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Comparing China and India:
Is the dividend of economic reforms polarized?

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Abstract

The paper compares the economic performance of China and India during the period of their ongoing reform policies. It develops a new measure of development, namely, a development quality index (DQI), to compare performance of China and India. The results show that national-level development quality grew three times faster in China than in India. Conversely, the health quality index grew three times as fast in India than China over the period 1980-2004, narrowing the gap in outcomes. The overall regional development quality level improved in both countries, but polarization widened in China. The direction of overall inter-regional polarization in China indicates a rising concentration of development gains from economic reform policies. The inter-regional economic polarization in recent years is more pronounced in India.

JEL Classification Numbers: C43, D63, O18

Key Words: Development, Inequality, Polarization, China, India

1. Introduction

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 economic reform policies in 1978, China's economic growth performance has been truly dramatic. 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 economic

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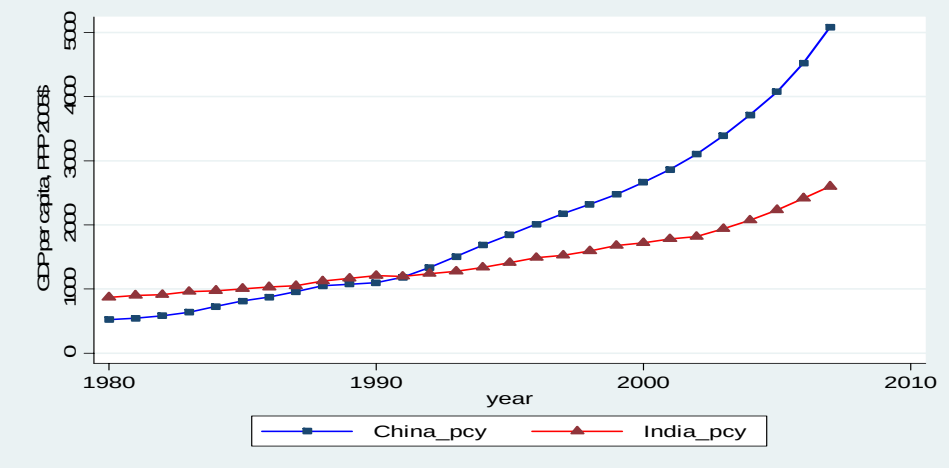
reform policies in 1991 has been relatively modest, falling behind on many fronts relative to the Chinese performance indicators. Figure 1 shows trends over the past decade of China's GDP per capita vis-à-vis India's, where the improvement has been much less fast.[3] It is evident that until the 1990s, GDP per capita (PPP international dollars) in China and India was at very similar levels, but since then China accelerated phenomenally leaving India far behind in the race. [4]

However, development indicators such as adult literacy rates and life expectancy show that India is still behind China in absolute levels. For example, the adult literacy rate in China rose from 67% in 1980 to 93% in 2007. In India, the adult literacy rate increased from 41% in 1980 to 64% in 2007. This clearly shows that India's recent figure for adult literacy rate is still below China's literacy rate of 1980. A similar trend can be observed in life expectancy figures. Chinese life expectancy grew from 66 years in 1980 to about 72 years in 2007, while India's life expectancy grew from 54 years in 1980 to about 65 years in 2007. So, India's life expectancy is still below China's 1980 level.

Hence, the essential inspiration behind this paper is to compare and understand China and India's differential level of development performance. I intend to discuss the results at the national and regional level performance so as to see how far the policy changes can contribute to the difference in development dividend in China and India

Figure 1: GDP per capita, PPP (constant 2005 international dollars) trends in China and India



Source: World Development Indicators (2009), The World Bank.

In order to recognize the reasons for better Chinese development, I intend to explore the variation in terms of economic policy strategies that were adopted to accelerate economic growth. However, national performance depends on the necessary inputs from the different regions at the sub-national level; hence I focus on inter-

[3] 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".

[4] Recently, the World Bank substantially revised downwards its GDP at PPP estimates of both countries. Alternative estimates, such as those by the GGDC, are closer to the unrevised figures. Refer to Figure 2 in following paper in this volume for a comparison.

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.

Although both at the national and regional level, China achieved much better results, a closer look at a regional analysis of development quality and its dimensions reveals widening gaps in China over the period of analysis. It is therefore crucial to consider a broadly based development strategy which could 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 briefly 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 basis in China and India. Afterwards, results are shown for the regional evolution of development quality. Finally, I report the polarization measures to indicate how over the study period the development quality index and its dimension evolved in Section 4. Section 5 concludes the paper.

2. Comparing China and India: An overview

In this section, I describe some related national and regional level comparative studies on China and India. There have been some significant studies over the years attempting to understand the differences and similarities of economic performance and development strategies in China and India.[5]

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. 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.[6] I intend to show that good economic policy-making should be supported by effective institutional arrangements to help sustain development quality. Desai (2003) argued that "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

[5] International media mainly focussed on the recent poverty rate decline over the decades in China and India. According to the 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 (the latest Planning Commission estimates suggest that poverty is expected to be 19.7% in 2007).

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

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 2005a, and Bardhan 2006).

Researchers have put forward several reasons for inter-regional differences in China and India. In the 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), Démurger et al. (2002), and OECD (2003) provided the above route for discussions of the inter-regional disparities. Kanbur and Zhang (2005) demonstrated that regional inequality could be explained by factors like openness and decentralization (see Bils 2005 for a survey of the literature on "what determined regional inequality in China").[7] 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 (see Nagaraj et al 2000, Sachs et al 2002, Krishna 2004, Veeramani and Goldar 2005, Agarwal and Basu 2005, Virmani 2006, Basu 2006, and Aghion et al 2008).[8]

By looking at 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 a substantial rising inequality since reform in China. Similarly, Basu, Fan and Zhang (2007) 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 to help spur social development and promote equity.

