8. Intra-Provincial Inequality in China:

An analysis of county-level data

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Introduction

Many studies have been carried out to investigate China's regional inequality, which has increased considerably since the initiation of economic reforms. Most of the studies in the literature, however, are based on provincial-level data while intra-provincial inequality has not been examined thoroughly (Cheong 2012). In particular, the patterns and trends of inequality between the county-level units (CUs, including counties and county-level cities) within the provinces are virtually unknown. In order to get a full grasp of the pattern and dynamic trend of the inequality between the county-level units, the data have to be continuous and must have a long time span. Even though some researchers employ county-level data in their studies, many of these studies are still plagued by the problem of either limited coverage or a short time span. In-depth studies of intra-provincial regional inequalities are mainly confined to the provinces in China's eastern zone with the rest of the country being ignored. The objective of this chapter is to estimate and decompose regional inequality using county-level data from the provinces in both the inland and the coastal regions for an extended period.

The county-level data used in this study can provide an opportunity to examine the pattern and evolution of regional inequality in greater detail. Specifically, this study decomposes overall inequality into the intra-provincial and inter-provincial components and hence makes it possible to identify the role of each province. Further decomposition of intra-provincial inequality can provide important insights into the effect on regional inequality of subregions within each province. The empirical exercise is carried out through a three-tier decomposition process so as to examine the contributions of the components in different spatial levels. The chapter begins with a literature review. Section three discusses the method of decomposition, while section four describes the data. Section five analyses the empirical findings and section six concludes and outlines some policy suggestions.

Literature Review

One of the major analytical tools used in the analysis of regional inequality is the decomposition method. This study is based on the decomposition of inequality by subgroups, which are defined as different spatial groupings in the literature. The common spatial groupings used in the literature are the provinces, the economic zones (eastern, central, western and north-eastern) as well as the inland and coastal regions. The focus of this study is on regional inequality measured by gross regional product (GRP) per capita at the county level. Therefore, this literature review is mainly confined to the studies that use regional output in their calculations. The studies are grouped according to the different spatial levels used in the decomposition.

Provincial-Level Decomposition

Tsui (1993) analysed inter-CU inequality using gross value of industrial and agricultural output (GVIAO) per capita in 1982. He decomposes overall inequality into two components: the inter-provincial and the intra-provincial components. Lee (2000) considered data for 1994 and compared his findings with those of Tsui. Lee found that the contribution of inter-provincial inequality to overall inequality increased between 1982 and 1994, while the contribution of intra-provincial inequality decreased. Herrmann-Pillath et al. (2002) also examined the contributions of inter-provincial and intra-provincial inequalities to overall inequality, but their study was based on GRP per capita amongst the prefectures. They found that the contribution of the inter-provincial inequality component to overall inter-prefectural inequality increased during 1993–98, whereas the contribution of the intra-provincial inequality component to overall inter-prefectural inequality decreased. Li and Xu (2008) also investigated regional inequality using prefectural-level GRP per capita and showed that the contribution of the intra-provincial component declined from 61.6 per cent in 1997 to 59.4 per cent in 2005, while the contribution of the inter-provincial component increased from 38.4 per cent to 40.6 per cent during the period considered. Their results provide further empirical evidence supporting the findings of both Lee (2000) and Herrmann-Pillath et al. (2002). Although overall inequality measures in the aforementioned studies are calculated using data compiled at different spatial levels, the conclusions are very similar. These studies all show that the contribution of inter-provincial inequality to overall regional inequality increased while the share of intra-provincial inequality declined.

Zonal-Level Decomposition

The decomposition of inequality into inter-zonal and intra-zonal components is very common in the studies of inequality for China. Bhalla et al. (2003), Yao and

Zhang (2001) and Yao et al. (2005) all conducted research on the contributions of the inter-zonal inequality and intra-zonal inequality components to overall inequality using provincial-level GRP per capita data. They all come to the same conclusion that the contribution of the inter-zonal inequality component increased, while that of the intra-zonal inequality component decreased. Yao and Zhang (2001) found that the contribution of the inter-zonal component was about 80 per cent in 1997. Cai et al. (2002) studied inter-provincial inequality using GRP per capita during 1978–98 and they considered three economic zones. They showed that in 1978 the eastern zone's contribution to overall inequality was more than 60 per cent; however, the contribution of the inter-zonal component increased significantly in the following 20 years and was about 60 per cent in 1998. The contribution of the eastern zone component declined dramatically over this period. Therefore, they argued that there was evidence of club convergence within the eastern zone. They also argued that the contributions of the central and western zone components remained very small during that period. Bhalla et al. (2003), who used provincial-level data in their study, showed that the eastern zone contributed the most to overall provincial inequality. Li and Xu (2008) decomposed inter-provincial inequality into contributions of four different zones using GRP per capita data during 1978–2005. They observed that the eastern zone component contributed about 20 per cent of overall inequality in 2005, while the sum of the contributions of the central, western and north-eastern zones was only 10 per cent. Moreover, they also showed that the contribution of the inter-zonal component rose from 40 per cent in 1978 to about 70 per cent in 2005. Therefore, they concluded that inter-provincial inequality was mainly caused by the disparity between the four economic zones. Gries and Redlin (2009) decomposed inequality in provincial GRP per capita during 1978–2004. They showed that the eastern zone component contributed to most of the overall inter-provincial inequality back in 1978; however, the contribution of this component decreased sharply after 1978. In contrast, the contribution of the inter-zonal component increased dramatically and became the largest contributor to overall inequality in 2004. Villaverde et al. (2010) found that the contribution of the inter-zonal component increased considerably, from below 20 per cent in 1978 to about 50 per cent in 2007, while the contribution of the intra-zonal component declined from 80 per cent to about 50 per cent during the same period. Liu (2006) investigated rural regional inequality using the data for agricultural output (AO), rural non-agricultural output (RNAO) and gross value of rural social product (GVRSP). Liu's findings supported the existing consensus that the contributions of the inter-zonal components to overall inequality during the period 1980–2002 increased while the contributions of the intra-zonal components decreased.

Inland and Coastal-Level Decomposition

It is well known that a large disparity exists between the inland and the coastal regions in China. Hao and Wei (2010), Jian et al. (1996), Tsui (2007) and Ying (1999) are representative works establishing this notion using provincial GRP per capita data. In these studies it is found that inequality between the inland and coastal regions increased while that within the inland and coastal regions decreased over time. Another study, by Fujita and Hu (2001), used regional GRP rather than GRP per capita in their calculation. They also reached the same conclusion: that there was an increase in inequality between the inland and coastal regions. Hao and Wei (2010) considered GRP per worker and showed that inequality between the inland and coastal regions increased sharply during 1978–2004. They repeated their exercises by excluding the municipalities, and their findings remained the same.

