0.274	0.201	0.763	1		
road	0.701	0.590	-0.544	0.742	-0.162	0.398	-0.078	1	
mv	0.362	0.511	-0.251	0.347	0.165	0.779	0.952	0.041	1

Note. See Appendix Table A4 and A5 for abbreviations.

Table A9

Descriptive statistics, China and India-regional figures

		China				India			
Indicators	Observations (China/India	Mean	Std.Dev	Min	Max	Mean	Std.Dev	Min	Max
alr	29/16	77.7	8.5	58.6	89.2	53.8	11.3	37.4	84.3
le	29/16	69.0	3.1	62.4	75.3	60.8	4.6	54.3	71.5
imr	29/16	47.2	28.1	14.9	130.3	84.5	22.3	36.3	126.2
phb	29/16	284.5	99.2	170.3	536.9	89.2	54.8	34.5	256.8
pcy	29/16	7.4	0.6	6.6	8.8	5.6	0.7	3.7	6.8
tel	29/16	97.5	52.0	34.7	244.0	27.1	16.8	6.8	62.7
pec	29/16	1105.8	631.4	429.3	2993.9	290.5	167.2	63.4	694.5
road	29/16	274.4	176.6	24.9	692.5	855.9	677.0	315.6	3196.5
mv	29/16	12.9	10.9	5.1	60.3	37.1	20.4	10.7	78.6

Note. See Appendix Table A4 and A5 for abbreviations.

Table A10

Development Quality Index (DQI) trends in China and India

	China				India			
Year	**DQI**	Knowledge	Health	Economic	**DQI**	Knowledge	Health	Economic
1980	0.896	0.8	0.565	0.24	0.770	0.555	0.501	0.3
1981	0.913	0.814	0.568	0.252	0.788	0.572	0.506	0.311
1982	0.933	0.829	0.573	0.268	0.805	0.589	0.513	0.317
1983	0.955	0.846	0.578	0.286	0.825	0.606	0.52	0.328
1984	0.979	0.856	0.585	0.311	0.84	0.62	0.525	0.336
1985	1.003	0.866	0.593	0.336	0.858	0.635	0.533	0.344
1986	1.037	0.886	0.601	0.367	0.878	0.648	0.546	0.354
1987	1.078	0.906	0.611	0.41	0.898	0.66	0.558	0.364
1988	1.124	0.926	0.622	0.46	0.913	0.673	0.571	0.365
1989	1.148	0.94	0.628	0.482	0.942	0.683	0.585	0.392
1990	1.173	0.954	0.634	0.505	0.972	0.693	0.599	0.42
1991	1.199	0.961	0.638	0.54	0.991	0.704	0.605	0.437
1992	1.233	0.968	0.642	0.59	1.015	0.723	0.612	0.453
1993	1.272	0.975	0.648	0.645	1.035	0.735	0.616	0.471
1994	1.317	0.989	0.653	0.704	1.052	0.741	0.621	0.49
1995	1.358	1.005	0.66	0.754	1.07	0.748	0.626	0.51
1996	1.399	1.022	0.671	0.799	1.093	0.759	0.636	0.529
1997	1.431	1.016	0.677	0.853	1.109	0.761	0.64	0.551
1998	1.464	1.017	0.681	0.906	1.137	0.764	0.662	0.575
1999	1.505	1.034	0.676	0.966	1.162	0.787	0.666	0.592
2000	1.584	1.076	0.675	1.062	1.181	0.797	0.671	0.61
2001	1.653	1.079	0.685	1.171	1.221	0.835	0.673	0.641
2002	1.747	1.086	0.698	1.315	1.239	0.839	0.682	0.66
2003	1.845	1.09	0.704	1.476	1.274	0.847	0.687	0.708
2004	1.863	1.094	0.713	1.495	1.292	0.854	0.692	0.726
Mean	**1.284**	**0.961**	**0.639**	**0.687**	**1.014**	**0.713**	**0.602**	**0.471**

Note. Author's computation

Table A11

Average annual relative growth rate (%) in DQI

Indices	China	India	Relative improvement ratio (China/India)
Development quality Index(**DQI)**	0.036%	0.012%	2.927
Knowledge Development Quality Index	0.005%	0.005%	1.000
Health Development Quality Index	0.001%	0.003%	0.306
Economic Development Quality Index	0.064%	0.009%	7.247