I propose a new measure of development quality and intend to provide some further explanations of development differentials in China and India, even as they pursue similar economic policies with varying degrees of intensity against the backdrop of different institutional settings.[9] The testable hypothesis of this paper is:

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

[8] 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 (2008), benefits from economic liberalization in different states differed because of initial level of technology and institutional factors.

[9] 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 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

Given increasingly converging economic policies in China and India, how much do differences in institutional settings matter for raising the quality of development and reducing inter-regional polarization?

Economic policies and geographical factors could play stronger 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 fruits of good outcomes 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: the development quality index (DQI)

In this section, I propose a new measure of development quality. I follow a methodology described in Nagar and Basu (2002) to construct a composite index based on multivariate statistical technique of principal component analysis.[10] 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 indexes for 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 using a time series profile, we look at the individual country, and trace out its own performance in comparison to the base period.

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

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."

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

values of these indicators are taken from a 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 a country's 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. 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 can be shown as:

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

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 the above methodology. I obtain three indices with corresponding eigenvalues of the normalised variables, which are used as weights. This enables me 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 group knowledge and health dimensions together, and then economic DQI is the remaining dimension. The higher values of both indices indicate higher levels of development quality.[11]

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

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

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 for the analysis. This is a sufficiently long time series 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 (see Appendix Table A2 and A3 for list of Chinese provinces and Indian states).[12] For the regional level analysis, I compute DQI for five different time points: 1980-1984, 1985-1989, 1990-1994, 1995-1999 and 2000-2004.[13] 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 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 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).[14]

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 changes 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

[12] 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 94 per cent of India's total population in the 2001 Census of India.

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

[14] 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. We attempt to obtain data which covers aspects similar to each other.

Table A10). The results of this year-to-year change of DQI are informative, as one can trace the rise of DQI with the changes in economic reform policies and other institutional changes. [15]

A careful look at the DQI figure definitely corresponds to the turning points of these two economies. From 1980-1984, the Chinese DQI figure was less than 1.000 in the estimation, and then later, 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 increase in the rest of the sample time period (Figure 2).

In a very similar fashion, the 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 them separately, the 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. I take 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 regression estimate gives the annual average rate of growth of DQI for China and India respectively, which takes the following form:

$$\log(DQI) = \alpha + \beta * (time) + \varepsilon \quad (3)$$

Now by running an 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*%.[16] 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. 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 includes indicators such as life expectancy, infant mortality, health infrastructure, access to drinking water and CO2 emissions, the findings are remarkably similar.[17] This also validates findings of DQI. However, growth of economic DQI has been outstanding in China. The average annual economic DQI grew in China

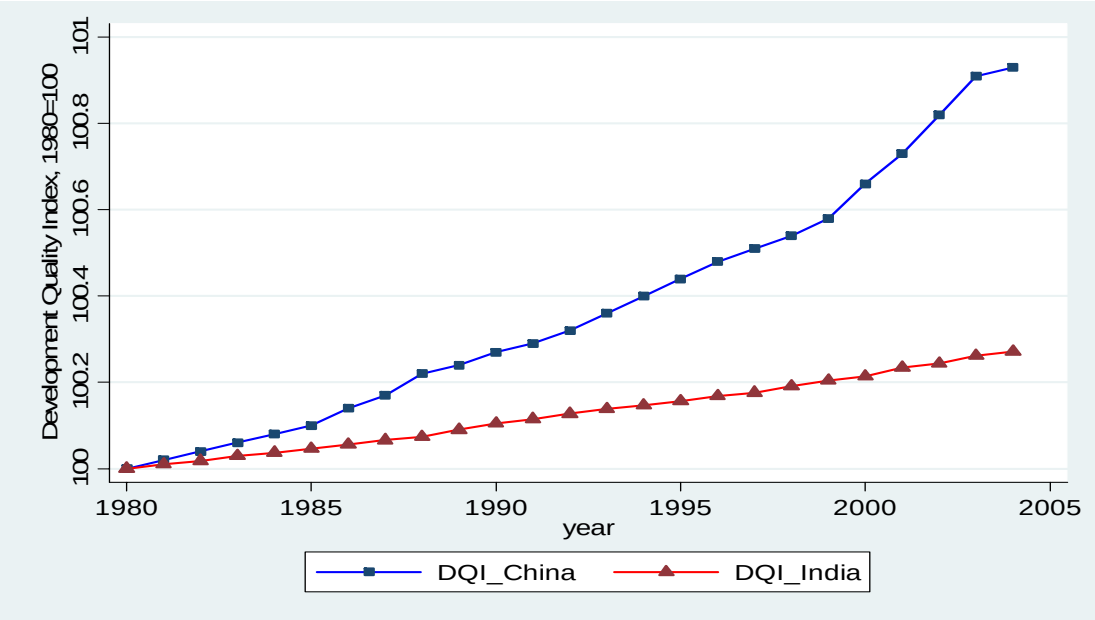
[15] See Basu, Klein and Nagar (2005a) for some results on quality of life comparison between China and India.

[16] 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.

[17] It must be noted that while health outcomes improved more rapidly over the period in India than in China, India also started at a much lower level.

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).

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



Source: Author's calculation. See appendix for sources of variables and their definitions.

