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# Fiscal Disparities and the Equalization Effects of Fiscal Transfers at the County Level in China

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Using the fiscal datasets from 1993 to 2003 in China, this paper studies fiscal disparities and the equalization effects of fiscal transfers at the county level. The results indicate that there are huge fiscal disparities across regions, and this kind of inequality takes on a lasting upward trend. The persistence of fiscal inequality is very high, and also trends upward. Moreover, transfers from upper governments exaggerate fiscal disparities at the county level. The earmarked subsidies and tax rebates are the most unequal fiscal transfer schemes. The factor transfers have some equalization effects when we take per capita fiscal ability calculated by fiscal-supported population into account, but neutralization effects disappear from the viewpoint of per-capita fiscal ability averaged by total population.

*Key Words*: Fiscal disparities; Fiscal transfers; Equalization effect; County-level jurisdictions.

*JEL Classification Numbers*: H77, O15.

## 1. INTRODUCTION

Unbalanced economic development across regions related to fiscal capacity disparities has troubled China for a long time. Fiscal disparities are mainly caused by differences in economic development levels, among other factors such as natural conditions, levels of urbanization, sizes of tax base, structures of tax sources and their extents of concentration, etc. Conversely, fiscal disparities can also cause imbalance in the development of economy and society. Because of the huge fiscal disparities in China, the levels of

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public services provided by local government are quite different across regions. Those with lower fiscal capacity have insufficient provision of public services, such as public education, infrastructure, health care and social security (Wang, 2002). This situation not only affects the efficiency of the overall economic system in China, but also results in a series of social problems. An important goal of fiscal transfers from upper government should be to narrow fiscal disparities across regions and promote equalization of basic public services.

Do fiscal transfers from upper government narrow fiscal disparities? Some past literature has described and analyzed these questions using provincial level data. Zeng (2000) compared inequality indices (such as the Gini coefficient and coefficient of variation) of per capita fiscal income and expenditure before and after fiscal transfers from 1994 to 1997 at provincial level. They found that indices have risen remarkably after the fiscal transfers, so they concluded that fiscal transfers lacked equalization effects. Also based on provincial data from 1988 to 1999, Liu and Jiao (2002) compared the Gini coefficient and coefficient of variation of per capita fiscal income across provinces, and then concluded that there are no obvious changes of disparities across regions after fiscal transfers. Liu (2006) used the coefficient of variation to analyze fiscal inequality from 1997 to 2003, and found an enlarging gap in the coefficient of variation before and after fiscal transfers. Cao and Qing (2006) also compared the coefficient of variation of fiscal revenue and expenditure across regions from 1996 to 2003, which led to the conclusion that fiscal transfers narrow the fiscal gap across provinces.

However, public services such as basic education, health care, social security, etc., are mainly provided by county-level governments in China,[1] whose fiscal capacities directly affect the level of public services and economic welfare shared by local residents. With the stated aim of establishing a harmonious society, the Chinese central government has recognized that the reform of public finance should integrate rural areas, and has called for extending public finance to provide full coverage to rural areas. This is a milestone in Chinese public finance. Since county-level governments play a key role in the central government's strategy aiming to let "the rural areas enjoy the sunshine of public finance", and their financial status directly determines the ability to supply public goods according to local needs, there is no doubt that the disparities of fiscal capacity across counties will definitely lead to unbalanced provision of public goods and widening regional gaps. Thorough research on the fiscal capacity at county-level is essential to understand and cope with the rising regional inequality in China.

[1]In this paper, "county" means rural county, county-level city, and district of provincial capital, municipality directly under the central government and prefecture-level city.

As far as we know, the only research based on county-level data was done by Tsui (2005).[2] He studied the inequality of fiscal capacity at the county level and the impact of income items on inequality. However, he did not adjust the differences in price across regions, and the data he used was only up to the year of 2000. Transfers from the central government to local governments have increased a lot since then, and a lot of new transfer schemes have been put into effect. Moreover, he only considered static indices of inequality (mainly from the generalized entropy class) without systematic analysis of the persistence of disparities and the equalization effects of fiscal transfers. This is exactly what we will try to work on in this paper.

We collect Chinese fiscal data from 1993 to 2003 covering more than 2000 counties. We find that the inequality of fiscal capacity is serious and becomes even wider during that period. The mobility of fiscal capacity is very low, which indicates high persistence of inequality. Moreover, the persistence takes on an upward trend. Further breakdown analysis reveals that the middle[3] counties are mostly in the lower fiscal capacity percentiles, while the western and eastern counties disperse more broadly, therefore showing higher inequality indices and lower mobility. We also find that fiscal transfers from upper governments do not shrink the fiscal inequality gap at the county level. On the contrary, it even widens fiscal disparities. Especially after the tax-sharing reform in 1994, fiscal transfers are accounted for almost half of the overall fiscal disparities. Earmarked subsidies and tax rebates are the major non-equalization factors. Furthermore, factor transfers aiming at narrowing the fiscal disparities do not exert equalization effect as expected.

In section 2, we introduce the analytic method used in this paper; section 3 describes the data; section 4 pictures the inequality of county-level fiscal capacity and its trend; section 5 depicts the persistence of fiscal disparities; section 6 analyzes the equalization effects of fiscal transfers using the Gini coefficient decomposition; section 7 gives robust analysis; section 8 concludes the whole study.

## 2. METHODS

We use description and analysis methods developed in personal income inequality literature (Fields and Ok, 1999; Cowell, 2000; Khor and Pencavel, 2005), such as the Gini coefficient and generalized entropy class of

[2]Yao (2005) found that transfer payment hindered the equalization between cities and rural areas using county-level data for 2002.

[3]In this study, "middle county", "eastern county" and "western county" stand for those counties in middle China, eastern China and western China, respectively. We will define them in detail later.

inequality indices, to measure fiscal disparities. However, these inequality indices only reflect the static distribution of fiscal capacity. The persistence of fiscal disparities is also very important. It can tell us in the long run whether inequality will be lasting and whether financially stronger regions will always remain strong. If inequality is not lasting, the weaker regions are more likely to rise to the upper percentiles, so it is not necessary to worry about fiscal inequality in those regions. Our persistence concept comes from the literature on individual income mobility, which measures the stability of income ranking. We analyze the persistence of fiscal disparities and its trend from four aspects: changes of fiscal disparities when measuring revenue over longer time horizons, time variance of fiscal capacity at different points of the fiscal distribution, correlation coefficients of fiscal capacity in different years and fiscal transition matrix. In particular, the element $p_{ij}$ of fiscal transition matrix represents the probability that a county located in $i$ quintile in beginning year moves to $j$ quintile in ending year. We estimate this matrix from samples as follows: dividing samples into quintiles from low to high $(20, 40, 60, 80, 100)$, locating the position of all counties in the beginning year and ending year, then for every quintile in the beginning year calculating the proportion of counties that move to or remain in every quintile in the ending year. In order to further measure the persistence, we define and calculate four indices based on transition matrix: the weighted average rate of move, inertia rate, sub-inertia rate, and $\chi^2$ index. For the $5 \times 5$ matrix, the weighted average rate of move is the average of the move probability weighted by the move distance:

$$\frac{1}{5}\sum_{j=1}^{5}\sum_{i=1}^{5}|j-i|\cdot p_{ij} \tag{1}$$

$i$ is fiscal capacity quintile in the beginning year; $j$ is the quintile in the ending year. The inertia rate is the proportion of counties that remain in their original positions in the ending year. It's the arithmetic mean of elements on the diagonal line of the matrix:

$$\frac{1}{5}\sum_{j=1}^{5}p_{jj} \tag{2}$$

The sub-inertia rate is the proportion of counties relatively stable, i.e. the proportion of counties that remain in their position or just move one step:

$$\frac{1}{5}\sum_{i=1}^{5}\sum_{j=i-1}^{i+1}p_{ij} \tag{3}$$

$\chi^2$ measures the distance between the transition matrix of fiscal capacity and the perfect mobility matrix (whose every element is 0.2):

$$\chi^2 = \sum_{ij} \frac{(p_{ij} - 0.2)^2}{0.2} \tag{4}$$

The lower the weighted average rate of move is, and the higher the inertia rate, the sub-inertia rate and $\chi^2$ are, then the higher the persistence of inequality is.[4]

As for the evaluation of the equalization effects, it was a common method in the literature before 1970 to compare inequality index before and after some revenues. It seems acceptable to define the equalization effects simply as the decrease of inequality indices if we are merely concerned about the inequality indices of individual income distribution. However, when discussing revenue's equalization effect we often focus on the extent to which it inclines toward the poor. It's particularly pertinent in the discussion of equalization effect of fiscal transfers whose fundamental policy goal is to support poorer regions. If we add fairness to the equalization concept and define the magnitude of equalization as the extent it inclines toward poor groups, the traditional method may come to some misleading results. For example, suppose there are three regions and the distribution of original revenues is $(100, 60, 1)$. The coefficient of variation, Gini coefficient and Theil Index ($I_1$) are 0.984, 0.437 and 0.427 respectively. Then consider a fiscal transfer $(10, 2, 1)$. This scheme gives the stronger more money whereas the weaker less, which obviously departs from the goal of decreasing fiscal disparities across regions. However, the coefficient of variation, Gini coefficient and Theil Index are 0.933, 0.414 and 0.390 respectively after fiscal transfer, falling 5.2%, 5.3% and 8.7%. In general, the overall inequality index after adding a revenue source is not only determined by the distribution of this revenue and original income, but also relies on the relationship between them. Moreover, the size of income also has important effect. For the same fiscal transfer, the bigger the mean before transfer is, the smaller the change of the inequality index is. Since every region has its own revenue structure, it's not so simple to analyze the impact that a source has on its fiscal inequality. Since the 1970s, some scholars in the individual income distribution fields have developed methods to decompose the inequality according to the income source, which offers powerful tools for us to evaluate the equalization effects of fiscal transfers.

[4] As a reference, the perfect mobility matrix is completely independent of time. The location in the ending year has no relationship to the beginning year. In a $5 \times 5$ perfect mobility matrix, the weighted average rate of move is 1.60; the inertia rate is 0.20, the sub-inertia rate is 0.52 and $\chi^2$ index is 0.