Decomposition Based on Other Spatial Groupings

Some researchers presented their own definitions in constructing spatial subgroups for decomposition exercises. Herrmann-Pillath et al. (2002) divided the provinces in China into seven ‘macro-regions’. Similarly, Huang et al. (2003) divided the provinces into seven ‘areas’. Herrmann-Pillath et al. (2002) examined inter-prefectural inequality using GRP per capita and found that the contribution of the inter-regional inequality component to overall inter-prefectural inequality decreased during 1993–98. Huang et al. (2003) explored inter-provincial inequality during 1991–2001 and found that the contribution of inter-area inequality to overall inter-provincial inequality increased, while the contribution of intra-area inequality to overall inequality decreased. Huang et al. (2003) thus concluded that inter-area inequality is the major driving force underlying the increase in overall inter-provincial inequality. On the surface, it appears that Herrmann-Pillath et al. (2002) and Huang et al. (2003) reached different conclusions; however, their results cannot be compared directly. First, the time span is not the same. Second, the results of Herrmann-Pillath et al. (2002) are based on prefectural-level data, whereas those of Huang et al. (2003) are based on provincial-level data. Third, Herrmann-Pillath et al. (2002) used GRP per capita data in their analysis, whereas Huang et al. (2003) used provincial GRP data unscaled by population. In addition, their methods of categorisation of the provinces into seven groups are not identical.

The aforementioned studies show that progress in raising living standards across China has been very uneven amongst the regions. Moreover, it is now well established that spatial groupings play a major role in inequality and thus it is necessary to study inequality with due respect to spatial factors.

Methodology

Overall inequality can be decomposed into several components and the contribution of each component can be computed accordingly. This is an excellent tool for determining the relative importance of each component, which is valuable in determining the priority of government policies. The most common approaches used in the literature are the decompositions by subgroups (Shorrocks 1980, 1984) and income sources (Yao 1997, 1999). Decomposition by subgroups can be applied to household survey or regional data (for example, see Cai et al. 2002; Cheng 1996b; Gries and Redlin 2009; Huang et al. 2003; Kanbur and Zhang 1999, 2005; Lee 2000; Li and Xu 2008; Lin et al. 2008; Liu 2010; Sicular et al. 2007; Tsui 1993; Wan 2007; Yang 1999; Yao and Liu 1998; Ying 1999), while decomposition by income sources is mostly used with household survey data to determine the significance of each income component (for instance, Cheng 1996a; Fang and Rizzo 2011; Gustafsson and Li 2001; Khan and Riskin 1998; Khan et al. 1993; Liu and Sicular 2009; Rozelle 1994; Zhou 2009). Theil-T and Theil-L indices are often employed in the decomposition by subgroups (Cowell 2000; Shorrocks 1980; Theil 1967, 1972), while the Gini coefficient is popularly used in the decomposition by income sources (for instance, Cheng 1996a; Yao 1997, 1999).

Decomposition of Inequality by Subgroups

The decomposition of inequality by subgroups is used to determine the contributions of the subgroups to overall inequality (Theil 1967, 1972). First, overall inequality is calculated using all the entities. Second, the entities are then divided into two or more subgroups. These subgroups can be defined by spatial relationship, quantifiable data or qualitative information. Overall inequality for all the entities is then decomposed into the weighted sum of the inequality within these subgroups (the intra-subgroup component) and the inequality between these subgroups (the inter-subgroup component).¹ Theil-T and Theil-L indices are often used in the decomposition of inequality by subgroups because both indices can be decomposed completely into the inter-subgroup and intra-subgroup components (Bourguignon 1979; Shorrocks 1980, 1984). The Gini coefficient, however, does not have this property (Yao 1999); therefore, the Gini coefficient has seldom been used in this kind of exercise (Bourguignon 1979).

The decomposition process can be carried out in successive tiers, so that the relationship between the various components can be investigated. There are five spatial levels in our decomposition: the county (level one), the provincial

1 For a detailed discussion, refer to Bourguignon (1979) and Shorrocks (1980, 1984).

(level two), the zonal (level three), the inland and coastal (level four), and the national (level five). Let $I_i^{j,k}$ be the inequality index for the k th region at level j . The subscript i and superscript j represent different spatial levels, where j is always higher than i by one spatial level. The measurement of inequality is based on population and GRP data compiled at level I , which is represented by subscript i and represents inequality as measured amongst the level- i units. Superscript j represents the level of the spatial grouping that is used in the measurement of inequality. Every spatial grouping in level j is made up of the level- i units. Generally, there are several spatial groupings in each level (except level five, which is the national level, so it has only one entity), and the k th region is one of the many spatial groupings at spatial level j . For example, the inter-CU inequality within the a th province can be represented by $I_1^{2,a}$. The subscript 1 (county-level) shows that the inequality measurement is based on the county-level units, while the superscript 2 (provincial level) shows that the county-level units are grouped into province, and the inequality measurement refers to the inequality amongst the county-level units within a province. The a behind the comma in the superscript refers to the a th province. Similarly, zonal level is level three and thus, the inter-provincial inequality within the b th economic zone can be represented by $I_2^{3,b}$. It should be noted that the overall inequality of the whole nation based on county-level data is represented by I_1^5 . There is no region notation after the number 5 in the superscript, because superscript 5 represents the whole nation and it is the only spatial grouping at the national level.

The inequality of the inter-subgroup component measured at any level i can be decomposed into the sum of the intra-subgroup component and inter-subgroup component measured at a higher spatial level, j . Overall inter-CU inequality for China (I_1^5) can be decomposed into the intra-provincial component and the inter-provincial component (I_2^5). The intra-provincial component is equal to the weighted sum of the inter-CU inequalities within all the provinces in the dataset. The inter-CU inequality within the a^{th} province is represented by $I_1^{2,a}$ (Equation 8.1).

Equation 8.1

$$I_1^5 = \sum_{a=1}^{22} W_a I_1^{2,a} + I_2^5$$

In Equation 8.1, $a = 1$ to 22 since there are 22 provinces in this study and W_a is the weight for the a^{th} province. The weights for the Theil-L and Theil-T decompositions are population and income based, respectively (Gustafsson and Li 2002). Specifically, the weight for the a^{th} province is n_a/N for the Theil-L decomposition and Y_a/Y for the Theil-T decomposition where n_a and Y_a represent the population and GRP in the a^{th} province, while N and Y denote the total population and GRP of all the regions.

Similarly, the inter-provincial inequality (I_2^5) can then be decomposed into the sum of the intra-zonal component and the inter-zonal component (I_3^5). The intra-zonal component is equal to the weighted sum of the inter-provincial inequalities within all the zones. The inter-provincial inequality within the b^{th} zone is represented by $I_2^{3,b}$ (Equation 8.2).

Equation 8.2

$$I_2^5 = \sum_{b=1}^4 W_b I_2^{3,b} + I_3^5$$

In Equation 8.2, $b = 1$ to 4 since there are four economic zones; W_b is the weight for the b^{th} zone.

In the third tier of decomposition, inter-zonal inequality (I_3^5) can be further decomposed into the sum of the component of the inequalities within the inland and coastal regions, and the component of the inequality between the inland and coastal regions (I_4^5). The component of the inequalities within the inland and coastal regions is equal to the weighted sum of the inter-zonal inequalities within the inland and coastal regions. The inter-zonal inequality within the c^{th} region is represented by $I_3^{4,c}$ (Equation 8.3).