Note. Author's computation

Table A12

Rank of Development Quality Index (DQI), Chinese provinces

Province	DQI 1980-84	DQI 1985-89	DQI 1990-94	DQI 1995-99	DQI 2000-2004
Beijing	2	1	1	1	1
Tianjin	3	3	3	3	3
Hebei	10	10	10	11	17
Shanxi	6	7	6.5	7	9
Inner Mongolia	16.5	17	16	20	18
Liaoning	4	4	4	4	5
Jilin	5	6	5	8	13
Heilongjiang	7	8	11	12	11
Shanghai	1	2	2	2	2
Jiangsu	12	14	15	13	8
Zhejiang	14	13	9	5	6
Anhui	25	25	24	22	25.5
Fujian	13	16	14	10	15
Jiangxi	19	22	23	25	27
Shandong	15	15	12	9	16
Henan	16.5	18	20	16	21
Hubei	9	12	17	18	19
Hunan	18	20	22	21	22
Guangdong	11	11	6.5	6	7
Guangxi	24	24	25	23	24
Hainan	22	5	8	14	14
Sichuan and Chongqing	27	27	27	26	23
Guizhou	29	29	29	29	29
Yunnan	28	28	28	28	28
Shaanxi	20.5	19	18	19	20
Gansu	26	26	26	27	25.5
Qinghai	20.5	23	21	24	12
Ningxia	23	21	19	17	4
Xinjiang	8	9	13	15	10

Notes. Rank 1 implies best performing province, and Rank 29 implies worst performing province. An equal value of rank implies that their index values are equal. Author's computation

Table A13

Rank of Knowledge and Health Development Quality Index (KHDQI), Chinese provinces

Province	KHDQI 1980-84	KHDQI 1985-89	KHDQI 1990-94	KHDQI 1995-99	KHDQI 2000-2004
Beijing	2	1	1	1	1
Tianjin	4	4	3	3	3
Hebei	10	10	9	8	12
Shanxi	7	7	6	6	8
Inner Mongolia	11	12	11	13	18
Liaoning	3	3	4	4	4
Jilin	5	6	5	5	6
Heilongjiang	8	9	7.5	7	5
Shanghai	1	2	2	2	2
Jiangsu	13	16	17	15.5	11
Zhejiang	20	14	13	10	7
Anhui	24	25	25	21	25
Fujian	15	19	18.5	15.5	17
Jiangxi	16	21	20	23	24
Shandong	17.5	15	12	11	13
Henan	17.5	17	18.5	18	19
Hubei	9	11	16	19	15
Hunan	19	20	22	20	16
Guangdong	12	13	15	14	10
Guangxi	22	22	24	22	20
Hainan	25	5	10	12	14
Sichuan and Chongqing	27	27	27	25	21
Guizhou	29	29	29	29	28
Yunnan	28	28	28	28	29
Shaanxi	21	18	14	17	22
Gansu	26	26	26	27	26
Qinghai	14	23	21	26	27
Ningxia	23	24	23	24	23
Xinjiang	6	8	7.5	9	9

Notes. Rank 1 implies best performing province, and Rank 29 implies worst performing province. An equal value of rank implies that their index values are equal. Author's computation

Table A14

Rank of Economic Development Quality Index (EDQI), Chinese provinces

Province	EDQI 1980-84	EDQI 1985-89	EDQI 1990-94	EDQI 1995-99	EDQI 2000-2004
Beijing	1	2	1	1	2
Tianjin	3	3	3	3	4
Hebei	12	13.5	12	13	15
Shanxi	5	8	13	9	11
Inner Mongolia	28	27.5	22	24	16
Liaoning	10.5	11	9	10	12
Jilin	13	13.5	14	14	17
Heilongjiang	17.5	16	15	16	20
Shanghai	2	1	2	2	1
Jiangsu	8.5	10	8	8	8
Zhejiang	8.5	5	5	5	6
Anhui	20.5	21	21	20	24
Fujian	7	6	6.5	6	9.5
Jiangxi	20.5	23	26	25.5	28
Shandong	14	12	11	7	14
Henan	17.5	18	18	15	23
Hubei	10.5	15	16	17	21
Hunan	15	17	19	21	26
Guangdong	6	4	4	4	7
Guangxi	26.5	27.5	28.5	28	29
Hainan	4	7	6.5	12	9.5
Sichuan and Chongqing	23	24	27	25.5	27
Guizhou	24.5	25	28.5	29	25
Yunnan	26.5	26	23.5	22	22
Shaanxi	19	19	20	19	19
Gansu	22	22	23.5	27	18
Qinghai	24.5	20	17	18	5
Ningxia	16	9	10	11	3
Xinjiang	29	29	25	23	13