Fei et al. (1978) noticed that the Gini coefficient could be decomposed according to the sources of revenue:

$$G = \sum_{k=1}^{K} \omega_k \overline{G}_k \tag{5}$$

$\omega_k$ is the proportion of source $k$ in the overall revenue. $\overline{G}_k$ is called pseudo-Gini coefficient, different from ordinary Gini coefficient. The relevant weight in calculating $\overline{G}_k$ is the ranking of overall revenue rather than source $k$. Lerman and Yitzhaki (1985) took a further step to decompose $\overline{G}_k$:

$$G = \sum_{k=1}^{K} \omega_k R_k G_k \tag{6}$$

$G_k$ is the Gini coefficient of source $k$,

$$R_k = \frac{COV(Y_k, F)}{COV(Y_k, F_k)} \tag{7}$$

$F$ is the cumulative distribution of overall revenue; $F_k$ is the cumulative distribution of source $k$. Lerman and Yitzhaki called $R$ as the "Gini correlation coefficient" between source $k$ and the overall revenue, which is equal to the covariance between source $k$ and the cumulative distribution of overall revenue divided by the covariance between source $k$ and the cumulative distribution of source $k$. $R_k$ ranges from $-1$ to 1. If $k$ is the monotonically increasing function of the overall revenue (then the ranking in source $k$ is exactly the same as that in the overall revenue), $R_k = 1$. If $k$ is the monotonically decreasing function of the overall revenue, then $R_k = -1$. If $k$ is a constant (all people's revenue from $k$ is the same), $R_k = 0$. The sign of $R_k$ depends on the difference between ranking of the overall revenue and that of source $k$. If they move at the same direction, then $R_k > 0$ and the contribution of this source to the overall inequality is positive, and vice versa.

This decomposition of Gini clearly distinguishes three factors which influence the contribution of a source to its overall inequality: the size of this source ($\omega_k$), the relationship between it and the distribution of the overall revenue ($R_k$), as well as the inequality itself ($G_k$). Among them, $R_k$ offers useful information about the relationship between the distribution of fiscal transfer and that of overall revenue. It's a crucial factor determining whether the fiscal transfer has equalization effect as well as to what extent it is. Therefore, we can use it to measure the equality of the allocation of fiscal transfers. A positive $R_k$ means that richer regions gain more fiscal

transfers and the allocation of fiscal transfers is non-equalized. The bigger $R_k$ is, the more the allocation inclines toward richer regions and the greater the non-equalization is, vice versa.

The generalized entropy class with $\alpha = 2(I_2)$ has got easily understandable meaning even with some zero or negative samples.[5] Therefore, it's also attractive for us to analyze the equalization effects of fiscal transfers.[6] $I_2$ can be decomposed as follows:

$$I_2 = \sum_{k=1}^{K} \left( \rho_k \omega_k \sqrt{I_2 I_{2k}} \right) \tag{8}$$

$\omega_k$ is defined as above; $I_{2k}$ is the $I_2$ index of source $k$; $\rho_k$ is the ordinary correlation coefficient between $k$ and the overall revenue. Denoted as percentage contributions, $I_2$ decomposition above is just Shorrocks's (1982) "unique decomposition", which is widely cited in the literature of decomposition by source.[7] We have provided a simple proof in the appendix. Compared with Shorrocks (1982) decomposition, $I_2$ decomposition can further decompose the contribution of a source into the size of the source, the relationship between two distributions and the inequality itself (represented by

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[5]The generalized entropy class is defined as $GE(\alpha) = \frac{1}{\alpha^2-\alpha}\left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_i}{\mu}\right)^{\alpha} - 1\right]$. $I_2 = GE(2) = \frac{1}{2}\left(\frac{\sigma}{\mu}\right)^2 = \frac{1}{2}CV^2$, $\sigma$ is standard deviation, $\mu$ is the mean, $CV$ is coefficient of variation.

[6]There are a lot of 0s and negatives in our fiscal transfer samples at county level. Jenkins (1995) discussed the decomposition of $I_2$.

[7]Shorrocks (1982) decomposition is: $s = \frac{COV(Y_k,Y)}{\sigma^2(Y)} = \rho\frac{\sigma(Y_k)}{\sigma(Y)}$. $s$ is the percentage contribution of source $k$ to overall inequality; $\sigma(Y_k)$ and $\sigma(Y)$ are the standard deviation of source $k$ and the overall revenue respectively; $COV(Y_k, Y)$ and $\rho_k$ are the covariance and correlation coefficient of source $k$ and overall revenue respectively. Shorrocks proved that the decomposition which satisfies common principles is not unique. Those principles are: the inequality measure is continuous and symmetric; source contributions to inequality are continuous and symmetric; source contributions do not depend on the level of arrogation; and the sum of source contributions add to the overall inequality. In fact, there are infinite possible decompositions that satisfy these principles. Shorrocks introduced two more principles: source with everyone gaining equal amount contributes 0 to overall inequality; and overall revenue can be divided into two components whose distributions are permutations of one another. He showed that there is only one decomposition that can satisfy all these assumptions simultaneously: $s_k = \rho_k\frac{\sigma(Y_k)}{\sigma(Y)}$. If we are willing to accept all this restrictive principles, then the advantage of Shorrocks decomposition is its independence to the choice of inequality measure. Therefore we can be free of the arbitrariness that different inequality measures may come to different conclusions. Still, we shouldn't abandon all other decomposition exercises simply because of their non-uniquity. Lerman (1999) pointed out that neither do regression coefficients uniquely account for the impact of independent variables on a dependant variable nor they uniquely decompose the variance (page 345). Moreover, some decompositions have very intuitive meaning and may shed light on specific questions. Decomposition discussed above is an example.

$\sqrt{I_2 I_{2k}}$). It also provides a convenient method to evaluate the equalization effects of fiscal transfers.

Therefore, the problem "whether an income source has equalization effects" is not as simple as it looks at first sight. There are different angles from which this problem can be analyzed. However, scholars have individual points (Lerman, 1999; pp. 355) and thus have not come to consensus about which method is the best. In this paper, we use the Gini coefficient decomposition as the main tool, and also take other implements into account as robust analysis.

## 3. DATA

As our goal is to describe county government's ability to provide public services, we define fiscal ability as the county government's real available revenue, i.e. revenue collected by local government plus transfers from upper governments (in per-capita form).[8] In Chinese practice, it is common to use population supported by fiscal budget as a denominator, which represents the real responsibility of local government. However, we think local government should not only take this fundamental obligation, but also provide public services to all residents including rural people. So we use the total population in a region as denominator. That is to say, the fiscal capacity in this paper is defined as local government's available revenue per capita.

[8]The definition of net fiscal transfers in 1993 is Original-system subsidies + Earmarked subsidies − Original-system remittances − Earmarked remittances. During 1994-1999 it's defined as Tax rebate + Original-system subsidies + Earmarked subsidies − Original-system remittances − Earmarked remittances. In 2000 it's Tax rebate + Original-system subsidies + Earmarked subsidies + General transfers + Subsidies of increasing government debt + Subsidies to increase salary + Balancing subsidies + Other transfers − Original-system remittances − Earmarked remittances − Other remittances. In 2001 it's Tax rebate + Original-system subsidies + Earmarked subsidies + General transfers + Minority nationality region transfers + Subsidies to pay teachers of elemental and secondary schools + Subsidies of increasing government debt + Subsidies to increase salary + Subsidies to poor and remote regions + Balancing subsidies + Other transfers − Original-system remittances − Earmarked remittances − Other remittances. In 2002 it's Tax rebate (including rebate of income tax) + Original-system subsidies + Earmarked subsidies + General transfers + Minority nationality region transfers + Subsidies of fee-to-tax reform + Subsidies of increasing government debt + Subsidies to increase salary + Balancing subsidies + Other transfers − Original-system remittances − Earmarked remittances − Other remittances. In 2003 it's Tax rebate (including rebate of excise and value added tax) + Original-system subsidies + Earmarked subsidies + General transfers + Minority nationality region transfers + Subsidies of fee-to-tax reform + Subsidies of increasing government debt + Subsidies to increase salary + Balancing subsidies + Subsidies to derate agricultural taxes + Other transfers − Original-system remittances − Earmarked remittances − Other remittances.

We choose the registered population according to the Chinese HuKou system (not the resident population) as denominator. Because of rural-urban migration, the registered population is different from the resident population in general. The resident population in a region is the population living for the most time of a year in that area, which seems more reasonable for the analysis of the responsibility of local government and calculation of the fiscal capacity per capita. In principle, we can utilize migration data of the national 1% sample survey in 1995, the national population census in 2000 and the annual national sample survey every year to adjust registered population to resident population. However, the definition of "migration" is not clear yet, partly because different government departments have their own statistical standard which changes with both time and space. Data in different departments and different years are not comparable and the accuracy is very low (Duan and Sun, 2006). Furthermore, we think it's more appropriate to use the registered population than the resident population when analyzing regional fiscal capacity per capita. Nowadays local governments do not pay much attention to the migration population while providing public services in China.[9] Since the income in the migration destination is typically not steady enough to support the whole family to settle down, most of the migrants still plan to return to their HuKou regions finally[10] and rely on those local governments to provide public services such as education, health care and social security.[11]

Our county-level fiscal and population data comes from Statistics of National Municipality and County Finance from 1993 to 2003 compiled by the Budget Sector of the Chinese Ministry of Finance.[12] Change in administrative division is an inevitable problem. Thus in order to get comparable panel data series, we have searched and analyzed every change of administrative division from 1993 to 2003, dealing with them in three ways. First, the name or administrative relation has been changed but the area under its jurisdiction remains the same.[13] We consider these counties the same

[9]For example, local public school is accessible only for children with local HuKou.

[10]Some investigations show that most migration people can only get temporary job. Only 10The percentage that has certain form of endowment insurance, unemployment insurance and the medical treatment insurance is 18.1 %, 11.1 % and 6.2 %, respectively( Zhu Yu, 2004).

[11]In fact, temporary migration is observed not only in China but common in developing countries. In many such countries without household registration system, the size of circulation population is much larger than that of formal migration. Circulation population people regard rural regions as their forever hometown and will go back eventually. The public services in those areas are still very important for their welfare (Hugo, 1997).

[12]It has been compiled by the National Treasury Sector and the Budget Sector together since 2001.