Equation 8.3

$$I_3^5 = \sum_{c=1}^2 W_c I_3^{4,c} + I_4^5$$

In Equation 8.3, $c = 1, 2$, since there are two regions—namely, the inland and the coastal regions—and W_c is the weight for the c^{th} region.

Substitute Equation 8.3 into Equation 8.2 to obtain Equation 8.4.

Equation 8.4

$$I_2^5 = \sum_{b=1}^4 W_b I_2^{3,b} + \sum_{c=1}^2 W_c I_3^{4,c} + I_4^5$$

Thus, Equation 8.1 becomes Equation 8.5.

Equation 8.5

$$I_1^5 = \sum_{a=1}^{22} W_a I_1^{2,a} + \sum_{b=1}^4 W_b I_2^{3,b} + \sum_{c=1}^2 W_c I_3^{4,c} + I_4^5$$

The contribution of the various spatial components to overall inequality in China can be derived from Equation 8.5. The percentage contribution of each component can then be found by dividing the value of each individual component by overall inequality. Overall inequality can be decomposed into the spatial components at four levels. This form of decomposition is the vertical decomposition, which can be applied across different administrative levels.

All components in Equation 8.5, except I_4^5 , are the weighted sums of inequality measured at a lower level. These intra-subgroup components can be further decomposed into their constituents within each level. The value of each constituent unit is the inequality of that entity times its weight. For example, the weighted sum of the inter-CU inequalities within all the provinces, which is made up of the contributions of 22 provinces, can be decomposed into the contribution of each province. This can identify major contributors to overall inequality for each spatial grouping. Similarly, the intra-provincial regional inequality (that is, the inter-CU inequality within each province) can be further decomposed into three components within each province: the components of the inter-county inequality, the intercity inequality and the inequality between city and county subgroups. The information can reveal the disparity between the cities and counties within each province. Accordingly, intra-provincial development policy can be formulated for each province.

Data

Regional inequality can be investigated using different indicators. Duncan and Tian (1999) noted that it is important to distinguish between studies using livelihood and output indicators, as they can lead to different results. Many inequality studies are based on expenditure, consumption, wages, total earnings and household income data. These indicators are good measures for the livelihood and economic wellbeing of people. On the other hand, output per capita is deemed to be a good measure of economic development for a region. Because the focus of this study is on regional inequality in economic development, regional output per capita is used in this study. Gross regional product (GRP) per capita is selected as the indicator of economic development in this research because it is the most frequently used indicator of output and is more comprehensive than other measures such as the gross value of industrial and agricultural output (GVIAO) and national income (NI).

The present study is based on a dataset of real GRP per capita for the counties and county-level cities in China. There are three kinds of county-level units: the counties, the county-level cities and the city districts (or simply 'districts') in the prefectural-level cities and municipalities. The data for the city districts, however, are unavailable for some provinces in the earlier years of the study period. Moreover, in some cases, only an aggregated value of the city districts, rather than the data for each individual district, is available. Therefore, this study is based on the data for the counties and county-level cities only. Many studies that examine inequality amongst the county-level units do not include city districts but are based on the data for the county-level cities and

counties only.² In this study, the four municipalities—Beijing, Tianjin, Shanghai and Chongqing—are not included because most of the administrative regions in the municipalities are districts.

The data are largely compiled from the *Provincial Statistical Yearbook* (NBS 1998–2008a) of each province; however, where the data are unavailable, the data from the *China Statistical Yearbook for Regional Economy* (NBS 2004–08) and the *Provincial Yearbook* (NBS 1998–2008b) for each province are used. Some cities and counties are dropped from the dataset because of incomplete information in the sources. All the county-level GRP data are adjusted for inflation and expressed in 1997 constant prices. Since the deflator for each individual county-level unit is not available, the provincial deflator is used for all the counties and county-level cities within a province. To ensure consistency of data, the database has been thoroughly checked for changing administrative status/boundaries and so on.³ Aggregation has been used in some instances, following Fan (1995), where boundaries have changed over time. The shortcoming of aggregation is the possible underestimation of inequality in the aggregated county-level units, although according to the web site of administrative divisions in China, there were few changes in administrative divisions during the period covered.

The county-level units are divided into spatial groupings at four levels: national, inland and coastal, economic zonal, and provincial. In this study, the coastal region and the eastern zone are identical, whereas the inland region is defined to comprise all the provinces in the central, western and north-eastern zones. The definition of the inland and coastal regions used in this study is slightly different from the official definition. As the data for some provinces are not available in some years, the county-level units within these provinces cannot be included in the measurement of inequality conducted at the national, inland and coastal, and economic zonal levels. Eventually, only the county-level units in 22 provinces are included in these three levels of analyses, and these provinces are grouped as follows.

- Eastern zone: Hebei, Jiangsu, Zhejiang, Fujian, Guangdong and Hainan. The municipalities of Beijing, Tianjin and Shanghai are excluded from this study. The province of Shandong is not included because of unavailability of data.
- Central zone: Anhui, Jiangxi, Henan and Hunan. The provinces of Shanxi and Hubei are not included because of unavailability of data.

2 Examples include Brajer et al. (2010); Gustafsson and Li (2002); Lee (2000); Jones et al. (2003); Li and Xu (2008); Rozelle (1994); Song et al. (2000); Veeck and Pannell (1989); Wei and Kim (2002); Wu and Zhu (2011); Yu et al. (2007); Zhou and Zou (2010).

3 Detailed descriptions are available in Cheong and Wu (2012).

- Western zone: Inner Mongolia, Guangxi, Sichuan, Guizhou, Yunnan, Gansu, Qinghai, Ningxia and Xinjiang. The municipality of Chongqing is excluded from this study. The provinces of Shaanxi and Tibet are not included because of unavailability of data.
- North-eastern zone: Liaoning, Jilin and Heilongjiang.

The categorisation of the zones is based on the *2006 China Statistical Yearbook* (NBS 2006). The final dataset used in the study comprises 1485 counties and county-level cities covering the period 1997–2007. Population data are compiled from the *Provincial Statistical Yearbook* (NBS 1998–2008a), *Provincial Yearbook* (NBS 1998–2008b) and *China Statistical Yearbook for Regional Economy* (NBS 2004–2008). It is well known that the provincial population data in China are based on the household registration system (*hukou*) population, and the number of temporary migrants is not taken into consideration. This could distort the final results and cannot be resolved given the resources available.⁴

Wan (2008) suggests that China's regional inequality can be divided into two dimensions: the east–central–west divide and rural–urban inequality. The latter contributes to more than 70 per cent of overall inequality. The data for rural and urban areas within the county-level units are not available, therefore, it is impossible to study inequality between the rural and urban areas at the county level. Lee (2000) and Tsui (1993) treated the county-level cities as urban areas and the counties as rural areas in their analysis. They decompose overall inter-CU inequality into the contributions of the 'intra-rural', 'intra-urban' and 'rural-urban' components. The same approach will be used in this chapter. To avoid confusion, the components are renamed as inter-county inequality, intercity inequality and inequality between city and county subgroups.