Notes. Rank 1 implies best performing province, and Rank 29 implies worst performing province. An equal value of rank implies that their index values are equal. Author's computation

Table A15

Rank of Development Quality Index (DQI), Indian states

state	DQI 1980-84	DQI 1985-89	DQI 1990-94	DQI 1995-99	DQI 2000-2004
Andhra Pradesh	10	10	10	10	9
Assam	11	11	11	14	13
Bihar	14	14	16	16	16
Gujarat	5	4	5	3	4
Haryana	9	9	7	7	8
Himachal Pradesh	6.5	6	6	6	6
Karnataka	4	7	8	8	7
Kerala	1	1	1	1	1
Madhya Pradesh	16	16	14.5	11.5	14
Maharashtra	2	2	3	5	5
Orissa	12	12.5	13	11.5	12
Punjab	3	3	2	2	2
Rajasthan	13	12.5	12	13	11
Tamil Nadu	6.5	5	4	4	3
Uttar Pradesh	15	15	14.5	15	15
West Bengal	8	8	9	9	10

Notes. Rank 1 implies best performing state, and Rank 16 implies worst performing state. An equal value of rank implies that their index values are equal. Author's computation

Table A16

Rank of Knowledge and Health Development Quality Index (KHDQI), Indian states

state	KHDQI 1980-84	KHDQI 1985-89	KHDQI 1990-94	KHDQI 1995-99	KHDQI 2000-2004
Andhra Pradesh	10	10	10	10	9.5
Assam	11	11	11	11	12
Bihar	14	13	14	15	16
Gujarat	7	6	6	3	5
Haryana	9	9	8	9	9.5
Himachal Pradesh	4	4	5	5	2
Karnataka	5	8	9	8	7
Kerala	1	1	1	1	1
Madhya Pradesh	16	16	16	16	14
Maharashtra	2	2	2	2	3
Orissa	12	12	12	12	13
Punjab	3	3	3	6	4
Rajasthan	13	14	13	13	11
Tamil Nadu	6	5	4	4	6
Uttar Pradesh	15	15	15	14	15
West Bengal	8	7	7	7	8

Notes. Rank 1 implies best performing state, and Rank 16 implies worst performing state. An equal value of rank implies that their index values are equal. Author's computation

Table A17

Rank of Economic Development Quality Index (EDQI), Indian states

state	EDQI 1980-84	EDQI 1985-89	EDQI 1990-94	EDQI 1995-99	EDQI 2000-2004
Andhra Pradesh	7	7	7	9	8
Assam	16	16	16	16	15
Bihar	13.5	14	14	15	16
Gujarat	3	3	3	3	4
Haryana	8	4	5	5	5
Himachal Pradesh	15	12	13	10	9
Karnataka	5	6	8	7	7
Kerala	11	13	10	2	2
Madhya Pradesh	9	9	6	8	14
Maharashtra	1	2	2	6	6
Orissa	13.5	15	15	11	10
Punjab	2	1	1	1	1
Rajasthan	12	10	11	12	11
Tamil Nadu	4	5	4	4	3
Uttar Pradesh	6	8	9	13	12
West Bengal	10	11	12	14	13

Notes. Rank 1 implies best performing state, and Rank 16 implies worst performing state. An equal value of rank implies that their index values are equal. Author's computation

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Table A18

Chinese regional inequality in Development Quality Index (DQI)