[13]For instance, in 1994 Baoding prefecture and Baoding city (county-level) were combined to Baoding prefecture-level city. The new city administrates both former Baoding prefecture's Fuping county, Tang county, Laiyuan county, Yi county, Shun-

as before, and their codes are not changed. Cases like this amount to 391 during 1993 and 2003. Secondly, the area under one's jurisdiction has been changed, but the name has not.[14] We consider them as different areas. The old code is abolished, and the new one is set. There are 74 cases like this from 1993 to 2003. Thirdly, both the name and the area have been changed.[15] We have also abolished the old code and set the new one. There are 323 cases like this from 1993 to 2003. We also have rectified some obvious mistakes in calculating the total population.[16] We mainly analyze 2206 counties in constant administrative division (we name this the 'constant sample set') from 1993 to 2003.

In order to make the data more comparable we need to deflate data according to prices in different areas and at different times. In general, nominal fiscal capacity is adjusted to real fiscal capacity by the GDP deflator of different years.[17] But simply using the GDP deflator would ignore differences in price levels and living cost across regions. China is a huge country with a vast territory and there is market separation to some extent. The HuKou registration system also limits mobility in labor markets. All these factors restrict the convergence of prices of non-tradable commodities which are locally produced and consumed, and price in some areas may be systematically higher than others. So simply comparing the income (even with GDP deflator) may exaggerate the difference in real fiscal capacity across regions. Brandt and Carsten (2005) calculated an adjusted price index in rural areas, cities, and rural-city areas from 1984 to 2003, which lays a foundation for the price level deflator across regions in China.[18] We utilize

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ping county, Xushui county, Gaoyang county, Wangdu county, Quyang county, Boye county, Laishui county, Dingxing county, Rongcheng county, Anxin county, Du county, and Xiong county, and former Baoding city's Mancheng county, Qingyuan county, South district, North district, and New-City district. The cities of Zhuozhou, Dingzhou, Anguo, and Gao Beidian which belonged to former Baoding prefecture now are under direct jurisdiction of Hebei Province.

[14]For instance, in 1997 Jiaqu of Cangzhou city was canceled, and put Nan Chentun town (excluding Wang Xilu village) and Xiao Wangzhuang town ( excluding San Lizhuang and Northern Zhao Jiafen village), which belonged to former Jiaqu, under the administration of Yun He district.

[15]For instance, in 1996, suburbs and the North, West, South, East districts of Changsha in Hu Nan province were rescinded. Areas were reset: Yuhua district, Furong district, Tianxin district, Yuelu district and Kaifu district were established.

[16]For example, the 1994 population data of Daxing county of Beijing is 5.01 million, whereas it is 0.5 million in1993 and 0.51 million in 1995. There are 234 errors like this during 1993 and 2003.

[17]See Tsui (2005).

[18]In the early 1990s, the State Statistics Bureau published the prices of common commodities of different provinces, after which it also published CPI. According to this publication, they constructed price series of basic commodity baskets by three steps: First, define basic commodity baskets and purchase amount in base year (1990); second, calculate prices of basic commodity baskets of every province in 1990, given the price level of provinces in base year is given; third, calculate basic commodities baskets after

the Brandt-Carsten rural-urban combined index to deflate all county-level samples, rural index for rural sample counties and urban index for urban districts respectively when making within-region analysis.[19]

Table 1 shows the descriptive statistics of data used in this paper, which gives us an impression of the huge fiscal disparities across regions in China. For example, the fiscal capacity per capita in the highest area is 22.7 times that of the lowest one in 2003. The difference in county-level fiscal capacity in China is far away from the criteria that different local governments should have similar capacity to offer public services. Table 1 also shows that this kind of inequality takes on a lasting upward trend, especially in the late 1990s and the early 2000s, when the difference between the highest and the lowest increased by 126.2%. This is because fiscal capacities in richer areas increased faster: from 1993 to 2003, the maximum increased 295% while growth of the minimum is only 55.6%.

**TABLE 1.**

Descriptive statistics of county-level fiscal capacity (Brandt-Carsten's composite commodity)

| Year | Constant Sample Set | | | Maximal Sample Set | | | |
|---|---|---|---|---|---|---|---|
| | Average | Standard Deviation | Maximum /Minimum | Sample Amount | Average | Standard Deviation | Maximum /Minimum |
| 1993 | 18.48 | 11.19 | 14.46 | 2435 | 18.47 | 11.39 | 14.47 |
| 1994 | 17.07 | 10.16 | 14.31 | 2471 | 17.12 | 10.57 | 15.86 |
| 1995 | 17.10 | 10.31 | 14.34 | 2482 | 17.27 | 11.02 | 15.96 |
| 1996 | 19.04 | 11.69 | 16.35 | 2489 | 19.20 | 12.49 | 16.39 |
| 1997 | 20.32 | 12.50 | 17.95 | 2497 | 20.71 | 14.00 | 19.21 |
| 1998 | 22.64 | 13.86 | 19.43 | 2501 | 23.31 | 16.06 | 19.56 |
| 1999 | 25.49 | 15.42 | 18.20 | 2791 | 26.52 | 20.00 | 28.86 |
| 2000 | 29.07 | 18.66 | 20.04 | 2838 | 30.02 | 23.06 | 29.36 |
| 2001 | 36.86 | 25.00 | 20.49 | 2852 | 37.91 | 30.70 | 30.21 |
| 2002 | 44.23 | 30.04 | 19.78 | 2858 | 45.80 | 37.46 | 30.54 |
| 2003 | 50.43 | 35.97 | 22.69 | 2852 | 52.98 | 46.04 | 32.73 |

Note: Maximal sample is all county-level samples with available data. In order to minimize errors, we delete 1% county-level sample of the highest and the lowest of fiscal capacity respectively. Of course, this will decrease the index of inequality, as the Gini coefficient has decreased 17.6% on average.

1990 according to CPI in every province. They calculated price series of urban and rural areas in every province annually, constructing rural-urban general commodity baskets in terms of rural-urban population weighted average, and then obtained general price series of provinces.

[19]Brandt-Carsten didn't report the rural deflator in 2003. In order to gain this deflator, we give an adjusted coefficient = adjusted rural areas CPI deflator in 2002/published rural areas CPI deflator in 2002, then multiply the published rural areas CPI in 2003 by this coefficient.

**TABLE 2.**

Indices of county-level fiscal capacity inequality

| Indices | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gini | 0.296 | 0.294 | 0.292 | 0.294 | 0.289 | 0.288 | 0.286 | 0.298 | 0.311 | 0.307 | 0.316 |
| CV | 0.606 | 0.595 | 0.603 | 0.614 | 0.615 | 0.612 | 0.605 | 0.642 | 0.677 | 0.679 | 0.713 |
| MLD | 0.138 | 0.135 | 0.134 | 0.136 | 0.132 | 0.132 | 0.129 | 0.141 | 0.153 | 0.149 | 0.159 |
| Theil | 0.149 | 0.146 | 0.146 | 0.150 | 0.147 | 0.146 | 0.143 | 0.158 | 0.173 | 0.171 | 0.184 |
| $A_{0.5}$ | 0.069 | 0.068 | 0.068 | 0.069 | 0.068 | 0.067 | 0.066 | 0.072 | 0.078 | 0.077 | 0.082 |
| $A_2$ | 0.222 | 0.220 | 0.216 | 0.218 | 0.212 | 0.211 | 0.208 | 0.221 | 0.236 | 0.230 | 0.240 |

Note: Gini stands for the Gini coefficient; CV stands for the Coefficient of Variation; MLD stands for the mean logarithmic deviation; Theil stands for the Theil index ($I_1$); $A_{0.5}$ stands for the Atkinson index with parameter $\varepsilon = 0.5$; $A_2$ stands for the Atkinson index with parameter $\varepsilon = 2$.

## 4. DESCRIPTION AND TREND OF FISCAL INEQUALITY AT THE COUNTY LEVEL

Table 2 shows inequality of the county-level fiscal capacity. During the whole sample period the inequality remained at very high level. For instance, the Gini coefficient in 2003 reached 0.32, which is quite high even compared with inequality in individual income. Owing to the huge difference of ability and opportunity among individuals, there may be great disparities in individual income distribution which are mainly determined by the market.[20] On the other hand, it has become a widely accepted principle that residents in different regions should have access to the same amount of public services and the fiscal capacity across different regions should be equalized. Therefore, we have sufficient reason to believe that the inequality of fiscal capacity across regions should be much lower than that of individual income. However, it is regretful that we can not establish it at the moment in China. As for the trend of fiscal disparities, it is rather stable before 1998. Inequality indices of fiscal capacity remain nearly the same before and after the tax sharing reform. This result is understandable, for the tax sharing reform hardly adjusts the vested interests of local governments. However, the inequality gains an upward impetus after 1998.[21]

Table 3 shows the fiscal capacity inequality across counties with different definitions.[22] In 2003, the fiscal inequality of the urban counties and

[20] For example, the Gini coefficient of individual income was as high as 0.46 in 2002, which was among the most unequal countries in the world. See Li et al. (2004).

[21] We also notice that the number of samples increased from 1999 (see Table 1). The disparities of fiscal capacity calculated according to bigger data set are even more surprising, the Gini coefficient reached 0.36 in 2003 and the upward trend is more obvious.

[22] rural or urban: rural area is defined as rural population exceeding 50% in the whole population (data of 2003); agricultural or non-agricultural: separated by whether the proportion of agricultural output to GDP exceeds 50% of total (also data of 2003); the

non-agricultural counties is much higher than that of the rural counties and agricultural counties, and the inequality in the eastern counties is also much higher than that of the middle and the western ones. Inequality is the lowest in the middle counties, whose Gini coefficient is lower by 42.1% than that of the eastern areas. As for the trend of fiscal disparities, the inequality in the eastern and urban counties increases quickly and steadily from 1993 to 2003, increased by 32.2% and 14.1% respectively. In the middle counties, inequality is comparatively low, and takes on a downward trend from 1993 to 2003. The disparities of fiscal capacity across agricultural counties remain constant during this period.