Results and Discussion

The dataset used in this research comprises data for the counties and county-level cities. The terms 'county-level city' and 'city' are used interchangeably hereinafter. The term 'inter-county-level-unit inequality' or simply 'inter-CU inequality' refers to the inequality amongst all the counties and county-level cities within a region. The term 'intra-provincial regional inequality' or simply

4 The data of the actual population in 2000 for each county-level unit are available in the *County Data of 2000 Census* (*2000 ren kou pu cha fen xian zi liao*) (NBS 2003). As the census data for 2010 are not yet available, for the time being, it is impossible to adjust the population data by interpolation because the only data available are for 2000. Further adjustment can be made when the data become available. Another concern is the quality of output data in China. Researchers have raised doubts about the reliability and accuracy of China's GDP statistics (Chow 1986; Holz 2006; Rawski 2001; Wu 1997). The official source is, however, still the only channel for statistics used in this type of exercise. Thus, caution should be exercised in interpreting the results here.

‘intra-provincial inequality’ refers to the inequality amongst the county-level units within a province (that is, the inter-CU inequality within each province). This section has two parts: the results based on decomposition of overall inequality into different spatial components are presented first. Then, intra-provincial inequality is further decomposed into three components: inter-county inequality, intercity inequality and inequality between city and county subgroups.

Decomposition of Inequality into Spatial Components

Table 8.1 shows the three-tier decomposition of inequality. The first tier is the decomposition of overall inter-CU inequality into the intra-provincial component (that is, the weighted sum of the inter-CU inequalities within all the provinces) and the inter-provincial component as shown in Equation 8.1. The contribution of each component is expressed as a percentage of the overall inter-CU inequality. The second tier is the decomposition of inter-provincial inequality into the intra-zonal component (that is, the weighted sum of the inter-provincial inequalities within all the zones) and the inter-zonal component as shown in Equation 8.2. The contribution at this level is expressed as a fraction of inter-provincial inequality. The third tier is the decomposition of the inter-zonal inequality into the component of inter-zonal inequality within the inland and coastal regions (that is, the weighted sum of the inter-zonal inequalities within the inland and coastal regions) and the component of the inequality between the inland and coastal regions as shown in Equation 8.3. The contributions of the components are expressed as a percentage of the inter-zonal inequality.

The first-tier decomposition in Table 8.1 shows that the contributions of inter-CU inequality within all the provinces and inter-provincial inequality to overall inter-CU inequality remain relatively constant during the period 1997–2007. It is interesting to note that the contribution of inter-provincial inequality (Theil-T is used in this calculation) decreased slightly between 1997 and 2007, but it increased slightly when Theil-L is used. The difference is, however, very small. In contrast, the contribution of inter-provincial inequalities within all the zones to overall inter-provincial inequality increased substantially according to either Theil-T or Theil-L measure, as shown in the second-tier decomposition in Table 8.1. In 1997, the contributions were about 26 per cent and 28 per cent according to Theil-T and Theil-L measures, respectively. These contributions increased enormously to reach about 48 per cent in both cases in 2007, while the contribution of the inter-zonal inequality decreased significantly. Finally, the third-tier decomposition results illustrate that the changes in the contributions of the components are relatively small. The contribution of inter-zonal inequality within the inland and coastal regions dropped about 4 per cent, whereas the contribution of inequality between the inland and coastal regions increased

slightly during 1997–2007. The contribution of inequality between the inland and coastal regions to overall inter-zonal inequality reached about 90 per cent in 2007.

Table 8.2 shows the overall result of the decomposition into different spatial components using Equation 8.5. The contribution of each component is expressed as a percentage of overall inter-CU inequality. Although there are some minor differences in the percentage contribution derived from the two indices, the magnitude and trend are similar. The component of inter-CU inequality within all the provinces contributed the most to overall inter-CU inequality and was about 60 per cent in 2007. The contributions of inter-provincial inequality within all the zones and inequality between the inland and coastal regions were very close in 2007, being 19 per cent and 18 per cent according to the Theil-T measure. The component of inter-zonal inequalities within the inland and coastal regions contributed about 2 per cent of overall inequality in 2007.

Table 8.3 shows the changes in the contributions of the spatial components to overall inter-CU inequality. It can be observed that the contribution of inter-CU inequality within all the provinces to overall inter-CU inequality remained fairly constant over time. The contribution of inter-provincial inequality within all the zones increased, while the contributions of inequality between the inland and coastal regions and inter-zonal inequality within the inland and coastal regions were found to decrease. According to the Theil-T method, the percentage increase in the contribution of inter-provincial inequality within all the zones was about 8.6 per cent during 1997–2007 while inter-zonal inequality within the inland and coastal regions declined 2.2 per cent and inequality between the inland and coastal regions declined 7.7 per cent. This finding highlights the importance of monitoring the increase in inequality amongst the provinces within the economic zones.

Table 8.1 Three-Tier Decomposition of Inter-CU Inequality into Spatial Components

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
First tier	Theil-T	Inter-CU inequality within all the provinces (%)										
	Theil-L	Inter-provincial inequality (%)										
		Inter-CU inequality within all the provinces (%)										
		Inter-provincial inequality (%)										
Second tier	Theil-T	Inter-provincial inequality within all the zones (%)										
	Theil-L	Inter-zonal inequality (%)										
		Inter-provincial inequality within all the zones (%)										
		Inter-zonal inequality (%)										
Third tier	Theil-T	Inter-zonal inequality within the inland and coastal regions (%)										
	Theil-L	Inequality between the inland and coastal regions (%)										
		Inter-zonal inequality within the inland and coastal regions (%)										
		Inequality between the inland and coastal regions (%)										

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones.

Source: Authors' own calculation.

Table 8.2 Decomposition of Inter-CU Inequality into Spatial Components

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Theil-T	Inequality between the inland and coastal regions (%)	25.70	27.62	28.24	27.50	27.42	27.28	27.09	25.55	19.46	18.05
	Inter-zonal inequality within the inland and coastal regions (%)	4.21	4.85	4.95	3.98	3.75	3.71	3.31	3.06	1.95	2.01
	Inter-provincial inequality within all the zones (%)	10.61	9.69	9.77	10.94	11.30	12.21	12.82	14.11	17.19	19.20
	Inter-CU inequality within all the provinces (%)	59.49	57.84	57.04	57.58	57.53	56.79	56.77	57.28	60.56	60.74
	Inequality between the inland and coastal regions (%)	25.38	27.40	28.16	27.55	27.52	27.74	28.05	26.63	21.14	19.70
Theil-L	Inter-zonal inequality within the inland and coastal regions (%)	5.32	6.22	6.35	5.12	4.85	4.87	4.46	4.16	2.77	2.83
	Inter-provincial inequality within all the zones (%)	12.10	10.84	10.57	11.64	11.92	12.72	13.35	15.13	19.53	21.01
	Inter-CU inequality within all the provinces (%)	57.19	55.55	54.93	55.70	55.71	54.67	54.14	55.98	56.56	56.46

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones.

Source: Authors' own calculation.