	Chinese regional inequality					Contribution to inequality				
	1980-84	1985-89	1990-94	1995-99	2000-04	1980-84	1985-89	1990-94	1995-99	2000-04
	Development									
Coast	1.46	1.44	1.84	1.34	1.00					
Inland	0.78	0.63	0.67	0.53	0.32					
Between Coast-Inland	0.19	0.27	0.54	0.65	0.52	14.96	21.15	30.35	40.44	44.02
Within Coast-Inland	1.04	0.96	1.18	0.90	0.62	81.60	75.39	66.18	56.13	52.59
Gini	7.70	7.57	8.74	8.53	7.40					
Theil	1.28	1.27	1.79	1.60	1.18					
Polarization Index	15.49	21.91	31.44	41.88	45.57					
	Knowledge and Health									
Coast	1.14	1.05	1.01	0.67	0.59					
Inland	0.76	0.59	0.58	0.40	0.23					
Between Coast-Inland	0.11	0.14	0.15	0.13	0.14	10.06	14.58	16.05	20.34	26.58
Within Coast-Inland	0.90	0.77	0.74	0.50	0.37	86.49	82.10	80.59	76.30	69.98
Gini	7.17	6.75	6.73	5.69	4.90					
Theil	1.04	0.93	0.92	0.65	0.52					
Polarization Index	10.42	15.08	16.61	21.04	27.52					
	Economic									
Coast	7.89	8.10	8.46	5.12	3.86					
Inland	2.16	1.88	3.16	1.68	3.84					
Between Coast-Inland	1.74	2.50	4.85	4.69	4.72	24.06	30.08	41.06	51.16	51.00
Within Coast-Inland	5.25	5.51	6.55	4.16	4.22	72.48	66.47	55.50	45.39	45.57
Gini	15.12	16.41	20.74	19.95	20.95					
Theil	7.24	8.30	11.81	9.17	9.26					
Polarization Index	24.92	31.15	42.53	52.99	52.81					

Notes. All the figures are in percentage. Inequality measures are computed using population weights in China and India at provincial and state level respectively. Polarization is defined as the ratio of between to between and within GE.

Table A19
Indian regional inequality in Development Quality Index (DQI)

	Indian regional inequality					Contribution to inequality				
	1980-84	1985-89	1990-94	1995-99	2000-04	1980-84	1985-89	1990-94	1995-99	2000-04
	Development									
Coast	1.48	1.44	1.39	1.84	2.55					
Inland	32.30	0.00	0.00	0.00	0.00					
Between Coast-Inland	1.31	1.26	1.02	0.98	1.30	46.11	77.12	42.28	34.45	33.04
Within Coast-Inland	1.36	1.45	1.24	1.68	2.39	47.65	88.29	51.47	59.33	60.70
Gini	11.79	11.92	10.71	11.44	13.31					
Theil	2.85	1.64	2.42	2.83	3.94					
Polarization Index	49.18	46.62	45.10	36.74	35.25					
	Knowledge and Health									
Coast	1.58	1.74	1.54	1.41	2.34					
Inland	1.02	0.85	0.78	0.49	0.53					
Between Coast-Inland	1.33	1.29	1.05	0.84	0.85	45.13	43.58	41.81	40.36	30.87
Within Coast-Inland	1.44	1.48	1.30	1.11	1.74	48.61	50.17	51.93	53.39	62.91
Gini	11.83	11.89	10.68	9.54	10.08					
Theil	2.95	2.96	2.51	2.08	2.77					
Polarization Index	48.14	46.48	44.60	43.05	32.92					
	Economic									
Coast	5.57	8.25	5.97	5.51	14.83					
Inland	5.76	9.80	7.41	10.33	5.06					
Between Coast-Inland	1.00	0.88	0.79	1.58	3.22	13.83	8.38	9.98	16.98	27.15
Within Coast-Inland	5.75	8.96	6.59	7.16	7.89	79.91	85.38	83.77	76.76	66.60
Gini	19.86	23.69	21.14	21.84	24.71					
Theil	7.19	10.49	7.87	9.33	11.85					
Polarization Index	14.76	8.94	10.64	18.12	28.96					

Notes. All the figures are in percentage. Inequality measures are computed using population weights in China and India at provincial and state level respectively. Polarization is defined as the ratio of between to between and within GE.

Table A20
Indian regional inequality in Development Quality Index (DQI)

	Indian regional inequality					Contribution to inequality				
	1980-84	1985-89	1990-94	1995-99	2000-04	1980-84	1985-89	1990-94	1995-99	2000-04
	Development									
BIMARUO	0.04	0.03	0.01	0.09	0.22					
Rest	1.21	1.36	1.19	1.73	2.39					
Between BIMARUO-Rest	1.75	1.68	1.39	1.34	1.79	61.33	102.75	57.63	47.17	45.47
Within BIMARUO-Rest	0.92	1.03	0.87	1.32	1.90	32.42	62.60	36.12	46.57	48.26
Polarization Index	65.42	62.14	61.47	50.32	48.51					
	Knowledge and Health									
BIMARUO	0.08	0.06	0.05	0.03	0.08					
Rest	1.29	1.46	1.30	1.23	2.11					
Between BIMARUO-Rest	1.77	1.67	1.39	1.05	1.05	59.99	56.32	55.20	50.26	38.00
Within BIMARUO-Rest	1.00	1.11	0.97	0.90	1.54	33.75	37.42	38.50	43.43	55.75
Polarization Index	63.99	60.08	58.91	53.64	40.53					
	Economic									
BIMARUO	2.44	3.08	3.14	2.37	2.39					
Rest	6.38	9.07	6.76	6.56	5.90					
Between BIMARUO-Rest	1.35	2.02	1.47	2.76	5.20	18.81	19.25	18.68	29.57	43.87
Within BIMARUO-Rest	5.39	7.82	5.91	5.99	5.91	74.93	74.51	75.06	64.17	49.88
Polarization Index	20.07	20.53	19.93	31.54	46.80					