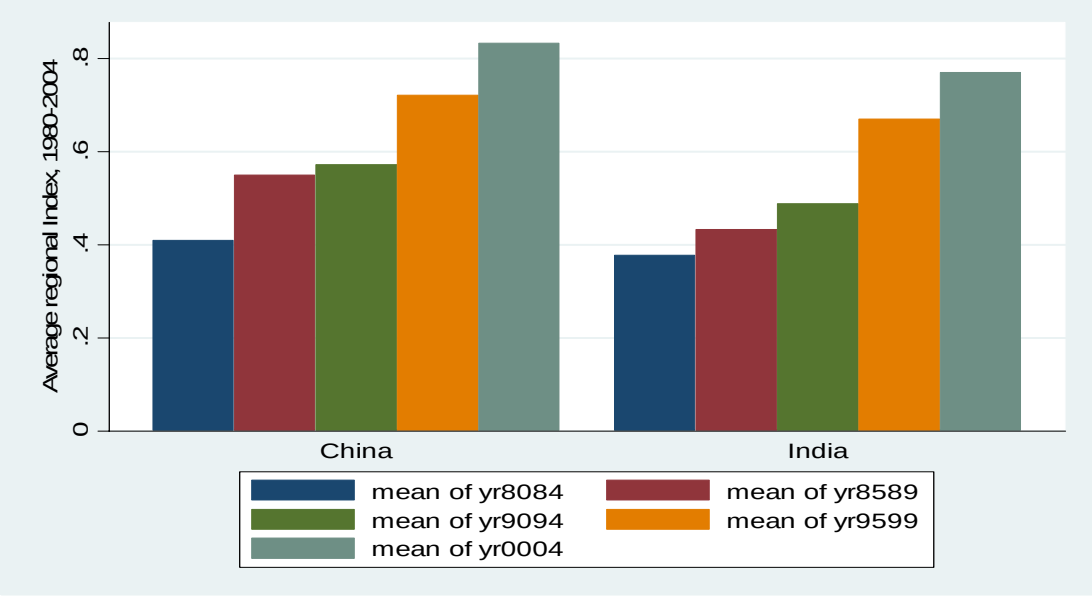
4.2 Trends in Regional Development

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.[18] 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.

Another point to note here is that of persistence of development quality across provinces and states in China and India. 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 provinces Guizhou, Yunnan and Gansu are at the bottom.

[18] 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.

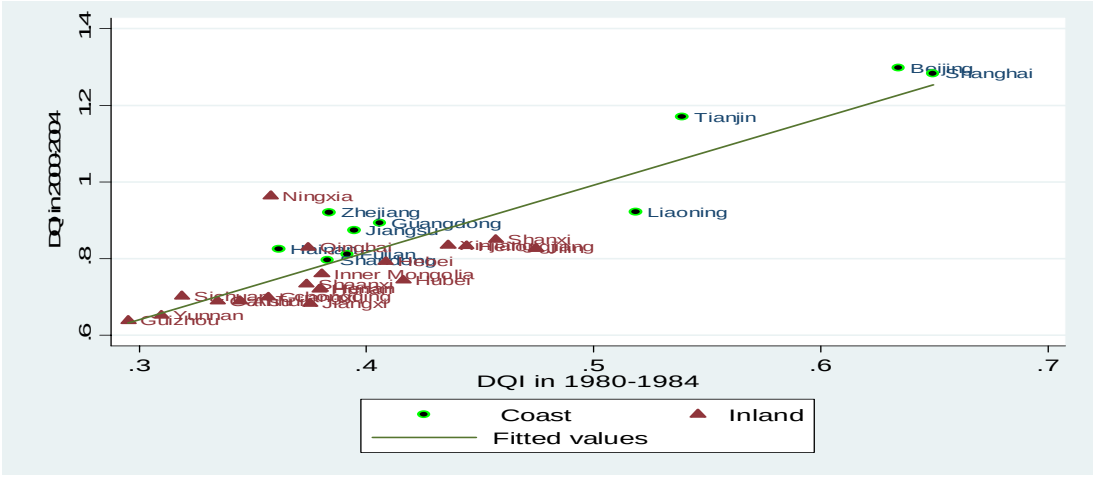
Figure 3: Regional development quality index (DQI) in China and India

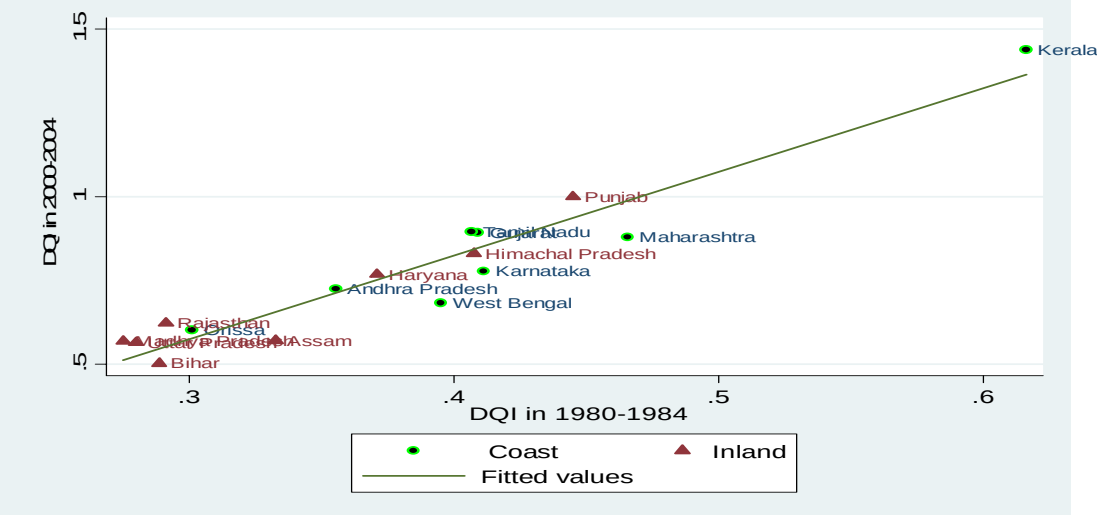


Source: Author's calculation. See appendix for sources of variables and their definitions.