**TABLE 3.**

The Gini coefficient of county-level fiscal capacity in different regions

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Rural | 0.288 | 0.285 | 0.281 | 0.284 | 0.279 | 0.276 | 0.274 | 0.287 | 0.302 | 0.297 | 0.305 |
| urban | 0.306 | 0.304 | 0.312 | 0.313 | 0.314 | 0.321 | 0.319 | 0.329 | 0.344 | 0.346 | 0.349 |
| Agri | 0.305 | 0.305 | 0.301 | 0.306 | 0.295 | 0.290 | 0.286 | 0.297 | 0.314 | 0.303 | 0.306 |
| Non-Agri | 0.276 | 0.270 | 0.271 | 0.269 | 0.274 | 0.280 | 0.280 | 0.294 | 0.304 | 0.311 | 0.328 |
| East | 0.264 | 0.273 | 0.279 | 0.274 | 0.275 | 0.283 | 0.286 | 0.303 | 0.320 | 0.335 | 0.349 |
| Middle | 0.251 | 0.242 | 0.227 | 0.219 | 0.219 | 0.222 | 0.218 | 0.211 | 0.213 | 0.196 | 0.202 |
| West | 0.310 | 0.310 | 0.314 | 0.324 | 0.315 | 0.307 | 0.302 | 0.311 | 0.321 | 0.314 | 0.321 |

Note: Rural areas use the Brandt-Carsten rural index as the deflator; urban areas use urban index as the deflator; and others use the urban-rural combined index. Agri stands for agricultural areas; and Non-Agri stands for non-agricultural areas.

Table 4 indicates the fiscal capacity distribution of different kind of counties. The urban and non-agricultural counties are mainly in the higher tier. For instance, the ratios of the higher tier of the urban and non-agricultural counties are 25 and 7.3 points higher than that of the rural areas and agricultural counties respectively in 2003. This is quite understandable, if taking into account the huge gap between the urban and rural areas and the difference of tax-revenue ability across industries in China. It is generally considered that the western counties are comparatively poorer in China. But the result is contrary to this common expectation. The proportion of the middle counties in the low fiscal capacity tier is higher than that of the western and eastern counties, while the proportion of the middle counties

Eastern, Middle or Western: the Eastern regions include 11 provinces, they are Beijing, Tianjin, Hebei, Liaoling, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan; the Middle areas include 8 provinces, Heilingjiang, Jilin, Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan; the Western areas are defined according to western development policy, which include 12 provinces, Sichuan, Chongqin, Guizhou, Yunnan, Tibet, Shanxi, Gansu, Qinhai, Ningxia, Xinjiang, Guangxi and Neimenggu, and also include Xiangxi prefecture of Henan province, Exi prefecture of Hubei province and Yanbian prefecture of Jilin province.

**TABLE 4.**

Distribution of fiscal capacity in different kinds of definitions (%)

| | | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rural | low | 42.1 | 42.2 | 42.1 | 42.2 | 42.1 | 42.1 | 42.1 | 41.8 | 41.5 | 41.7 | 41.7 |
| | high | 37.5 | 37.5 | 37.3 | 37.2 | 37.7 | 37.5 | 37.4 | 37.7 | 38.0 | 37.7 | 37.4 |
| Urban | low | 20.3 | 19.4 | 20.3 | 19.4 | 20.8 | 20.3 | 20.8 | 23.6 | 25.9 | 24.5 | 24.0 |
| | high | 62.5 | 62.5 | 64.3 | 64.8 | 60.6 | 62.5 | 63.4 | 60.6 | 57.4 | 60.1 | 63.4 |
| Agri | low | 41.8 | 43.4 | 44.6 | 44.9 | 44.2 | 44.7 | 44.7 | 44.2 | 42.5 | 43.0 | 43.4 |
| | high | 37.4 | 36.9 | 35.8 | 36.7 | 36.2 | 35.4 | 35.3 | 36.0 | 37.6 | 37.1 | 36.2 |
| Non-Agri | low | 36.7 | 33.7 | 31.4 | 30.9 | 32.3 | 31.3 | 31.3 | 32.2 | 35.3 | 34.5 | 33.7 |
| | high | 44.7 | 45.4 | 47.5 | 45.8 | 46.9 | 48.3 | 48.5 | 47.1 | 44.3 | 45.2 | 46.9 |
| East | low | 40.6 | 38.8 | 35.4 | 34.2 | 33.7 | 33.4 | 35.0 | 34.2 | 38.6 | 39.8 | 40.0 |
| | high | 37.6 | 38.9 | 41.7 | 41.8 | 43.8 | 44.6 | 44.2 | 44.1 | 38.8 | 39.4 | 39.4 |
| Middle | low | 54.7 | 52.8 | 51.4 | 50.9 | 51.1 | 53.5 | 51.8 | 55.3 | 56.3 | 52.7 | 51.1 |
| | high | 24.5 | 25.7 | 26.0 | 25.2 | 26.7 | 26.9 | 26.9 | 24.0 | 23.4 | 23.1 | 25.3 |
| West | low | 30.9 | 33.2 | 36.3 | 37.4 | 37.6 | 36.4 | 36.4 | 34.9 | 31.3 | 32.6 | 33.4 |
| | high | 50.7 | 49.0 | 47.0 | 47.4 | 45.1 | 44.5 | 44.7 | 46.6 | 50.5 | 50.3 | 48.9 |

Note: Low tier means the proportion of counties that locate in the lower 1%-40% fiscal capacity percentiles. High tier means the proportion of counties that locate in the higher 60%-100% fiscal capacity percentiles.

in the high fiscal capacity tier is lower than that of the western and eastern counties. For example, in 2003 the former is higher by 11.1 and 17.7 points and the latter is lower by 14 and 23.6 points respectively. Furthermore, the western counties are located even more intensively in the upper tier than the eastern ones. In 2003, the proportion of the western counties in the high tier is 9.6 points higher than that of the eastern ones, and the proportion of the western counties in the bottom tier is 6.6 points lower.

In order to further study the distribution of fiscal capacity across regions, we divide all counties into quintiles. Table 5 presents the comparison of the distribution of the eastern, middle and western counties. It shows that the middle counties are mostly in the lower fiscal capacity quintiles, while the western and eastern counties are more widely dispersed. For example, in 2003, there are 27.5% of the middle counties staying in the lowest 20% quintile, 10.1% higher than the east and 10.0% higher than the west. Only 5.6% staying in the highest 20% quintile, 16.1% lower than the east and 21.9% than the west. Among the 100 lowest fiscal capacity counties, the proportion of the east, the middle, and the west is respectively 24%, 36%, and 40% (in 2003). Among the 100 highest fiscal capacity counties, the proportion is 44%, 1%, and 55%. Combined with Table 3, we find that the middle counties are mostly in the lower fiscal capacity percentiles, while the western and eastern counties are more widely dispersed. Therefore,

inequality indices in the latter regions are higher. Disparities in fiscal capacity across the western counties are the highest. These results are not too strange when analyzing fiscal capacity at per capita level. In general, the western counties have fewer population but receiving higher transfers from the central government, whereas the middle counties have more population and almost the same regional development level. Therefore, the middle counties' fiscal capacity per capita is relatively weaker in general.

**TABLE 5.**

Distribution of fiscal capacity in the eastern, middle, western counties (%)

| | The 1st quintile | | | The 2nd quintile | | | The 3rd quintile | | | The 4th quintile | | | The 5th quintile | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | East | Mid | Wes | East | Mid | Wes | East | Mid | Wes | East | Mid | Wes | East | Mid | West |
| 1993 | 17.96 | 30.3 | 15.4 | 22.7 | 24.5 | 15.5 | 21.8 | 20.7 | 18.4 | 21.5 | 15.0 | 22.0 | 16.1 | 9.6 | 28.8 |
| 1994 | 15.7 | 29.9 | 17.2 | 23.2 | 23.0 | 16.1 | 22.2 | 21.4 | 17.7 | 21.3 | 16.4 | 21.3 | 17.7 | 9.4 | 27.8 |
| 1995 | 14.3 | 26.8 | 19.9 | 21.2 | 24.7 | 16.4 | 22.8 | 22.4 | 16.6 | 22.2 | 16.5 | 20.5 | 19.5 | 9.6 | 26.5 |
| 1996 | 12.9 | 24.5 | 22.2 | 21.3 | 26.4 | 15.3 | 23.9 | 23.8 | 15.1 | 22.5 | 15.8 | 20.7 | 19.3 | 9.4 | 26.7 |
| 1997 | 11.6 | 26.3 | 22.1 | 22.2 | 24.9 | 15.6 | 22.4 | 22.1 | 17.2 | 23.6 | 17.4 | 19.1 | 20.2 | 9.4 | 26.1 |
| 1998 | 12.2 | 27.8 | 20.7 | 21.3 | 25.7 | 15.7 | 21.9 | 19.5 | 19.0 | 23.1 | 17.9 | 19.1 | 21.5 | 9.0 | 25.5 |
| 1999 | 13.6 | 27.5 | 20.0 | 21.5 | 24.4 | 16.4 | 20.7 | 21.2 | 18.8 | 23.3 | 17.9 | 19.0 | 21.0 | 9.0 | 25.8 |
| 2000 | 15.1 | 29.6 | 17.8 | 19.2 | 25.7 | 17.2 | 21.6 | 20.7 | 18.5 | 22.7 | 18. | 19.3 | 21.5 | 5.9 | 27.3 |
| 2001 | 17.7 | 30.6 | 15.4 | 21.0 | 25.7 | 15.9 | 22.5 | 20.2 | 18.2 | 18.1 | 17.9 | 22.5 | 20.7 | 5.6 | 28.0 |
| 2002 | 19.0 | 27.8 | 16.1 | 20.9 | 24.9 | 16.5 | 20.7 | 24.2 | 17.0 | 19.5 | 16.7 | 22.3 | 19.9 | 6.4 | 28.0 |
| 2003 | 17.4 | 27.5 | 17.5 | 22.7 | 23.7 | 16.0 | 20.6 | 23.5 | 17.6 | 18.0 | 19.8 | 21.5 | 21.5 | 5.6 | 27.5 |

## 5. THE PERSISTENCE OF FISCAL DISPARITIES

From above we have a primary impression that the distribution of fiscal capacity is very stable across time. Table 6 describes the change of the ranking of fiscal capacity. We divide the 11-year period into three sub-periods in order to describe the characteristics of changes: mid-1990s when the old fiscal system was replaced by tax sharing system; late 1990s when the central government carried out expanding fiscal policy and public investment supported by public debt increased rapidly; early 2000s when the western development program, rural fee-to-tax reform, and the abolish of agricultural tax were carried out in succession, while transfers from upper governments (especially central government) to local ones increased rapidly. Generally speaking, the ranking of fiscal capacity does not change very much in 11 years. Nearly 50% counties remain in their original positions. The proportion of the counties that remain in their original position becomes larger during the three sub-periods, which indicates a higher

persistence of inequality. In mid-1990s the non-agricultural counties, the eastern counties and middle counties have the tendency to move upward. For example, the net rate of moving upward for the eastern counties is 16.1 points. Meanwhile, the western and agricultural counties have downward trend. This is mainly because the tie between local fiscal capacity and local economic performance was tightened after the tax-sharing reform in 1994, while transfers system to equalize fiscal capacity was not set up yet. Therefore, the fiscal capacity of relative richer regions like non-agricultural and some eastern counties was enhanced. In the late 1990s, the middle counties have downward trend (decreased by 8.9 points), the western counties have upward trend (increased by 8.3 points), and the eastern counties remain constant. This is consistent with the facts that the central government began to focus on western development and invested more money there during this period. Moving to the 21st century, the middle counties begin to rise and the western counties remain an upward trend, while the eastern counties begin to fall behind (decreased by 6.7 points), which is mainly due to the great western development program, rural fee-to-tax reform and the abolishment of agricultural tax. Transfers from central government to the western and the middle counties increased greatly during this period.