Notes. All the figures are in percentage. Inequality measures are computed using population weights in China and India at provincial and state level respectively. Polarization is defined as the ratio of between to between and within GE.

References

Agarwal, M. and S.R. Basu (2005). "Development Strategy and Regional Inequality in India," in Barua, A. (ed.) "India's Northeast: Development Issues in a Historical Perspective," Manohar Publishing, New Delhi.

Aghion, P., R. Burgess, S. Redding and F. Zilibotti (2003). "The Unequal Effects of Liberalization: Theory and Evidence from India," Economic Department, Harvard University.

Ahluwalia, M.S. (1999). "India's Economic Reforms An Appraisal," in Sachs, J., A.Varshney and N.Bajpai, (eds) India in the Era of Economic Reforms. Oxford University Press.

Aziz, J. and C. Duenwald (2001). "China's Provincial Growth Dynamics," International Monetary Fund Working Paper-01/3.

Bajpai, N., T. Jian and J. Sachs (1997). "Economic Reforms in China and India: Selected Issues in Industrial Policy," Development Discussion Paper No. 580, Harvard Institute for International Development, Harvard University.

Bardhan, P. (2006). "A comparative assessment of the rise of China and India," The paper presented at the International Conference on the Dragon and the Elephant: China and India's Economic Reforms, June 30– July 2, 2006, China Executive Leadership Academy Pudong, Shanghai, China

Basu, S. R. (2002). "Does Governance Matter? Some Evidence from Indian States," Paper presented at the VIIth Spring Meeting of Young Economists, 17-19 April, Paris, France.

Basu, S.R., L.R. Klein and A.L. Nagar (2005a). "Quality of Life: Comparing India and China," The paper presented at Project LINK meeting, November 1, 2005, UN Office, Geneva.

Basu, S.R. and J. Krishnakumar (2005b). "Spatial Distribution of Welfare across States and Different Socio-Economic Groups in Rural and Urban India," Paper was accepted for presentation at First meeting of the Society for the Study of Economic Inequality (ECINEQ), Palma de Mallorca, July 20-22, 2005.

Basu, S.R (2006a). "Economic growth, well-being and governance under economic reforms: Evidence from Indian States" Journal of World Economics Review.

Basu, S.R., S. Fan and X. Zhang (2006b). "Welfare Comparison beyond GDP," The paper presented at the International Conference on the Dragon and the Elephant: China and India's Economic Reforms, June 30– July 2, 2006, China Executive Leadership Academy Pudong, Shanghai, China.

Bell, M.W., H.E. Khor and K. Kochar (1993). "China at the Threshold of a market economy," IMF, Washington.

Bhagwati, J.N. (1998). "The Design of Indian Development," in I.J.Ahluwalia and I.M.D. Litle (eds) India's Economic Reforms and Development Essays for Manmohan Singh, Oxford University Press.

Bils, B (2005). "What determines regional inequality in China? ─ A survey of the literature and official data," BOFIT No. 4, Institute for Economies in Transition, Bank of Finland.

China (various years). **China Statistical Yearbook**. State Statistical Bureau, Beijing.

China Development Research Foundation (2005). **China Human Development Report: Development with equity**, UNDP, Beijing.

DeMurger, S., J. Sachs, W. Woo, S. Bao, G. Chang and A.Mellinger (2002). "Gepgraphy, Economic Policy and regional Development in China," NBER Working Paper 8897, National Bureau of Economic Research.

Desai, M. (2003). 'India and China: An easy in comparative political economy', Paper for IMF conference on India/China, Delhi, November.

Dreze, J. and A. Sen (eds) (1997). **Indian Development: Selected Regional Perspective**. Oxford University Press.

Fan, S. and X. Zhang (2004). 'Infrastructure and regional economic development in rural China,' China Economic Review 15, 203– 214.