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 Development Quality Index (DQI) in China and India

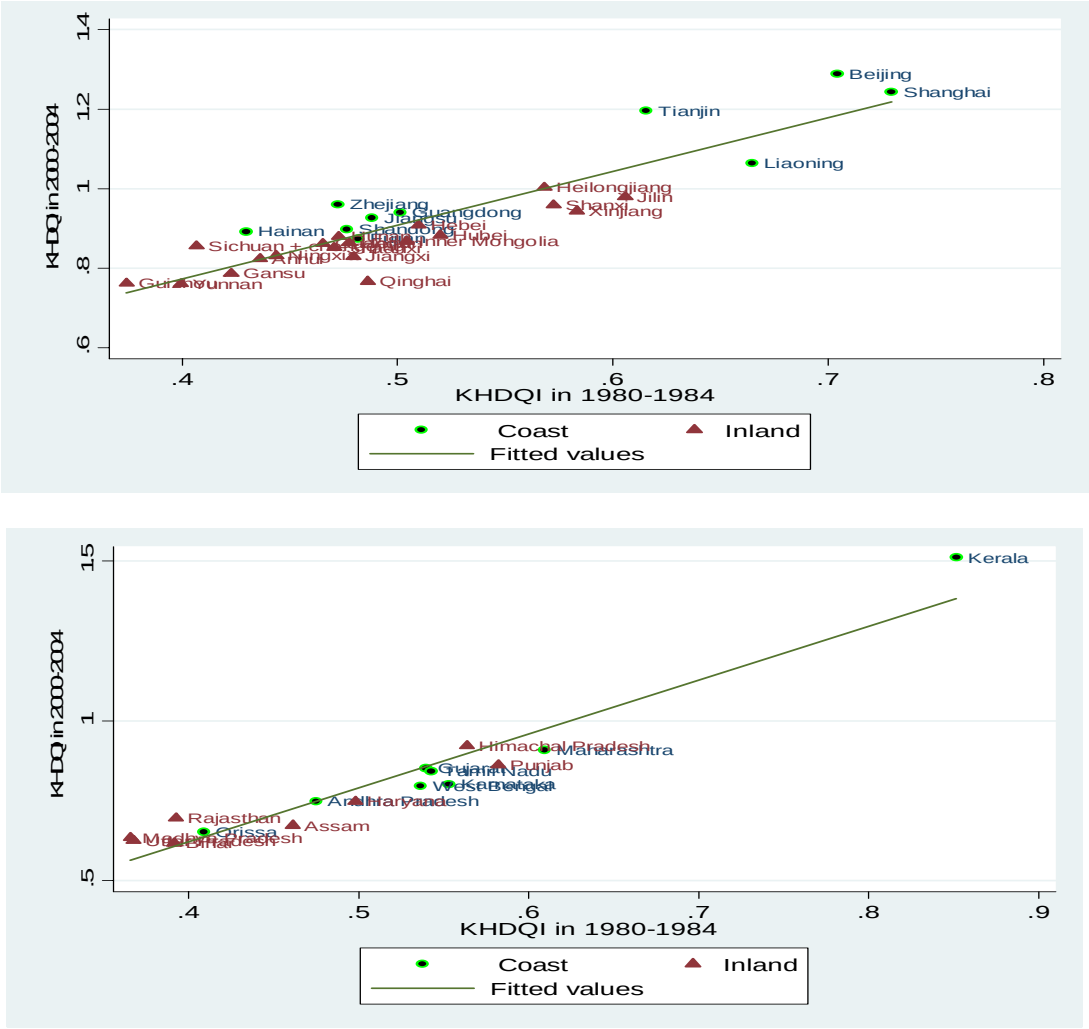




Source: Author's calculation. See appendix for sources of variables and their definitions.

In one of the latest reports on human development status in China, the 2005 China Human Development Report 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 Knowledge and Health DQI in China and India



Source: Author's calculation. See appendix for sources of variables and their definitions.

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.[19] Some other states, like, Punjab, Tamil Nadu, Maharashtra, and Gujarat 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 call this as BIMARUO) are consistently lagging behind in DQI.[20] In India also there is some evidence to suggest that coastal

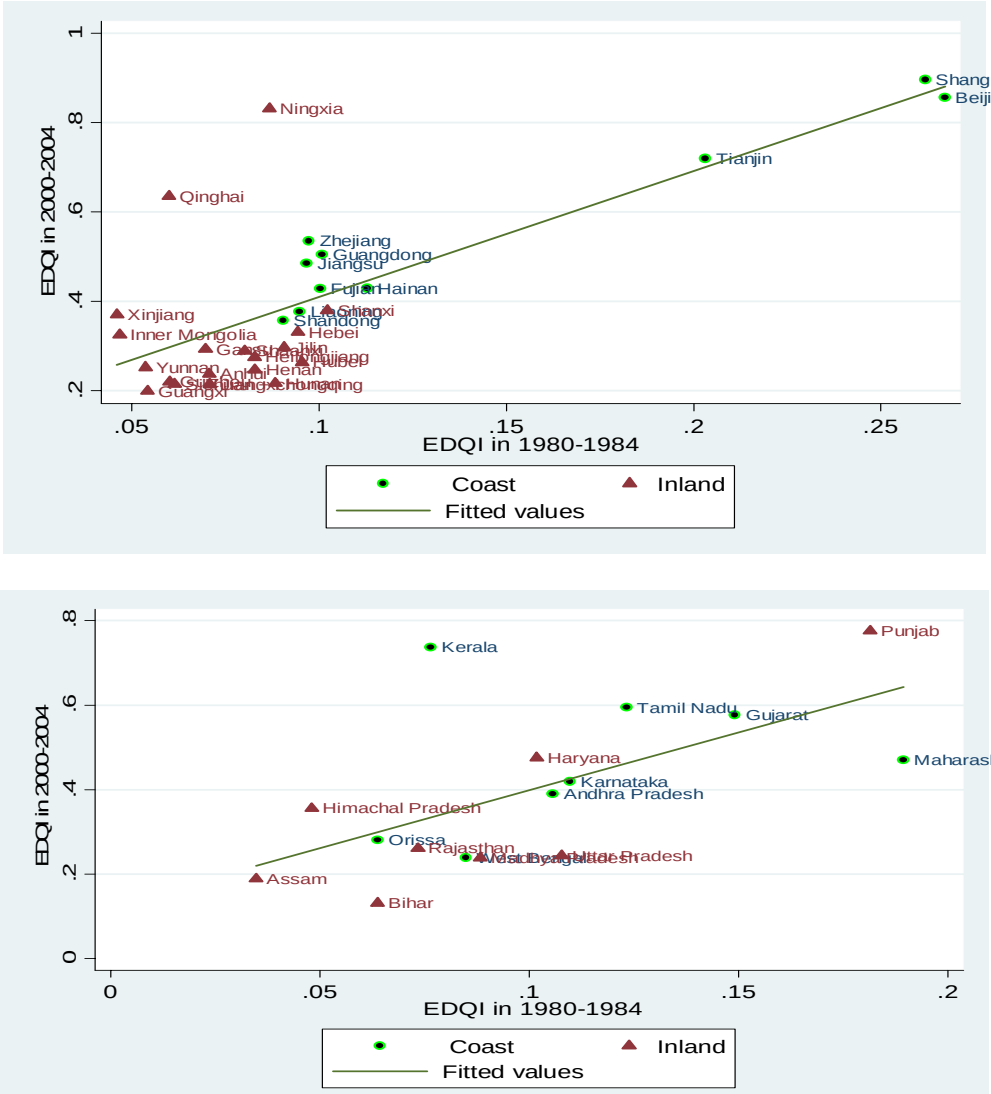
[19] Sen (2005) repeatedly noted that Kerala's development performance is actually better than most of the Chinese provinces and that of many developing countries.