1. Changes of fiscal disparities measuring revenue over a longer time horizon

In general, the short-term fluctuation will be smoothed away as time horizon is extended, and the inequality will be alleviated. If fiscal capacity of different years do not present strong serial correlation, and there are a lot of changes in the rank of fiscal capacity, then long-term indices of fiscal inequality will be much lower than those in short-term. Therefore, comparing long-term inequality indices with short-term ones can reveal the persistence of fiscal inequality. Table 7 makes a comparison of the Gini coefficient in long-term and short-term. The result reveals that indices of long-term inequality are not much lower than those of short-term, but even higher in the latter sub-period. From this we can draw a primary conclusion: the persistence of fiscal inequality is very high and it takes on a downward trend.

2. Changes of fiscal capacity at different points in the fiscal distribution

Figure 1 presents the average growth rate of different fiscal capacity percentiles over three sub-periods. The horizontal axis is the percentile of five years' average fiscal capacity. The $y$-axis is average difference between logarithmic fiscal capacity in the ending year (1997, 2000, 2003) and the beginning year (1993, 1996, 1999), which represents the growth rate of fiscal capacity. The fluctuation of short-term fiscal capacity has been smoothed away by the average of five years, which can be a good approximation of long-term fiscal capacity. In Figure 1, the growth rate of different fiscal capacity percentiles fluctuates dramatically. But the basic trend is clear:

**TABLE 6.**

Changes of fiscal capacity ranking (%)

| | 1993-2003 | | | 1993-1996 | | |
|---|---|---|---|---|---|---|
| | Maintenance | Up | Down | Maintenance | Up | Down |
| General | 49.38 | 25.8 | 24.74 | 60.94 | 19.1 | 19.87 |
| Rural | 49.51 | 26.06 | 24.44 | 60.66 | 19.31 | 20.03 |
| Urban | 48.20 | 24.32 | 27.47 | 63.24 | 18.18 | 18.58 |
| Agri. | 53.58 | 22.02 | 24.40 | 61.50 | 16.66 | 21.85 |
| Non-Agri. | 41.61 | 33.04 | 25.35 | 59.98 | 23.57 | 16.45 |
| East | 41.03 | 34.09 | 24.89 | 61.65 | 27.21 | 11.14 |
| Middle | 52.99 | 25.58 | 21.43 | 60.95 | 23.65 | 15.40 |
| West | 52.76 | 20.60 | 26.63 | 60.45 | 10.99 | 28.56 |
| | 1997-2000 | | | 2000-2003 | | |
| | Maintenance | Up | Down | Maintenance | Up | Down |
| General | 64.45 | 18.15 | 17.41 | 64.95 | 17.65 | 17.40 |
| Rural | 64.18 | 18.00 | 17.82 | 64.28 | 18.00 | 17.73 |
| Urban | 66.34 | 19.14 | 14.52 | 68.02 | 16.09 | 15.89 |
| Agri. | 65.38 | 17.24 | 17.37 | 66.02 | 17.87 | 16.11 |
| Non-Agri. | 62.87 | 19.67 | 17.46 | 63.47 | 17.35 | 19.18 |
| East | 61.72 | 18.54 | 19.74 | 63.85 | 14.74 | 21.40 |
| Middle | 64.83 | 13.15 | 22.02 | 61.15 | 21.44 | 17.42 |
| West | 66.21 | 21.03 | 12.76 | 68.72 | 17.04 | 14.25 |

Note: Fiscal capacity is divided into quintiles from weak to strong; maintenance/up/down means the proportion of counties whose fiscal capacity remain/rise/descend comparing to their original quintile.

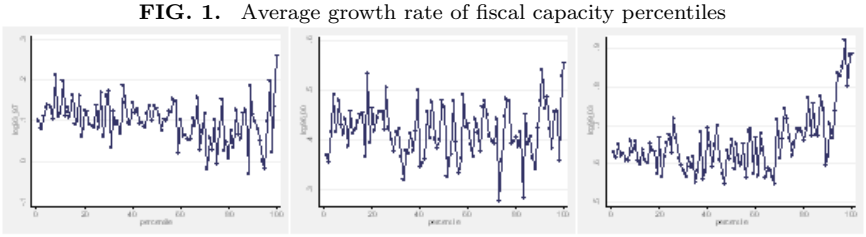
**TABLE 7.**

The Gini coefficient of fiscal capacity over long/short time horizons

| | 1993-1997 | 1996-2000 | 1999-2003 |
|---|---|---|---|
| Gini coefficient of fiscal capacity in the fist year | 0.296 | 0.294 | 0.286 |
| Gini coefficient of the mean fiscal capacity in the fist 2 years | 0.292 | 0.290 | 0.290 |
| Gini coefficient of the mean fiscal capacity in the fist 3 years | 0.290 | 0.287 | 0.296 |
| Gini coefficient of the mean fiscal capacity in the fist 4 years | 0.289 | 0.284 | 0.297 |
| Gini coefficient of the mean fiscal capacity in 5 years | 0.287 | 0.286 | 0.297 |

it slopes downward during 1993 and 1997, and is almost horizontal during 1996 and 2000. As for the period of 1999 to 2003, it is horizontal in low percentiles while sloping upward apparently after 60th percentile. This indicates that on average the growth rate of fiscal capacity in low-percentiles is somewhat faster than that of high-percentiles in middle 1990s, which brings about a downward trend in inequality. Besides, the rank order of fiscal capacity also changes a lot during this period. However, the trend reverses in early 2000s: fiscal capacity of high-percentiles increases faster, which makes the inequality rise and the persistence of inequality increase.

**FIG. 1.** Average growth rate of fiscal capacity percentiles



In order to further test and verify above findings, we estimate a simple linear model which is very common in the literature of economy growth convergence:

$$g_i = \alpha + \beta_1 \cdot y_{i,0} + \beta_2 \cdot URBAN_i + \beta_3 \cdot AGRI_i + \beta_4 \cdot EAST_i + \beta_5 \cdot WEST_i + \mu \quad (9)$$

$g_i = \frac{y_{i,t} - y_{i,0}}{y_{i,0}}$; $y_{i,0}, y_{i,t}$ is the fiscal capacity of sample $i$ in the beginning year (1993, 1996, 1999) and ending year (1997, 2000, 2003) respectively. $URBAN$ is a dummy for urban-rural, $URBAN = 1$ stands for urban area. $AGRI$ is a dummy for industry structure, $AGRI = 1$ represents agricultural county. $EAST$ and $WEST$ respectively are dummies for the eastern and western county. Results in Figure 1 are further demonstrated in Table 8. After controlling some dummies for region traits, coefficients of $y_{i,0}$ in the first two sub-periods are negative. This indicates a slight convergence: the growth rate of fiscal capacity of high-percentiles is relatively slow during those two periods. In the third sub-period, this kind of convergence no longer exists: coefficient of $y_{i,0}$ becomes positive, which means that strong areas grow faster. Table 8 also indicates that the growth rate of fiscal capacity of agricultural areas is lower than that of non-agricultural areas, which is especially obvious in the second sub-period. Besides, the growth rate of the eastern counties is notably higher than that of the middle counties in the first two sub-periods, while the growth rate of the western counties are much higher than that of others in the latter two sub-periods.

3. The correlation of fiscal capacity in different years

**TABLE 8.**

OLS estimate of the change of fiscal capacity

Dependent variable: the growth rate of fiscal capacity

| | | The 1st period (93-97) | The 2nd period (96-00) | The 3rd period (99-03) |
|---|---|---|---|---|
| Constant | coefficient | 0.250 | 0.588 | 0.904 |
| | $t$-Statistic | 15.18 | 29.19 | 32.83 |
| $y_{i,0}$ | coefficient | −0.005 | −0.005 | 0.0004 |
| | $t$-Statistic | −8.31 | −8.26 | 0.64 |
| URBAN | coefficient | 0.030 | −0.026 | −0.064 |
| | $t$-Statistic | 1.44 | −1.04 | −1.89 |
| AGRI | coefficient | −0.003 | −0.049 | −0.022 |
| | $t$-Statistic | −0.21 | −2.97 | −0.99 |
| EEST | coefficient | 0.073 | 0.115 | 0.032 |
| | $t$-Statistic | 4.65 | 5.94 | 1.20 |
| WAST | coefficient | −0.116 | 0.154 | 0.153 |
| | $t$-Statistic | −7.73 | 8.44 | 6.19 |
| $\overline{R}^2$ | | 0.126 | 0.052 | 0.020 |

The correlation of fiscal capacity in different years can also help us understand the persistence of fiscal disparities and their trend. Numbers on diagonal line in Table 9 represent the correlation coefficients of fiscal capacity in two consecutive years. From left to right, the time span used in calculating the correlation coefficients becomes longer. We can see a high correlation between the fiscal capacities in two consecutive years (the correlation coefficients is about 0.95). This also indicates that the persistence of fiscal disparities is very high. As for the change of correlation, it takes on an upward trend from left-up corner to right-down corner. For example, the correlation coefficients between two neighbouring years is increasing, which reflects the persistence becomes higher and higher, especially after 2000. We can also see that the correlation coefficients decrease as time horizon becomes longer, which is easy to understand because the relative change of fiscal capacity across regions is larger in a longer time period.