Government of India (various years). **Statistical Abstract of India**. New Delhi.

Guha, A. (1993). "Economic Reforms in India and China: What each can learn from the other," *Journal of Asian Economics*, 4/2.

Kanbur, R. and X. Zhang (2005). "Spatial inequality in education and health care in China," *China Economic Review* 16,189–204.

Khanna, T., and Y. Huang (2003). "Can India Overtake China?," Foreign Policy.

Klein L.R. and S. Ozmucur (2002/2003). "The Estimation of China's Economic Growth," *Journal of Economic and Social Measurement* 62.

Klein, L. R. (2004). "China and India: Two Asian Economic Giants, Two Different Systems," Applied Econometrics and International Development, Euro-American Association of Economic Development, 4.

Klein, L. R. (2005). "South and East Asia: Leading the World Economy" (13th Prebisch Lecture, November 2005), UNCTAD, New York and Geneva.

Krishna, K.L. (2004). "Patterns and determinants of economic growth in Indian states," *Working Paper # 144*, ICRIER, New Delhi.

Kuitenbrouwer, J. (1973). "Growth and Equity in India and China: A historical comparative analysis," *Occasional Papers, Institute of Social Studies*, The Hauge.

Lieberthal, K. (1993). "The Great Leap Forward and the Split in the Ya'an Leadership, 1958-1965," in MacFarquhar (ed.). The Politics of China, 1949-89. Cambridge University Press.

Malenbaum, W. (1959). "India and China: Contrasts in Development Performance," *American Economic Review*, 49.

Nagar, A.L. and S.R. Basu (2002). "Weighting Socio-Economic Indicators of Human Development: A Latent Variable Approach," in Ullah, A. et al (eds.) **Handbook of Applied Econometrics and Statistical Inference,** Marcel Dekker, New York, USA.

Nagar, A.L. and S.R. Basu (2004). "Statistical Properties of a Composite Index as Estimate of a Single Latent Variable," *Journal of Quantitative Economics*, Special Issue; 2(2).

Nagaraj, R., A.Varoudakis and M.A. Veganzones (2000). "Long Term Growth Trends and Convergence Across Indian States," *Journal of International Developments*, 12/1.

OECD (2001). 'Regional Disparities and Trade and Investment Liberalisation in China', Contribution to the OECD- China Conference on Foreign Investment in China's regional Development: Prospects and Policy Challenges. 11-12 October 2001, Xi'an, China.

Planning Commission (2002). **National Human Development Report 2001**. Government of India, New Delhi.

Rodrik, D. and A. Subramanian (2005). "From "Hindu Growth" to Productivity Surge: The Mystery of the Indian Growth Transition," IMF Staff Papers.

Sachs, J., N.Bajpai and A. Ramiah (2002). "Understanding Regional Economic Growth in India," *Center for International Development Working Papers Number 88*, Harvard University.

Sen, A. (2005). **The Argumentative Indian: Writings on India History, Culture and Identity,** Penguin. Allen Lane. England.

Srinivasan, T.N. (2004). 'China and India: economic performance, competition and cooperation: an update', *Journal of Asian Economics*, 15.

Shorrocks, A.F. (1980), 'The Class of Additively Decomposable Inequality Measures,' Econometrica 48.

Shorrocks, A.F. (1980), 'Inequality Decomposition by Population Subgroups,' Econometrica 52.

United Nations (1954). **International Definition and Measurement of Standards and Levels of Living**. New York, United Nations.

United Nations (2003). **Human Development Reports,** United Nations Development Program, UNDP, New York.

Veeramani, C. and B. Goldar (2005). "Manufacturing productivity in Indian States: Does Investment Climate Matter?," *Economic and Political Weekly*, June 11.

Virmani, A. (2006). " China's socialist market economy: Lessons of success," Working paper No. 178, ICRIER, New Delhi

White, Gordon (1996). "The Chinese Development Model: A Virtuous Paradigm?," Oxford Development Studies, 24.2, 169-183.

Wilson, D. and R. Purushothaman (2003). "Dreaming With BRICs: The Path to 2050". *Global Economics Paper No: 99*. Goldman Sachs.

World Bank (2006). The World Development Indicator, CD-ROM 2006.

Zhang, X. and R. Kabur (2001). 'What Difference Do Polarization Measures Make?,' *Journal of Development Studies*, 37.

MAP 1: CHINESE PROVINCES

MAP 2: INDIAN STATES