[20] BIMARU comes from the word 'Bimaar' in Hindi which means 'sick'. We added also Orissa, and re-label it as BIMARUO.

states have performed relatively well as compared to Inland states of India, except Orissa.[21]

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 slowly over the period (Figure 5).[22]

Figure 6: Persistence of Economic DQI in China and India



Source: Author's calculation. See appendix for sources of variables and their definitions.

I report in Figure 6 the persistence of the economic DQI. The fast growing Chinese provinces kept their speed over the period, including Beijing, Shanghai, and

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

[22] It should be noted that all these indices are obtained from the normalized variables, and one can't ignore the absolute levels of these variables, which in some cases are large.

others; while 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 detail results).[23]

The discussion of results provides some interesting insights into the relative performance of provinces/states in China and India over the studied period. 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?

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 is possible to understand the process of change (either convergence or divergence) at the regional level. To address this issue, I follow the methodology as discussed in Zhang and Kanbur (2001), Kanbur and Zhang (2005), and Basu, Fan and Zhang (2007). 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 the 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 the development quality index (DQI), I analyze inter-regional inequality of DQI in China and India. I report DQI results for Chinese provinces at five 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 the 1990s. However, economic DQI has shown a steady increase in the inequality level since 1990. The knowledge and health DQI inequality has shown a decline over the same period. While in the Indian case, the Gini inequality figures of DQI have shown a rise in the early 1980s, with a decline only during the period of economic reform policies of the 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 as well as

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

economic DQI figures have shown similar pattern as in Chinese provinces.[24] I further look at 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 discussing 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.[25] DQI statistics show that (see Appendix Table A18 for China and Table A19 for India) at the beginning of 1980s, regional inequality was mainly contributed 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 group 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 groups is decreasing over time, while the within-group 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 the 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.

In India, the development status of BIMARUO states is of great concern.[26] It may be noted that the current population share in these five states of India constitutes about 94% 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 have been directed toward reduction in overall development

[24] We 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.

[25] 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 additive for the components attributable to between and within-group differentials as shown above in mathematical form.

[26] Due to lack of consistent data availability since 1980s, I could not take into consideration seven states of north-eastern India, namely, Arunachal Pradesh, 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. The 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. The Government of India set up the Ministry of Development of North Eastern Region in 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://necouncil.nic.in/

disparities of these five Indian states (the 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, different interest groups have influenced the allocation of resources more equitably in these states of India. The national planning commission has been able to cause closing down of gaps between two groups of Indian states. [27]