To determine whether this result survives in a more thorough analysis, we construct city-industry-location cells and calculate correlation coefficient $\rho$ between different years' revenue of these cells.[23] Then we specify a least-

[23]The number of cell amounts to $2 \times 2 \times 3 = 12$. During 1993 and 2003, the number of correlation coefficient in one cell from 1993 is ten (1-year span, 2-year span, ..., 10-year span), nine from 1994, ..., one from 2002 (between 2002 and 2003). So there are 55 correlation coefficients of different spans and different beginning years in one cell. In all, we can calculate $12 \times 55 = 660$ correlation coefficients. For example, one correlation coefficient is between 1993 and1994 among non-agricultural western rural areas.

**TABLE 9.**

The Correlation coefficients of county-level fiscal capacity in different years

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1993 | 0.947 | 0.927 | 0.880 | 0.851 | 0.834 | 0.836 | 0.827 | 0.810 | 0.775 | 0.741 |
| 1994 | | 0.960 | 0.925 | 0.888 | 0.871 | 0.871 | 0.857 | 0.834 | 0.810 | 0.780 |
| 1995 | | | 0.953 | 0.929 | 0.910 | 0.903 | 0.882 | 0.852 | 0.832 | 0.804 |
| 1996 | | | | 0.957 | 0.932 | 0.910 | 0.884 | 0.847 | 0.830 | 0.804 |
| 1997 | | | | | 0.962 | 0.930 | 0.905 | 0.868 | 0.840 | 0.819 |
| 1998 | | | | | | 0.958 | 0.938 | 0.901 | 0.884 | 0.866 |
| 1999 | | | | | | | 0.964 | 0.928 | 0.913 | 0.894 |
| 2000 | | | | | | | | 0.960 | 0.947 | 0.928 |
| 2001 | | | | | | | | | 0.972 | 0.954 |
| 2002 | | | | | | | | | | 0.981 |

squares regression equation as follows:

$$\begin{aligned}\rho \;=\; & \alpha + \beta_1 \cdot URBAN + \beta_2 \cdot AGRI + \beta_3 \cdot EAST + \beta_4 \cdot WEST \\ & + \beta_5 \cdot INTER + \beta_6 \cdot YEAR93 + \cdots + \beta_{14} \cdot YEAR01 + \mu \quad (10)\end{aligned}$$

$INTER = 1, 2, \ldots, 10$ is the time span of the correlation coefficient; $YEAR93$-$YEAR01$ are dummies for beginning years in calculating the correlation coefficient, with 2002 as the base year. $URBAN$, $AGRI$, $EAST$ and $WEST$ are defined as before. We use Weighted Least Square (WLS), weighted by the number of counties in a cell when calculating the correlation coefficient. According to table 10, the coefficient of $INTER$ is minus, which indicates that the correlation coefficient decreases as the time span becomes longer. The year dummy reveals the trend of the persistence of fiscal disparities: the correlation coefficient in early 2000s is obviously higher than that of middle and late 1990s, which demonstrates that the persistence indeed becomes stronger. From table 10, we can even analyze the difference in the persistence across counties: the correlation coefficients of rural counties or agricultural counties are significantly higher than that of urban or non-agricultural counties respectively, which means that the persistence of fiscal disparities within those areas is higher. There are also significant differences across the eastern, middle and western counties: generally speaking, the correlation coefficients in the western counties are the highest, then the eastern counties, and the middle counties are the lowest. This indicates that the persistence of fiscal disparities in the middle counties is lower than that of the western and eastern counties.

4. The fiscal capacity transition matrix

Now we analyze the persistence of fiscal disparities by fiscal capacity transition matrix. Table 11 shows the fiscal capacity transition matrix in

**TABLE 10.**

WLS estimate of the fiscal capacity correlation coefficient

| Independent Variable | Coefficient | $t$-Statistic | Dependent Variable | Coefficient | $t$-Statistic |
|---|---|---|---|---|---|
| Constant | 0.961 | 63.67 | YEAR95 | −0.027 | −1.72 |
| URBAN | −0.024 | −3.50 | YEAR96 | −0.040 | −2.57 |
| AGRI | 0.021 | 4.51 | YEAR97 | −0.051 | −3.22 |
| EAST | 0.025 | 4.83 | YEAR98 | −0.042 | −2.65 |
| WEST | 0.039 | 7.89 | YEAR99 | −0.032 | −2.01 |
| INTER | −0.021 | −23.15 | YEAR00 | −0.019 | −1.14 |
| YEAR93 | −0.031 | −1.95 | YEAR01 | −0.006 | −0.33 |
| YEAR94 | −0.032 | −2.06 | | | |
| Quantity of Sample | | 660 | $\overline{R}^2$ | | 0.57 |

the whole period and in three sub-periods. Generally speaking, we can also find that the persistence is rather high. For instance, among counties in the first fiscal capacity quintile in 1993, 64% remains at that quintile 11 years later; 28% arises one step to the second quintile; only 1% rises to the fourth quintile; and no county can move to the fifth quintile. Comparison between various transition matrixes in different sub-periods also shows the upward trend of persistence: in middle 1990s the move among quintiles is relatively high, but it slows down in the late 1990s. In the early 2000s the move is even lower. For example, the proportions of counties that remain in their original position are 75%, 49%, 47%, 53%, and 79% respectively for each quintile in the first sub-period; 79%, 55%, 52%, 56%, and 80% in the second sub-period; and 75%, 51%, 51%, 60%, and 82% in the third sub-period.

Table 12 presents some persistence indices based on transition matrix. In general, all these indices show that the persistence is very high. For example, the weighted average rate of move in 11 years is only 40.4% of the perfect mobility matrix, while the inertia rate is 143% more. Also, all the indices consistently reflect the upward trend of persistence: compared with the first sub-period, the weighted average rate of move in the second sub-period and third sub-period decrease by 11.9% and 11.4% respectively. Results based on maximal sample set remain the same.

Table 13 shows the persistence indices within regions. We can also see that persistence of non-agricultural counties is lower than that of agricultural ones, and it is higher in the middle areas than that in the eastern and western counties. Like the whole sample, the persistence of fiscal disparities of each region also takes on an upward trend in three sub-periods. These results are identical to previous analysis.

**TABLE 11.**

The transition matrix of fiscal capacity in different years

| Transition matrix of fiscal capacity in 1993-2003 | | | | | | | Transition matrix of fiscal capacity in 1993-1996 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Position in 2003 | | | | | | | Position in 1996 | | | | | |
| Position in 1993 | | I | II | III | IV | V | Position in 1993 | | I | II | III | IV | V |
| | I | 0.64 | 0.28 | 0.07 | 0.01 | 0.00 | | I | 0.75 | 0.20 | 0.05 | 0.00 | 0.00 |
| | II | 0.24 | 0.37 | 0.27 | 0.11 | 0.02 | | II | 0.22 | 0.49 | 0.22 | 0.06 | 0.00 |
| | III | 0.10 | 0.23 | 0.36 | 0.26 | 0.06 | | III | 0.03 | 0.27 | 0.47 | 0.22 | 0.02 |
| | IV | 0.02 | 0.09 | 0.26 | 0.39 | 0.25 | | IV | 0.00 | 0.04 | 0.24 | 0.53 | 0.19 |
| | V | 0.00 | 0.03 | 0.05 | 0.24 | 0.67 | | V | 0.00 | 0.00 | 0.02 | 0.19 | 0.79 |
| Transition matrix of fiscal capacity in 1996-1999 | | | | | | | Transition matrix of fiscal capacity in 2000-2003 | | | | | | |
| | Position in 1999 | | | | | | | Position in 2003 | | | | | |
| Position in 1996 | | I | II | III | IV | V | Position in 2000 | | I | II | III | IV | V |
| | I | 0.79 | 0.19 | 0.01 | 0.00 | 0.01 | | I | 0.75 | 0.23 | 0.02 | 0.00 | 0.00 |
| | II | 0.20 | 0.55 | 0.21 | 0.04 | 0.00 | | II | 0.22 | 0.51 | 0.24 | 0.02 | 0.00 |
| | III | 0.01 | 0.22 | 0.52 | 0.23 | 0.02 | | III | 0.02 | 0.23 | 0.51 | 0.22 | 0.02 |
| | IV | 0.00 | 0.03 | 0.24 | 0.56 | 0.17 | | IV | 0.00 | 0.02 | 0.21 | 0.60 | 0.16 |
| | V | 0.00 | 0.00 | 0.02 | 0.17 | 0.80 | | V | 0.00 | 0.01 | 0.02 | 0.16 | 0.82 |

Note: The sum of every row and column should be 1 according to the definition. We have rounded them off.

**TABLE 12.**

The persistence indices based on transition matrix of fiscal capacity

| | Constant Sample Set | | | | Maximal Sample Set | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | Number of sample | A | B | C | D |
| 1993-2003 | 0.646 | 0.486 | 0.892 | 4.146 | 2260 | 0.632 | 0.494 | 0.894 | 4.273 |
| 1993-1996 | 0.438 | 0.606 | 0.956 | 6.629 | 2340 | 0.436 | 0.610 | 0.958 | 6.680 |
| 1996-1999 | 0.386 | 0.644 | 0.970 | 7.476 | 2423 | 0.376 | 0.654 | 0.970 | 7.721 |
| 2000-2003 | 0.388 | 0.638 | 0.972 | 7.386 | 2736 | 0.382 | 0.650 | 0.972 | 7.666 |

Note: A stands for weighted average rate of move; B stands for inertia rate; C stands for sub-inertia rate; D stands for $\chi^2$ index.