Table 8.3 Changes in the Contributions of the Spatial Components to Inter-CU Inequality (per cent)

		1997	2007	Differences
Theil-T	Inequality between the inland and coastal regions	25.70	18.05	-7.65
	Inter-zonal inequality within the inland and coastal regions	4.21	2.01	-2.19
	Inter-provincial inequality within all the zones	10.61	19.20	8.59
	Inter-CU inequality within all the provinces	59.49	60.74	1.25
Theil-L	Inequality between the inland and coastal regions	25.38	19.70	-5.68
	Inter-zonal inequality within the inland and coastal regions	5.32	2.83	-2.50
	Inter-provincial inequality within all the zones	12.10	21.01	8.91
	Inter-CU inequality within all the provinces	57.19	56.46	-0.73

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones.

Source: Authors' own calculation.

Decomposition techniques can also be applied to analyse the *changes* in inequality itself. This extends the conventional decomposition of inequality. The decomposition of changes in inequality can provide detailed information about the contributions of the changes in different components to the change in overall inequality. The conventional approach shows the significance of the component to the absolute level of inequality. The results of the decomposition of the changes in overall inter-CU inequality over the period 1997–2007 are shown in Table 8.4. The increase in inter-CU inequality within all the provinces contributed substantially to the change in overall inequality during the period considered (63 per cent and 55 per cent according to Theil-T and Theil-L measures respectively), followed by the increase in inter-provincial inequality within all the zones (35 per cent and 43 per cent according to Theil-T and Theil-L). A comparison of Table 8.4 with Table 8.3 shows that inequality between the inland and coastal regions registered a decrease in its contribution to overall inequality in Table 8.3, whereas Table 8.4 shows that 4 per cent (given Theil-T) of an increase in overall inequality can be explained by the increase in inequality between the inland and coastal regions. This information is quite revealing. It suggests that inequality between the inland and coastal regions increased in the study period, but the increase was not as dramatic as those of other components and hence led to a decline in its total contribution. Therefore, this component should not be overlooked just because it had a decline in total contribution.

All the county-level units in a province can be further divided into city and county subgroups, and an additional tier of decomposition can be performed to investigate the contribution of the city and county subgroups to intra-provincial regional inequality. The latter can be further decomposed into three

intra-provincial components: inter-county inequality, intercity inequality and inequality between the city and county subgroups in each province.⁵ The results are shown in Table 8.5. It is observed that inter-county inequality within all the provinces has the largest contribution to overall inequality—namely, 23 per cent and 31 per cent in 2007 according to the Theil-T and Theil-L measures respectively. The changes in the contributions of these components are shown in Table 8.6. It is shown that the changes of the three intra-provincial components were very small and remained fairly constant over the whole period.

Table 8.4 Decomposition of the Changes in Inter-CU Inequality, 1997–2007

Changes in	Contribution to inter-CU inequality change		Contribution to inter-CU inequality change (%)	
	Theil-T	Theil-L	Theil-T	Theil-L
Inequality between the inland and coastal regions	0.005	0.004	4.072	5.447
Inter-zonal inequality within the inland and coastal regions	−0.002	−0.003	−1.999	−3.426
Inter-provincial inequality within all the zones	0.039	0.034	34.892	43.338
Inter-CU inequality within all the provinces	0.070	0.042	63.035	54.641

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones.

Source: Authors' own calculation.

Table 8.7 shows the contributions of the changes in different spatial components (first three rows in the table) and the three intra-provincial components (last three rows in the table) to the change in overall inequality. It is shown that the contributions of the changes in the three intra-provincial components (inter-county, intercity and between city and county subgroups) were respectively 25 per cent, 26 per cent and 12 per cent according to the Theil-T technique (or 33 per cent, 13 per cent and 9 per cent if Theil-L indices are used). It is worth noting that in Table 8.6 the contribution of inequality between city and county subgroups within all the provinces exhibited a declining trend while the increase in this component still contributed to 12 per cent (as measured by Theil-T) of the increase in overall inequality. Similarly, though in Table 8.6 the changes in the contributions of the other two intra-provincial inequality components remained constant, the increases in these two components contributed to more than 50 per cent (as measured by Theil-T) of the change in overall inequality during the period 1997–2007. Therefore, these inequality components should not be overlooked and efforts should also be made to mitigate these intra-provincial inequalities.

5 The decomposition of inequality into city and county subgroups cannot be conducted for Ningxia because there is only one county-level city in Ningxia, and there has also been a boundary change in this city that makes the data incomparable. This city is thus removed from the dataset.

Table 8.5 Decomposition of Inter-CU Inequality into Spatial Components and the Three Intra-Provincial Components

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Theil-T	Inequality between the inland and coastal regions (%)	25.70	27.62	28.24	27.50	27.42	27.28	27.09	25.55	19.46	18.05
	Inter-zonal inequality within the inland and coastal regions (%)	4.21	4.85	4.95	3.98	3.75	3.71	3.31	3.06	2.47	2.01
	Inter-provincial inequality within all the zones (%)	10.61	9.69	9.77	10.94	11.30	12.21	12.82	14.11	17.19	18.03
	Inter-county inequality within all the provinces (%)	22.23	21.64	21.92	22.07	22.24	21.19	20.47	20.83	22.25	23.31
	Intercity inequality within all the provinces (%)	20.85	20.79	20.19	20.69	20.47	20.88	21.39	21.41	22.26	22.62
	Inequality between city and county subgroups within all the provinces (%)	16.41	15.41	14.93	14.82	14.83	14.72	14.92	15.04	15.15	14.81
Theil-L	Inequality between the inland and coastal regions (%)	25.38	27.40	28.16	27.55	27.52	27.74	28.05	26.63	22.14	19.70
	Inter-zonal inequality within the inland and coastal regions (%)	5.32	6.22	6.35	5.12	4.85	4.87	4.46	4.16	3.45	2.83
	Inter-provincial inequality within all the zones (%)	12.10	10.84	10.57	11.64	11.92	12.72	13.35	15.13	18.43	21.01
	Inter-county inequality within all the provinces (%)	29.66	28.87	29.12	29.44	29.81	28.80	28.22	28.32	29.92	30.57
	Intercity inequality within all the provinces (%)	12.61	12.71	12.33	12.91	12.49	12.51	12.39	12.24	12.49	12.72
	Inequality between city and county subgroups within all the provinces (%)	14.93	13.96	13.49	13.35	13.41	13.36	13.52	13.52	13.56	13.17

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones.

Source: Authors' own calculation.

Table 8.6 Changes in the Contributions of Inequality Components (per cent)

		1997	2007	Differences
Theil-T	Inequality between the inland and coastal regions	25.70	18.05	-7.65
	Inter-zonal inequality within the inland and coastal regions	4.21	2.01	-2.19
	Inter-provincial inequality within all the zones	10.61	19.20	8.59
	Inter-county inequality within all the provinces	22.23	23.31	1.08
	Intercity inequality within all the provinces	20.85	22.62	1.78
	Inequality between city and county subgroups within all the provinces	16.41	14.81	-1.60
Theil-L	Inequality between the inland and coastal regions	25.38	19.70	-5.68
	Inter-zonal inequality within the inland and coastal regions	5.32	2.83	-2.50
	Inter-provincial inequality within all the zones	12.10	21.01	8.91
	Inter-county inequality within all the provinces	29.66	30.57	0.92
	Intercity inequality within all the provinces	12.61	12.72	0.11
	Inequality between city and county subgroups within all the provinces	14.93	13.17	-1.75

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones.