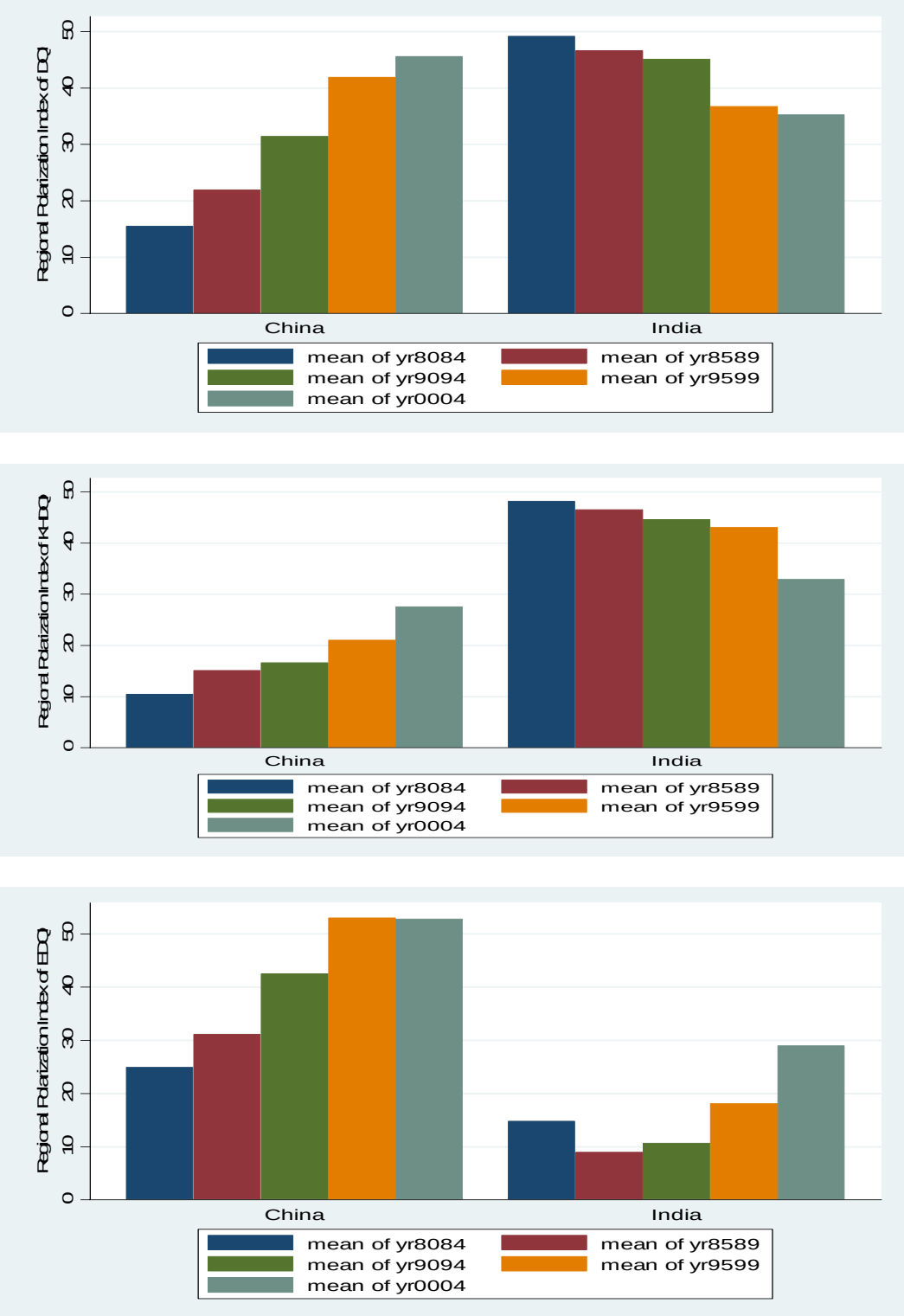
So, the preliminary results indicate that between regions inequality in DQI has been rising in China over the years, and reversing in India. By looking at the knowledge and health dimension of DQI, I find the trend has been decreasing in India, while there has been a tendency for it to increase among Chinese provinces.

All of this means 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 15.5% in 1980-1984 to 45.6% in 2000-2004), while there has been a clear indication of decline in India over the same period (from 49.2% to 35.3%) in DQI. Then, analysing knowledge and health DQI, I find a similar pattern as in DQI. But, the polarization index shows a much faster rise both in China and India in the 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 the 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.

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.

[27] It may be noted that the non-inclusion of some of the poorest north-eastern states in India could make some differences in the polarization index results.

Figure 7: Regional polarization index of DQI, KHDQI and EDQI in China and India



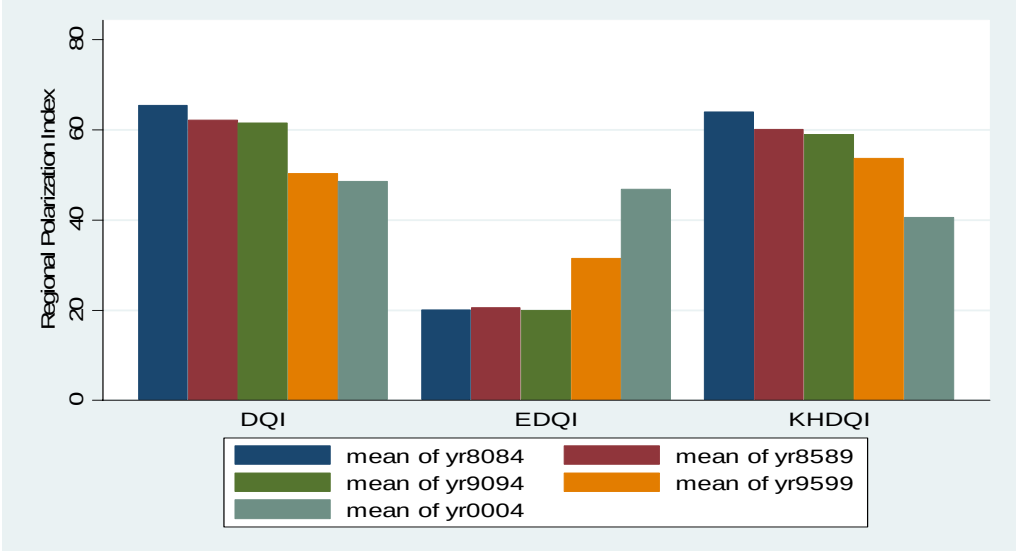
Source: Author's calculation. See appendix for sources of variables and their definitions.

But with the deepening of the economic reform process in China, the government initiated preferential policies for the coastal provinces, and that is evident in the 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 the central government, in a democratic setting, introduced economic policies that were intended to be equitable, and resources were made available across regions and 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 the 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 the economic DQI, the polarization is increasing in both countries, but the magnitude of polarization in China is dramatically rising. This is now a major issue in China as the latest China Human Development Report calls for "development with equity". A similar concern has been aired in Indian too.

Figure 8 Regional polarization index of BIMARUO states in India



Source: Author's calculation. See appendix for sources of variables and their definitions.

Once again, by looking at the polarization index of BIMARUO states with the rest, in overall DQI and the 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 (65.4%) and declined to 48.5% in the latest period. The knowledge and health DQI polarization index figure was 64.0% in 1980s, and declined to 40.5% in the latest period. However, the polarization index between BIMARUO states on the economic DQI has been stable until mid-1990s, and thereafter it has started picking up. This indicates that since economic reforms of the early 1990s, the economic performance (that includes income per capita) has been concentrated in pockets of India's

states/regions and with sections of the population gaining much from economic prosperity, leading to an increasing inequality level over the period.[28]

A closer look illustrates that from the 2nd half of the 1990s, because of rising economic prosperity in many Indian states, such as Tamil Nadu, Maharashtra, Karnataka and others, due to a manifold rise in the service sector and other high-tech industries.[29]

In Table 1 below, 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.