## 6. THE EQUALIZATION EFFECTS OF FISCAL TRANSFERS: THE GINI COEFFICIENT DECOMPOSITION

Table 14 shows the results of the Gini coefficient decomposition. We not only calculate the contribution of total fiscal transfers to overall fiscal disparities, but also analyze the equalization effects of each fiscal transfer scheme. From Table 14, all contributions of fiscal transfers to fiscal disparities are positive from 1993 to 2003. This indicates that fiscal transfers do not play a role in narrowing the fiscal gap at the county-level. On the contrary, they even greatly aggravate fiscal disparities. In addition, they explain about half of the overall fiscal disparities at the county level after

**TABLE 13.**

The persistence indices within regions

| | weighted average | | | inertia rate | | | sub-inertia rate | | | $\chi^2$ index | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 93-96 | 97-00 | 00-03 | 93-96 | 97-00 | 00-03 | 93-96 | 97-00 | 00-03 | 93-96 | 97-00 | 00-03 |
| General | 0.438 | 0.386 | 0.388 | 0.606 | 0.644 | 0.638 | 0.956 | 0.970 | 0.972 | 6.629 | 7.476 | 7.386 |
| Rural | 0.45 | 0.42 | 0.41 | 0.60 | 0.62 | 0.63 | 0.96 | 0.97 | 0.97 | 6.50 | 6.93 | 7.23 |
| Urban | 0.44 | 0.38 | 0.32 | 0.58 | 0.65 | 0.70 | 0.98 | 0.97 | 0.98 | 6.52 | 7.80 | 9.22 |
| Agri | 0.41 | 0.40 | 0.37 | 0.62 | 0.62 | 0.65 | 0.97 | 0.97 | 0.98 | 6.94 | 7.11 | 7.74 |
| Non-Agri | 0.50 | 0.44 | 0.44 | 0.57 | 0.61 | 0.60 | 0.95 | 0.95 | 0.95 | 5.63 | 6.55 | 6.60 |
| East | 0.43 | 0.45 | 0.39 | 0.62 | 0.59 | 0.65 | 0.96 | 0.96 | 0.97 | 6.91 | 6.36 | 7.55 |
| Middle | 0.53 | 0.44 | 0.49 | 0.55 | 0.62 | 0.58 | 0.93 | 0.95 | 0.93 | 5.63 | 6.63 | 5.99 |
| West | 0.36 | 0.36 | 0.35 | 0.66 | 0.66 | 0.68 | 0.98 | 0.98 | 0.98 | 8.03 | 8.03 | 8.34 |

the 1994 tax sharing reform. This result stands sharply against what is from traditional method.

**TABLE 14.**

Contributions of fiscal transfers to fiscal disparities: The Gini coefficient decomposition (%)

| Time | Overall Fiscal Transfers | Tax rebates | Net Original-system subsidies | Earmarked subsidies | Earmarked remittances | Factor transfers | Balancing subsidies | Other transfers |
|---|---|---|---|---|---|---|---|---|
| 1993 | 25.63 | - | 2.71 | 23.77 | −4.43 | - | - | 3.58 |
| 1994 | 56.65 | 22.80 | 9.17 | 23.44 | −2.93 | - | - | 4.17 |
| 1995 | 49.72 | 19.96 | 8.62 | 19.94 | −3.26 | - | - | 4.46 |
| 1996 | 60.52 | 16.12 | 12.96 | 20.51 | −3.07 | - | - | 14.00 |
| 1997 | 53.03 | 14.39 | 13.76 | 22.42 | −2.71 | - | - | 5.17 |
| 1998 | 48.51 | 13.23 | 10.28 | 21.74 | −2.84 | - | - | 6.10 |
| 1999 | 46.56 | 12.72 | 7.28 | 22.68 | −4.16 | - | - | 8.04 |
| 2000 | 45.38 | 11.72 | 4.26 | 18.96 | −2.63 | 5.65 | 6.51 | 0.91 |
| 2001 | 48.92 | 9.56 | 3.00 | 18.50 | −3.15 | 13.32 | 6.24 | 1.45 |
| 2002 | 52.81 | 15.64 | 1.84 | 18.31 | −4.35 | 12.71 | 5.93 | 2.73 |
| 2003 | 49.41 | 15.92 | 0.54 | 17.67 | −4.93 | 11.70 | 6.22 | 2.29 |

Note: 1. According to the allocation policy of fiscal transfers, we classify them as follows. The tax rebates are the excise and value-added tax rebates during 1994-2001, and after 2002 also including the income tax rebates. The net Original-system subsidies are the original-system subsidies minus the original-system subsidies remittances. The earmarked subsidies include the subsidies of increasing government debt during 2000-2003. The factor transfers consist of the general transfers, the subsidies to pay teachers of elemental and secondary schools, the minority nationality region transfers, the subsidies to poor and remote regions, the subsidies to increase salary, the subsidies for fee-to-tax reform, and the subsidies to derate agricultural taxes. (Below is the same)

2. Column 2 should equal to the sum from column 3 to column 9 according to the independence axiom of the Gini Coefficient decomposition.

As for the equalization of each fiscal transfer scheme, we can see the biggest contribution to overall fiscal disparities comes from the earmarked subsidies. Although its share decreases during 1993-2003, it still explains 17.7% of overall fiscal disparities in 2003. Some researchers have pointed out that the assignment of the earmarked subsidies lacks reasonable standards: they are allocated according to the project officer's will, or scatters randomly among regions (for example, Jiang et al., 1999). Bargaining and nepotism are inevitable, and the underdeveloped areas are often incompetent in the game of "rushing to the ministries for money". Thus most funds flow into the developed areas, and widen fiscal gaps. This is just what we have seen in Table 14.

The tax rebates is another important contributor to overall fiscal inequality. Its share tends to decease during 1994-2001, but after the income tax sharing policy in 2002 it gains the impetus to rise, and accounts for 15.9% of overall fiscal disparities in 2003. This result is understandable, for the tax sharing reform whose main goal is to restore the central government's control over the overall public revenue hardly adjusts the vested interests of local governments. According to the arrangement of tax sharing reform in 1994, central government rebated value-added tax and excise collected by central government in excess of 1993's amount in 1994. In the following years, in addition to 1993's rebate base, the central government also rebated 30% of the increment of value-added tax and excise each year. Therefore, the developed regions gain more rebate, and the underdeveloped regions still suffer from lack of revenue, which contributes more to overall fiscal disparities.

The balancing subsidies which also aim at ensuring the local vested interests mainly compensate for the loss of local revenue because of changes of enterprises' affiliation and central government's new policy in the past fiscal year. It accounts for 6.2% of overall fiscal disparities in 2003.

The original-system subsidies and remittances originated from the central-province fiscal contract during 1988-1993, which set the amount of money each province should receive or remit to central government. It was reserved after the tax sharing reform in 1994. The original purpose of this subsidies and remittances was to equalize fiscal disparities through subsidies to underdeveloped areas. But the amount was set on the base of 1988-1993, and was fixed for such a long period. Thus it becomes obviously unreasonable now.[24] Therefore, the original-system subsidies and remittances are also non-equalized. They explain 9.2% of the overall disparities in 1994.

[24] For instance, at present provinces with low local fiscal power like Henan, Chongqing, Hunan and Anhui must remit to central government, while relative richer provinces such as Fujian, Hainan and Shandong gain subsidies from upper government.

The only transfer scheme that has somewhat equalization effect at the county-level is the earmarked remittances. Its contribution is negative at all timea, as low as −4.9% in 2003.

What surprises us is the factor transfers, which aim at narrowing the fiscal gaps, do not achieve their goals. On the contrary, they bring about 11.7% of overall fiscal disparities in 2003. At first sight, these fiscal transfers try to allocate funds according to local government's fiscal ability, i.e. assigning funds according to the difference between standard fiscal revenue and standard expenditure estimated from objective factors by way of regression. Therefore, they should have some equalization effect.

In order to understand these results, table 15 further decomposes the inequality contributions of the factor transfers in terms of per capita fiscal ability averaged by total population and population supported by fiscal budget. The non-equalization effects of the general transfers and subsidies to increase salary are rather high in view of fiscal ability averaged by total population. However, almost all factor transfers' contributions to fiscal disparities become negative during 2002-2003 when population supported by fiscal budget is taken into account.[25]

**TABLE 15.**

The contribution of factor transfers schemes to fiscal disparity: Different definition of population (%)

| Time | Total factor transfers | General transfers | Subsidies to increase salary | Minority nationality region transfers | Subsidies to poor and remote regions | Subsidies for fee-to-tax reform |
|---|---|---|---|---|---|---|
| Contribution to fiscal disparities in terms of fiscal ability averaged by total population | | | | | | |
| 2000 | 5.65 | 3.76 | 1.90 | - | - | - |
| 2001 | 13.32 | 4.69 | 4.80 | 0.55 | 3.32 | −0.04 |
| 2002 | 12.71 | 5.21 | 7.12 | 0.31 | - | 0.06 |
| 2003 | 11.70 | 4.23 | 6.55 | 0.43 | - | 0.48 |
| Contribution to fiscal disparities in terms of fiscal ability averaged by population supported by budget | | | | | | |
| 2000 | −1.65 | −0.08 | −1.58 | - | - | - |
| 2001 | −0.46 | 0.90 | −1.99 | 0.21 | 1.11 | −0.68 |
| 2002 | −1.59 | 0.73 | −1.15 | 0.10 | - | −1.27 |
| 2003 | −2.88 | −0.70 | −0.99 | 0.13 | - | −1.33 |

Note: The data of the subsidies for fee-to-tax reform in 2001 is the subsidies to pay teachers of elemental and secondary schools. (Below is the same)

[25] From the view of fiscal power averaged by population supported by fiscal budget, although the quantity of inequality contribution of fiscal transfers decreases (the contributions of all fiscal transfers to overall fiscal disparities is 32%), the above conclusions are the same. The inequality contributions of tax rebate and earmarked subsidies remain positive in 2003 (25.17% and 10.41% respectively).

This result is also understandable. At present the allocation of the factor transfers mainly concerns factors related to population supported by fiscal budget, while neglecting total population within those regions. Moreover, pubic finance mainly covers urban areas these days in China. Therefore, some poorer counties with bigger rural population gain relatively less factor transfers than urban regions, and disparities of fiscal ability averaged by total population are thus enlarged. Meanwhile, allocation policy of the factor transfers is over-simplified in some regions. Taking Hunan province for an example, subsidies to increase salary from province and prefectures to counties are simply assigned according to "salary that should increase $\times 60\%$" in 2003. NingXiang county, the poorest county in Changsha prefecture, shared the same transfers with five other richer urban districts, while they are by no means at the same fiscal ability tier.[26] So it is not strange that factor transfers do not achieve their goals of narrowing the fiscal disparities from the aspect of total population.