Source: Authors' own calculation.

Table 8.7 Decomposition of the Change in Inter-CU Inequality, 1997–2007

Changes in each component	Contribution to overall changes		Contribution to overall changes (%)	
	Theil-T	Theil-L	Theil-T	Theil-L
Inequality between the inland and coastal regions	0.005	0.004	4.072	5.447
Inter-zonal inequality within the inland and coastal regions	-0.002	-0.003	-1.999	-3.426
Inter-provincial inequality within all the zones	0.039	0.034	34.892	43.338
Inter-county inequality within all the provinces	0.028	0.025	25.277	32.876
Inter-city inequality within all the provinces	0.029	0.010	25.875	12.985
Inequality between city and county subgroups within all the provinces	0.013	0.007	11.882	8.780

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones.

Source: Authors' own calculation.

Further Decomposition Analyses

Further analysis can be performed to gain more insights into inequality in each province. Decomposition can be conducted horizontally amongst the provinces so as to identify the contributions of individual provinces.

The results are shown in Tables 8.8 and 8.9 (corresponding to the Theil-T and Theil-L methods). As the two sets of results are similar, our discussions are based on the Theil-T results in Table 8.8. The values in column CU in Table 8.8 represent percentage contributions of individual provinces to overall inequality and they sum to one hundred. Individual provinces' contributions are then decomposed into three components reported in columns Co, Ci and Co-Ci in Table 8.8. According to this table, in 2007 Jiangsu made the largest contribution to overall inequality. This finding is in agreement with the results of Sakamoto and Fan (2010), who showed that Jiangsu contributed considerably to the income disparity within the Yangtze River Delta and that its contribution was growing. Other large contributors in 2007 were, in turn, Hebei, Henan, Inner Mongolia and Zhejiang. Together, these top-five contributors have a share of about 63 per cent. These provinces are situated close to each other. That could imply that spatial factors play major roles in inequality in China. Table 8.8 also shows that inter-county inequality in Hebei, Henan and Inner Mongolia dominates each province's contribution while intercity inequality in Jiangsu is the most important contributing factor. Intercity inequality within Fujian, Guangdong, Hebei, Zhejiang, Henan and Xinjiang also contributed greatly to overall inequality. Most of these provinces belong to the eastern zone. It shows that the great disparity amongst the cities in the eastern zone further reinforced overall inequality. The inequality between city and county subgroups in Fujian, Hebei, Jiangsu, Zhejiang, Henan and Xinjiang contributed significantly to overall inequality. Four of these provinces also belong to the eastern zone.

Table 8.10 shows the changes in the contributions of the three intra-provincial components of the provinces to overall inequality during 1997–2007. It is observed that inter-CU inequality in Jiangsu had the largest increase in its contribution (using the Theil-T technique), which is largely attributed to the increase in the intercity inequality component. The contribution of inter-county inequality did not, however, change significantly though that of inequality between city and county subgroups increased moderately. It is also observed that inter-CU inequality in Inner Mongolia had the second-largest increase in its contribution (according to Theil-T). This change was mainly caused by the increase in the contribution of the inter-county inequality component. The results using the Theil-L method, however, show that inter-CU inequality in Hebei had the largest increase in its contribution, which was mainly due to the increase in the contribution of the inter-county inequality component. Table 8.10 also shows that inter-CU inequality in Guangdong had the largest decrease in its contribution (3.46 per cent according to Theil-T), which was mainly due to the decline in the contribution of the intercity inequality component (2.04 per cent) and a modest decline in the inter-county inequality component (0.96 per cent). According to the Theil-L method, inter-CU inequality in Sichuan had the largest decrease in its contribution (3.05 per cent).

Table 8.8 Decomposition of Inter-CU Inequality within the Provinces in 1997 and 2007 (Theil-T)

		1997				2007			
		CU	Co	Ci	Co-Ci	CU	Co	Ci	Co-Ci
Coastal	Eastern	Fujian	6.76	1.23	2.78	2.75	0.64	1.86	1.63
		Guangdong	6.47	2.28	3.72	0.47	1.32	1.68	0.00
		Hainan	0.27	0.09	0.05	0.13	0.05	0.04	0.02
		Hebei	7.33	3.57	1.39	2.37	4.98	2.96	2.52
		Jiangsu	23.31	1.21	14.40	7.70	1.39	18.96	9.74
Inland	Central	Zhejiang	6.62	2.98	1.86	1.78	2.39	1.78	1.15
		Anhui	2.58	1.54	0.36	0.68	0.88	0.18	0.14
		Henan	8.94	3.21	1.99	3.75	4.19	2.05	3.18
		Hunan	2.74	2.24	0.38	0.13	2.46	0.54	0.29
		Jiangxi	1.14	0.90	0.18	0.05	1.33	0.44	0.16
	Western	Gansu	2.02	1.55	0.08	0.39	1.32	0.14	0.46
		Guangxi	2.47	1.98	0.47	0.02	1.19	0.12	0.00
		Guizhou	1.28	0.72	0.08	0.48	0.64	0.14	0.49
		Inner Mongolia	2.04	1.33	0.42	0.28	6.79	0.85	0.02
		Qinghai	0.49	0.25	0.03	0.22	0.21	0.06	0.55
North-eastern		Sichuan	7.51	4.26	1.15	2.09	2.82	0.71	0.89
		Xinjiang	4.99	2.38	1.78	0.83	2.02	1.63	1.04
		Yunnan	5.13	2.45	1.08	1.59	1.62	0.43	0.67
		Heilongjiang	1.75	0.92	0.48	0.35	0.84	0.86	0.61
		Jilin	0.82	0.30	0.38	0.14	0.40	0.61	0.03
		Liaoning	5.16	1.76	2.00	1.40	0.75	1.18	0.77

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones. CU = inter-CU inequality; Co = inter-county inequality; Ci = intercity inequality; Co-Ci = inequality between city and county subgroups.

Source: Authors' own calculation.