Table 1: Summary of polarization measures in China and India (inter-regional analysis)

Polarization index			
Indices	**Coastal-Inland Regions**		**BIMARUO States vs. the rest of Indian 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.

[28] 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-reform era.

[29] In India over the past few years, the services sector has largely been growing due to IT and IT-enabled services and more recently business process outsourcing (BPO). 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. The 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 attention on China and India as commentators predict that these two countries would together dominate world economic conditions.[30] 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, leading to a substantial narrowing of the gap in human development. The better Indian performance on the growth of this measure may be attributable to the democratic setting of India, as argued 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.

These findings may have some very important policy implications. A democratic framework of government 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 economic growth frontier.

[30] 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)

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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. 1Barro-Lee database (2000), 2National 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 calculation

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 calculation

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	0.634	0.885	1.053	1.271	1.297
Tianjin	0.539	0.732	0.816	1.094	1.170
Hebei	0.409	0.547	0.581	0.726	0.792
Shanxi	0.457	0.601	0.604	0.769	0.849
Inner Mongolia	0.380	0.508	0.528	0.638	0.760
Liaoning	0.518	0.682	0.680	0.818	0.922
Jilin	0.475	0.621	0.615	0.743	0.826
Heilongjiang	0.444	0.577	0.578	0.721	0.833
Shanghai	0.650	0.871	1.002	1.230	1.283
Jiangsu	0.395	0.525	0.549	0.713	0.874
Zhejiang	0.384	0.537	0.585	0.795	0.920
Anhui	0.344	0.456	0.458	0.611	0.689
Fujian	0.392	0.515	0.550	0.732	0.811
Jiangxi	0.375	0.479	0.477	0.584	0.683
Shandong	0.383	0.521	0.557	0.741	0.796
Henan	0.380	0.503	0.506	0.659	0.722
Hubei	0.416	0.539	0.524	0.645	0.743
Hunan	0.379	0.496	0.486	0.618	0.720
Guangdong	0.406	0.544	0.604	0.784	0.892
Guangxi	0.357	0.464	0.455	0.591	0.699
Hainan	0.361	0.651	0.587	0.701	0.824
Sichuan and Chongqing	0.319	0.437	0.436	0.570	0.702
Guizhou	0.295	0.403	0.398	0.506	0.638
Yunnan	0.310	0.415	0.434	0.556	0.652
Shaanxi	0.374	0.497	0.515	0.642	0.733
Gansu	0.335	0.444	0.451	0.558	0.689
Qinghai	0.374	0.469	0.494	0.590	0.829
Ningxia	0.358	0.485	0.510	0.654	0.963
Xinjiang	0.436	0.554	0.554	0.662	0.834
Mean	**0.410**	**0.550**	**0.572**	**0.721**	**0.833**
Coefficient of Variation (%)	**20.751**	**21.543**	**26.458**	**25.561**	**20.200**

Notes. Higher value of index implies best performer. Author's calculation

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	0.704	0.964	0.963	1.088	1.288
Tianjin	0.616	0.829	0.812	0.974	1.195
Hebei	0.510	0.678	0.664	0.781	0.908
Shanxi	0.573	0.743	0.703	0.824	0.959
Inner Mongolia	0.504	0.663	0.645	0.740	0.867
Liaoning	0.665	0.862	0.795	0.899	1.063
Jilin	0.606	0.783	0.720	0.831	0.979
Heilongjiang	0.568	0.728	0.685	0.816	1.003
Shanghai	0.730	0.932	0.900	1.033	1.243
Jiangsu	0.488	0.638	0.600	0.728	0.927
Zhejiang	0.472	0.648	0.626	0.770	0.960
Anhui	0.436	0.572	0.541	0.687	0.824
Fujian	0.482	0.619	0.592	0.728	0.874
Jiangxi	0.480	0.607	0.577	0.672	0.829
Shandong	0.477	0.639	0.627	0.759	0.897
Henan	0.477	0.627	0.592	0.719	0.864
Hubei	0.520	0.667	0.610	0.713	0.883
Hunan	0.473	0.617	0.566	0.697	0.879
Guangdong	0.501	0.654	0.616	0.739	0.940
Guangxi	0.465	0.601	0.555	0.685	0.862
Hainan	0.430	0.812	0.646	0.742	0.892
Sichuan and Chongqing	0.407	0.555	0.526	0.650	0.855
Guizhou	0.374	0.509	0.475	0.584	0.762
Yunnan	0.399	0.528	0.514	0.614	0.761
Shaanxi	0.471	0.623	0.617	0.721	0.852
Gansu	0.423	0.556	0.537	0.635	0.787
Qinghai	0.486	0.585	0.575	0.640	0.766
Ningxia	0.444	0.581	0.558	0.670	0.831
Xinjiang	0.583	0.730	0.685	0.771	0.944
Mean	**0.509**	**0.674**	**0.639**	**0.756**	**0.920**
Coefficient of Variation (%)	**17.400**	**17.289**	**17.575**	**15.668**	**14.406**