Table 8.9 Decomposition of Inter-CU Inequality within the Provinces in 1997 and 2007 (Theil-L)

		1997				2007			
		CU	Co	Ci	Co-Ci	CU	Co	Ci	Co-Ci
Coastal	Eastern	Fujian	3.76	0.99	1.11	1.65	0.74	1.01	1.35
		Guangdong	6.05	2.57	3.04	0.44	2.04	2.37	0.01
		Hainan	0.31	0.12	0.04	0.14	0.09	0.06	0.04
		Hebei	6.20	3.47	0.86	1.87	5.37	1.87	2.20
		Jiangsu	13.78	1.46	6.83	5.49	1.66	7.21	6.38
		Zhejiang	3.94	2.09	0.91	0.95	1.65	0.86	0.62
Inland	Central	Anhui	2.95	2.01	0.22	0.72	2.08	0.27	0.29
		Henan	10.45	4.57	1.58	4.30	5.57	1.53	3.42
		Hunan	3.60	3.02	0.42	0.17	4.13	0.74	0.49
		Jiangxi	1.86	1.52	0.25	0.09	2.59	0.57	0.28
		Gansu	5.07	4.24	0.08	0.75	3.55	0.11	0.83
		Guangxi	3.45	2.84	0.58	0.03	2.34	0.22	0.01
Inland	Western	Guizhou	3.36	2.06	0.13	1.16	2.04	0.27	1.29
		Inner Mongolia	2.53	1.83	0.37	0.33	5.17	0.50	0.02
		Qinghai	0.75	0.46	0.02	0.27	0.39	0.02	0.55
		Sichuan	10.36	6.35	1.23	2.79	4.96	0.86	1.49
		Xinjiang	4.70	2.72	1.14	0.84	2.91	1.05	1.18
		Yunnan	8.61	5.19	1.04	2.38	3.94	0.52	1.21
North-eastern	North-eastern	Heilongjiang	1.93	1.18	0.40	0.35	1.77	0.94	0.92
		Jilin	0.92	0.38	0.38	0.16	0.42	0.58	0.04
		Liaoning	4.84	2.19	1.42	1.22	0.97	0.97	0.71

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones. CU = inter-CU inequality; Co = inter-county inequality; Ci = intercity inequality; Co-Ci = inequality between city and county subgroups.

Source: Authors' own calculation.

Table 8.11 presents the results of the decomposition of the change in overall inter-CU inequality into the changes in the three components of intra-provincial inequality for each province. According to the estimates using Theil-T, the increase in inter-CU inequality in Jiangsu contributed to 26.35 per cent of the change in overall inequality in China. The increase in intercity inequality accounted for 16.91 per cent, while the increase in inequality between the city and county subgroups accounted for 8.37 per cent. It implies that more than one-quarter of the increase in inter-CU inequality in China over the study period could be due to the increase in intra-provincial inequality in Jiangsu. Furthermore, it is observed that the increases in inter-CU inequalities in Hebei and Inner Mongolia also contributed significantly to overall inequality. These three provinces combined contributed to about 47 per cent of the increase in overall inequality according to the Theil-T estimates. It means that if the levels of inter-CU inequality in these provinces had remained unchanged during the entire study period then the overall increase in inequality in China would have been reduced by nearly one-half.

The relative importance of the three intra-provincial inequality components in every province can also be estimated. In Table 8.12 the contributions of inter-county inequality, intercity inequality and inequality between city and county subgroups in every province are expressed as a percentage of the sum of these three components. For example, inter-county inequality in Hainan contributed to 34.58 per cent of the intra-provincial inequality of Hainan in 1997 while this figure increased to 43.88 per cent in 2007 according to the Theil-T estimates. The contribution of intercity inequality increased from 18.61 per cent to 35.63 per cent while that of inequality between city and county subgroups decreased from 46.81 per cent to 20.49 per cent during the same period. The contribution of the intercity component increased substantially in this period. This could have important policy implications for local government as well as the Central Government.

Table 8.12 provides additional information about the characteristics of the provinces in each zone. According to the Theil-T measurement, inter-county inequality in 2007 contributed to more than 50 per cent of the intra-provincial regional inequality in Anhui, Hunan, Jiangxi, Gansu, Guangxi, Guizhou, Inner Mongolia, Sichuan and Yunnan. These provinces are all in the central and western zones. The intercity component contributed to more than 50 per cent of intra-provincial regional inequality in Guangdong, Jiangsu and Jilin. Both Guangdong and Jiangsu are in the eastern zone. Inequality between city and county subgroups contributed to about 67 per cent of intra-provincial regional inequality in Qinghai, which is in the western zone.

Table 8.10 Changes in the Contributions of Intra-Provincial Components During 1997–2007 (per cent)

		Theil-T change				Theil-L change			
		CU	Co	Ci	Co-Ci	CU	Co	Ci	Co-Ci
Coastal	Fujian	-2.63	-0.59	-0.92	-1.12	-0.66	-0.25	-0.10	-0.30
	Guangdong	-3.46	-0.96	-2.04	-0.47	-1.63	-0.53	-0.67	-0.43
	Hainan	-0.15	-0.04	-0.01	-0.11	-0.12	-0.03	0.02	-0.10
	Hebei	3.13	1.41	1.57	0.15	3.24	1.90	1.01	0.33
	Jiangsu	6.78	0.18	4.56	2.04	1.47	0.20	0.38	0.89
	Zhejiang	-1.30	-0.59	-0.08	-0.63	-0.81	-0.44	-0.05	-0.33
Central	Anhui	-1.38	-0.66	-0.18	-0.54	-0.31	0.07	0.05	-0.43
	Henan	0.49	0.98	0.06	-0.57	0.07	1.00	-0.05	-0.88
	Hunan	0.55	0.22	0.16	0.16	1.76	1.11	0.32	0.32
	Jiangxi	0.80	0.43	0.26	0.11	1.58	1.07	0.32	0.19
	Gansu	-0.10	-0.23	0.06	0.07	-0.57	-0.69	0.03	0.08
	Guangxi	-1.15	-0.79	-0.35	-0.02	-0.88	-0.50	-0.36	-0.02
Inland	Guizhou	0.00	-0.08	0.06	0.01	0.23	-0.02	0.14	0.13
	Inner Mongolia	5.62	5.46	0.43	-0.26	2.64	2.82	0.13	-0.31
	Qinghai	0.32	-0.04	0.03	0.33	0.21	-0.07	0.00	0.28
	Sichuan	-3.09	-1.44	-0.44	-1.20	-3.05	-1.39	-0.37	-1.30
	Xinjiang	-0.30	-0.36	-0.15	0.21	0.44	0.19	-0.09	0.34
	Yunnan	-2.41	-0.83	-0.65	-0.92	-2.94	-1.25	-0.52	-1.17
	Heilongjiang	0.56	-0.08	0.38	0.26	1.70	0.59	0.54	0.57
	Jilin	0.23	0.10	0.23	-0.11	0.12	0.04	0.20	-0.12
North-eastern	Liaoning	-2.46	-1.01	-0.82	-0.63	-2.18	-1.22	-0.45	-0.51

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones. CU = inter-CU inequality; Co = inter-county inequality; Ci = intercity inequality; Co-Ci = inequality between city and county subgroups.

Source: Authors' own calculation.