Notes. Higher value of index implies best performer. Author's calculation

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	0.267	0.370	0.633	0.826	0.856
Tianjin	0.203	0.267	0.411	0.668	0.720
Hebei	0.094	0.123	0.188	0.285	0.331
Shanxi	0.102	0.137	0.181	0.308	0.380
Inner Mongolia	0.047	0.072	0.121	0.189	0.325
Liaoning	0.095	0.132	0.199	0.300	0.377
Jilin	0.091	0.123	0.179	0.255	0.297
Heilongjiang	0.083	0.112	0.159	0.237	0.275
Shanghai	0.262	0.387	0.622	0.823	0.896
Jiangsu	0.097	0.134	0.212	0.326	0.485
Zhejiang	0.097	0.143	0.241	0.412	0.536
Anhui	0.071	0.093	0.129	0.207	0.237
Fujian	0.100	0.141	0.222	0.357	0.429
Jiangxi	0.071	0.090	0.117	0.180	0.214
Shandong	0.090	0.126	0.193	0.336	0.357
Henan	0.083	0.109	0.148	0.249	0.247
Hubei	0.095	0.122	0.157	0.232	0.264
Hunan	0.088	0.110	0.146	0.206	0.217
Guangdong	0.101	0.149	0.286	0.430	0.505
Guangxi	0.054	0.072	0.106	0.175	0.199
Hainan	0.113	0.140	0.222	0.290	0.429
Sichuan and Chongqing	0.061	0.081	0.108	0.180	0.215
Guizhou	0.060	0.078	0.106	0.153	0.220
Yunnan	0.054	0.076	0.120	0.200	0.253
Shaanxi	0.080	0.103	0.134	0.217	0.289
Gansu	0.070	0.092	0.120	0.178	0.293
Qinghai	0.060	0.102	0.149	0.226	0.635
Ningxia	0.087	0.136	0.196	0.297	0.831
Xinjiang	0.046	0.069	0.118	0.191	0.370
Mean	**0.097**	**0.134**	**0.204**	**0.308**	**0.403**
Coefficient of Variation (%)	**56.147**	**57.876**	**65.422**	**57.401**	**50.652**

Notes. Higher value of index implies best performer. Author's calculation

Table A15: Development quality index (DQI), Indian states

state	DQI 1980-84	DQI 1985-89	DQI 1990-94	DQI 1995-99	DQI 2000-2004
Andhra Pradesh	0.355	0.395	0.459	0.619	0.725
Assam	0.333	0.368	0.399	0.515	0.570
Bihar	0.289	0.333	0.376	0.488	0.502
Gujarat	0.409	0.478	0.548	0.790	0.892
Haryana	0.371	0.421	0.505	0.687	0.768
Himachal Pradesh	0.407	0.471	0.507	0.698	0.830
Karnataka	0.411	0.452	0.499	0.679	0.777
Kerala	0.616	0.702	0.783	1.142	1.438
Madhya Pradesh	0.275	0.312	0.377	0.543	0.568
Maharashtra	0.466	0.552	0.585	0.759	0.878
Orissa	0.301	0.336	0.386	0.543	0.602
Punjab	0.445	0.516	0.587	0.836	0.999
Rajasthan	0.291	0.336	0.388	0.539	0.623
Tamil Nadu	0.407	0.475	0.550	0.765	0.895
Uttar Pradesh	0.280	0.329	0.377	0.502	0.564
West Bengal	0.395	0.451	0.492	0.620	0.683
Mean	**0.378**	**0.433**	**0.489**	**0.670**	**0.770**
Coefficient of Variation (%)	**23.394**	**23.816**	**22.455**	**25.050**	**29.985**

Notes. Higher value of index implies best performer. Author's calculation

Table A16: 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	0.475	0.525	0.582	0.693	0.748
Assam	0.461	0.510	0.545	0.635	0.673
Bihar	0.392	0.454	0.496	0.587	0.617
Gujarat	0.540	0.622	0.673	0.816	0.852
Haryana	0.498	0.556	0.641	0.729	0.748
Himachal Pradesh	0.564	0.646	0.680	0.810	0.922
Karnataka	0.553	0.603	0.639	0.754	0.801
Kerala	0.852	0.975	1.055	1.233	1.510
Madhya Pradesh	0.366	0.413	0.461	0.573	0.634
Maharashtra	0.609	0.721	0.723	0.837	0.908
Orissa	0.409	0.460	0.512	0.616	0.652
Punjab	0.582	0.657	0.708	0.795	0.862
Rajasthan	0.393	0.448	0.498	0.612	0.696
Tamil Nadu	0.543	0.635	0.698	0.813	0.843
Uttar Pradesh	0.368	0.434	0.479	0.588	0.625
West Bengal	0.537	0.616	0.656	0.763	0.796
Mean	0.509	0.580	0.628	0.741	0.805
Coefficient of Variation (%)	**23.911**	**24.322**	**23.112**	**21.816**	**26.532**

Notes. Higher value of index implies best performer. Author's calculation

Table A17: 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	0.106	0.152	0.255	0.247	0.390
Assam	0.035	0.046	0.071	0.126	0.188
Bihar	0.064	0.076	0.135	0.140	0.132
Gujarat	0.149	0.248	0.384	0.406	0.577
Haryana	0.102	0.175	0.275	0.327	0.475
Himachal Pradesh	0.048	0.088	0.140	0.239	0.355
Karnataka	0.110	0.162	0.253	0.278	0.419
Kerala	0.077	0.080	0.195	0.516	0.737
Madhya Pradesh	0.088	0.127	0.272	0.264	0.238
Maharashtra	0.189	0.267	0.393	0.319	0.470
Orissa	0.064	0.070	0.126	0.205	0.280
Punjab	0.181	0.328	0.461	0.524	0.776
Rajasthan	0.073	0.120	0.194	0.203	0.261
Tamil Nadu	0.123	0.166	0.298	0.363	0.595
Uttar Pradesh	0.108	0.141	0.208	0.164	0.244
West Bengal	0.085	0.099	0.151	0.154	0.240
Mean	**0.100**	**0.147**	**0.238**	**0.280**	**0.398**
Coefficient of Variation (%)	**43.911**	**53.205**	**45.290**	**44.191**	**48.657**

Notes. Higher value of index implies best performer. Author's calculation

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.