Table 8.11 Decomposition of Changes in Inter-CU Inequality, 1997–2007, into Changes in Three Intra-Provincial Components

	Change in component	Theil-T				Theil-L			
		CU	Co	Ci	Co-Ci	CU	Co	Ci	Co-Ci
Coastal	Fujian	-0.25	-0.23	0.18	-0.19	0.75	0.06	0.40	0.30
	Guangdong	-1.87	-0.21	-1.15	-0.50	0.08	0.36	0.34	-0.62
	Hainan	-0.08	-0.01	0.02	-0.09	-0.05	0.01	0.06	-0.12
	Hebei	10.00	4.68	3.56	1.76	9.80	5.67	2.47	1.67
	Jiangsu	26.35	1.08	16.91	8.37	10.45	1.19	4.49	4.77
	Zhejiang	1.94	0.86	1.04	0.04	0.54	0.27	0.40	-0.12
Central	Anhui	-0.73	-0.16	-0.08	-0.50	1.00	1.25	0.22	-0.47
	Henan	6.47	3.72	1.36	1.39	5.85	4.48	0.75	0.61
	Hunan	2.67	1.79	0.51	0.36	5.44	3.84	0.87	0.73
	Jiangxi	2.09	1.31	0.57	0.22	4.15	2.95	0.78	0.43
	Gansu	1.11	0.59	0.16	0.36	1.63	0.95	0.11	0.57
	Guangxi	-0.41	-0.10	-0.30	-0.02	0.14	0.56	-0.39	-0.02
Inland	Guizhou	0.80	0.32	0.15	0.32	2.30	1.07	0.33	0.89
	Inner Mongolia	10.94	10.22	0.99	-0.27	6.60	6.59	0.46	-0.44
	Qinghai	0.86	0.08	0.07	0.71	0.82	0.11	0.02	0.69
	Sichuan	-0.57	0.21	-0.03	-0.75	-0.38	0.73	-0.06	-1.04
	Xinjiang	2.64	0.87	0.88	0.89	3.44	1.86	0.45	1.13
	Yunnan	-0.90	0.12	-0.44	-0.58	-1.11	0.37	-0.46	-1.02
North-eastern	Heilongjiang	2.06	0.44	0.95	0.67	4.41	1.81	1.27	1.33
	Jilin	0.91	0.35	0.65	-0.09	0.74	0.29	0.61	-0.15
	Liaoning	-0.97	-0.62	-0.15	-0.20	-1.68	-1.21	-0.12	-0.35

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones. CU = inter-CU inequality; Co = inter-county inequality; Ci = intercity inequality; Co-Ci = inequality between city and county subgroups.

Source: Authors' own calculation.

Table 8.12 Decomposition of Intra-Provincial Inequality in 1997 and 2007

		Theil-T						Theil-L					
		1997			2007			1997			2007		
		Co	Ci	Co-Ci	Co	Ci	Co-Ci	Co	Ci	Co-Ci	Co	Ci	Co-Ci
Coastal	Fujian	18.21	41.07	40.72	15.54	45.04	39.42	26.30	29.66	44.03	24.00	32.48	43.52
	Guangdong	35.32	57.47	7.21	43.93	55.96	0.11	42.52	50.23	7.25	46.23	53.65	0.11
	Hainan	34.58	18.61	46.81	43.88	35.63	20.49	39.37	14.63	46.00	47.07	32.35	20.59
	Hebei	48.68	18.99	32.33	47.64	28.25	24.11	56.03	13.86	30.11	56.96	19.78	23.26
	Jiangsu	5.20	61.79	33.02	4.63	62.99	32.37	10.59	49.56	39.85	10.87	47.27	41.86
Central	Zhejiang	45.07	28.06	26.87	44.90	33.54	21.56	52.98	23.01	24.02	52.66	27.41	19.93
	Anhui	59.74	13.86	26.40	73.34	15.11	11.55	68.08	7.43	24.49	78.92	10.21	10.87
	Henan	35.86	22.24	41.90	44.47	21.78	33.75	43.72	15.13	41.15	52.96	14.51	32.54
	Hunan	81.50	13.86	4.63	74.72	16.39	8.89	83.83	11.59	4.59	77.07	13.81	9.12
	Jiangxi	79.55	15.79	4.66	68.81	22.95	8.24	81.99	13.37	4.64	75.28	16.66	8.06
Inland	Gansu	77.01	3.87	19.12	68.85	7.47	23.68	83.59	1.54	14.87	78.94	2.51	18.56
	Guangxi	80.06	19.05	0.88	90.35	9.36	0.29	82.31	16.89	0.80	90.97	8.73	0.30
	Guizhou	56.34	6.31	37.35	50.57	11.08	38.36	61.46	3.98	34.56	56.67	7.38	35.95
	Inner Mongolia	65.43	20.73	13.84	88.68	11.04	0.29	72.36	14.52	13.12	90.03	9.63	0.33
	Qinghai	50.25	5.57	44.18	25.20	7.39	67.41	61.55	2.15	36.30	40.53	2.26	57.21
	Sichuan	56.78	15.31	27.90	63.73	16.10	20.17	61.26	11.84	26.90	67.86	11.70	20.44
	Xinjiang	47.76	35.59	16.65	42.98	34.83	22.19	57.83	24.26	17.91	56.57	20.47	22.96
	Yunnan	47.80	21.17	31.03	59.64	15.74	24.62	60.24	12.07	27.69	69.47	9.14	21.40
	Heilongjiang	52.47	27.51	20.02	36.23	37.25	26.52	61.15	20.91	17.94	48.70	25.80	25.50
North-eastern	Jilin	37.17	45.79	17.04	38.05	58.70	3.25	41.28	41.34	17.38	40.30	56.04	3.67
	Liaoning	34.09	38.78	27.13	27.80	43.71	28.49	45.25	29.43	25.31	36.65	36.60	26.75

Notes: The coastal region is treated the same as the eastern zone. The inland region includes the central, western and north-eastern zones. Co = inter-county inequality; Ci = intercity inequality; Co-Ci = inequality between city and county subgroups.

Source: Authors' own calculation.

Conclusions

Important information can be obtained from the decomposition of inequality based on county-level data. In this chapter, we found that intra-provincial regional inequality (that is, inequality amongst the county-level units within the provinces) contributed about 60 per cent of China's overall inequality in 2007, whereas the increase in intra-provincial regional inequality contributed to about 63 per cent of the overall increase in regional inequality during 1997–2007. Thus, intra-provincial regional inequality is the crux of the problem of regional inequality in China. It was also found that the contribution of inter-provincial inequality within all the zones increased significantly while the contributions of other components remained relatively constant or even tended to decline during the period considered. Therefore, more specific government policies should be implemented in order to reduce intra-provincial regional inequality.

The results of our decomposition analysis imply that inequality alleviation might need a local rather than a national approach in the first instance. For example, the results of the Theil-T decomposition of the changes in inequality show that immediate actions are needed at least in three provinces: Jiangsu, Inner Mongolia and Hebei. These three provinces together contributed to about 47 per cent of the increase in overall inequality in China during 1997–2007.

It is shown that the evolution of regional inequality in each province has its own characteristics and patterns. Thus, it is necessary for the provincial governments to formulate province-specific policies for the county-level units. For instance, the provinces in the central and western zones should focus more on inter-county inequality, while the provinces in the eastern zone should concentrate on both inter-county and intercity inequalities. The provinces in the north-eastern zone should focus on intercity inequality. The provinces of Fujian, Jiangsu, Henan, Guizhou and Qinghai should pay special attention to inequality between city and county subgroups.

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