Let's look into the factor transfers in more details. The general transfers originating from "the fiscal transfers in transition period" were put into practice by the Minister of Finance in 1995.[27] Its policy purpose is to reverse the trend of enlarging fiscal gaps and gradually equalize local government's ability to provide public services. The size of the general transfers keeps increasing after 2000. For the first time the general transfers allocate funds according to so-called factor method, based on objective factors such as natural conditions, population, area and per capita GDP, etc. However, from Table 15, the general transfers still account for 4.23% of overall disparities in terms of fiscal ability averaged by total population in 2003. Its equalization effect is not obvious even when the population supported by fiscal budget is considered.

The subsidies to increase salary are those transferred from central government to local governments to adjust the salary of employees supported by budget. On July 1st, 1999, the central government decided to increase the salary of employees supported by budget. Several raises were made in the following years. The central government prescribed that the coastal developed areas should cover the cost of increasing salary by themselves, while supporting the middle and west regions with lower fiscal ability through fiscal transfers according to formulation related to factors such as the number of employees and the degree of fiscal deficiency. We can see from Table 15 that it indeed has some equalization effect in terms of population supported by budget, but is still non-equalized according to total population.

[26] Fiscal power averaged by total population of Furong district (an urban district) was 3.06 times larger than that of Ningxiang in 2003.

[27] State council made the decision that all the increased revenue due to income tax sharing was put into the general transfers. At the same time, the concept of "transition period transfer" was not used any more since 2002.

Another large scale fiscal transfer scheme is the subsidies for fee-to-tax reform. In order to smoothly carry out the reform of fee to tax in countryside, and taking into account the decrease of local fiscal ability due to abolishment of the rural pooling funds,[28] the decrease of agricultural tax rate and the removal of butchery tax, the central government decided to subsidize provinces except richer areas such as Beijing, Tianjin, Shanghai, Jiangsu, Zhejiang, and Guangdong by means of fiscal transfers in 2001. We can see from Table 15 that the inequality share of the subsidies for fee-to-tax reform is the smallest, and indeed exerts some equalization effect in terms of population supported by budget.

**TABLE 16.**

The structure of inequality constructions of fiscal transfers: The Gini Coefficient decomposition

| | Total fiscal transfers | | | | Of whichTax rebates | | | | Of whichEarmarked subsidies | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | value | $\omega_k$ | $R_k$ | $G_k$ | value | $\omega_k$ | $R_k$ | $G_k$ | value | $\omega_k$ | $R_k$ | $G_k$ |
| 1993 | 0.080 | 0.199 | 0.277 | 1.453 | - | - | - | - | 0.074 | 0.221 | 0.735 | 0.456 |
| 1994 | 0.178 | 0.526 | 0.712 | 0.475 | 0.072 | 0.280 | 0.494 | 0.518 | 0.074 | 0.209 | 0.747 | 0.472 |
| 1995 | 0.159 | 0.486 | 0.631 | 0.518 | 0.064 | 0.262 | 0.440 | 0.555 | 0.064 | 0.186 | 0.695 | 0.492 |
| 1996 | 0.196 | 0.516 | 0.672 | 0.566 | 0.052 | 0.212 | 0.467 | 0.529 | 0.067 | 0.201 | 0.663 | 0.499 |
| 1997 | 0.172 | 0.476 | 0.659 | 0.547 | 0.047 | 0.192 | 0.457 | 0.530 | 0.073 | 0.209 | 0.675 | 0.515 |
| 1998 | 0.161 | 0.451 | 0.667 | 0.533 | 0.044 | 0.174 | 0.469 | 0.535 | 0.072 | 0.206 | 0.708 | 0.494 |
| 1999 | 0.160 | 0.452 | 0.646 | 0.546 | 0.044 | 0.155 | 0.520 | 0.541 | 0.078 | 0.248 | 0.628 | 0.498 |
| 2000 | 0.162 | 0.445 | 0.638 | 0.568 | 0.042 | 0.143 | 0.523 | 0.556 | 0.068 | 0.184 | 0.675 | 0.543 |
| 2001 | 0.180 | 0.486 | 0.683 | 0.542 | 0.035 | 0.116 | 0.539 | 0.562 | 0.068 | 0.176 | 0.712 | 0.543 |
| 2002 | 0.194 | 0.560 | 0.714 | 0.484 | 0.057 | 0.174 | 0.559 | 0.590 | 0.067 | 0.181 | 0.688 | 0.540 |
| 2003 | 0.186 | 0.551 | 0.703 | 0.481 | 0.060 | 0.169 | 0.584 | 0.611 | 0.067 | 0.177 | 0.745 | 0.506 |

Note: 1. value $= \omega_k \cdot R_k \cdot G_k$;
2. There are 599 zeros and negatives in total fiscal transfers in 1993, so that the Gini coefficient is abnormal (1.45), (below is the same)

As we mentioned in section 2, the Gini coefficient decomposition can also tell us through which source fiscal transfers lead to fiscal disparities. In Table 16 and 17, we further decompose the inequality contributions of transfer schemes into three parts: the size of transfer ($\omega_k$), the Gini coefficient of transfer itself ($G_k$) and its relation to the overall local fiscal revenue ($R_k$). According to Table 16, the non-equalization effect of overall fiscal transfers greatly enhances in 1994's tax sharing reform. The contribution value increases from 0.08 in 1993 to 0.18 in 1994, by 32.2%. The reason for this is

[28]Including township pooling funds referred as 'five pools', such as the schooling funds for both townships and villages, birth-control funds, militia training funds, road construction funds, preferential treatment and compensation funds, and the villages pooling funds referred as 'three withdrawals', such as accumulation funds, funds for public welfare and administrative funds.

the significant rise in size (measured by $\omega_k$) and the inequality of allocation (measured by $R_k$), increase by 164.7% and 156.7% respectively. Although total inequality share of fiscal transfers does not obviously change after the tax sharing reform according to Table 14, its contribution value does take on an upward trend. The Gini coefficient of overall fiscal disparities at county-level is 0.377 in which fiscal transfers contribute 0.19 in 2003. This is because on the one hand the size of total fiscal transfers increases (their share in total fiscal ability increases from 48.6% in 1995 to 55.1% in 2003); on the other hand it becomes more obvious that rich regions get more while poor regions get less ($R_k$ increases from 0.631 in 1995to 0.703 in 2003). Take the tax rebates and earmarked subsidies for example. From 1993 to 2003, although the share of the earmarked subsidies declines, its $R_k$ and $G_k$ take on an upward trend. This makes the earmarked subsidies the most non-equalized transfers. As for the tax rebates, its inequality contribution keeps on rising since 1998, with $R_k$ increasing from 0.47 in 1998 to 0.58 in 2003, and $G_k$ increasing from 0.54 to 0.61.

From Table 17, the share and the inequality itself of the total factor transfers are basically the same as those of tax rebates and earmarked subsidies since 2000. Its inequality of allocation ($R_k$) also remains quite positive. Therefore, its contribution to overall disparities is in a considerably high level (explains 4.4 Gini points). Among the total factor transfers, the subsidies to increase salary and the general transfers are two largest non-equalization schemes (explains 2.5 and 1.6 Gini points respectively in 2003). Their Inequality of allocation ($R_k$'s) rise year by year. Other factor transfers contribute relatively less to overall disparities owing to either small share (such as the minority nationality region transfers), or low $R_k$ (such as the subsidies for fee-to-tax reform). Ranked by inequality of allocation ($R_k$), the first two are the earmarked subsidies and the tax rebates, being 0.76 and 0.58 respectively in 2003. The minority nationality region transfers (0.57), the subsidies to increase salary (0.47), and the general transfers (0.44) follow behind. The subsidies for fee-to-tax reform have the lowest inequality of allocation, even a negative value ($-0.03$) in 2001, indicating somewhat equalization effect.

## 7. THE ROBUST ANALYSIS: OTHER DECOMPOSITION METHODS

Are the results above sensitive to decomposition method? We further try $I_2$ decomposition. From Table 18[29], the results are exactly the same as the Gini coefficient decomposition. Fiscal transfers greatly aggravate fiscal disparities. The non-equalization effect drastically increases after 1994 tax

[29]This table is equivalent to the decomposition of Shorrocks (1982).

**TABLE 17.**
The structure of inequality constructions of factors transfers: The Gini Coefficient decomposition

| | Total factor transfers | | | | General transfers | | | | Subsidies to increase salary | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | value | $\omega_k$ | $R_k$ | $G_k$ | value | $\omega_k$ | $R_k$ | $G_k$ | value | $\omega_k$ | $R_k$ | $G_k$ |
| 2000 | 0.020 | 0.08 | 0.41 | 0.59 | 0.013 | 0.03 | 0.45 | 0.77 | 0.007 | 0.04 | 0.28 | 0.55 |
| 2001 | 0.049 | 0.16 | 0.53 | 0.55 | 0.017 | 0.04 | 0.52 | 0.77 | 0.018 | 0.09 | 0.39 | 0.49 |
| 2002 | 0.047 | 0.19 | 0.48 | 0.49 | 0.019 | 0.05 | 0.52 | 0.72 | 0.026 | 0.11 | 0.46 | 0.50 |
| 2003 | 0.044 | 0.19 | 0.46 | 0.48 | 0.016 | 0.05 | 0.44 | 0.68 | 0.025 | 0.10 | 0.47 | 0.50 |
| | Minority nationality region transfers | | | | Subsidies for fee-to-tax reform | | | | Subsidies to poor and remote regions | | | |
| Time | value | $\omega_k$ | $R_k$ | $G_k$ | value | $\omega_k$ | $R_k$ | $G_k$ | value | $\omega_k$ | $R_k$ | $G_k$ |
| 2001 | 0.002 | 0.00 | 0.51 | 0.93 | 0.000 | 0.00 | $-0.03$ | 0.66 | 0.012 | 0.02 | 0.70 | 0.89 |
| 2002 | 0.001 | 0.00 | 0.48 | 0.94 | 0.000 | 0.03 | 0.01 | 0.54 | - | - | - | - |
| 2003 | 0.002 | 0.00 | 0.56 | 0.95 | 0.002 | 0.03 | 0.12 | 0.40 | - | - | - | - |

sharing reform, accounting for almost half of the overall disparities. Results about transfer schemes remain the same. The earmarked subsidies and tax rebates are still the first two non-equalized schemes, and the earmarked remittances still exert some equalization effect. We have also taken one further step to analyze the inequality contributions of various factor transfers in terms of different population definition (not reported here). The results also indicate that the factor transfers are non-equalized in view of fiscal ability averaged by total population, while having some equalization effect in terms of population supported by fiscal budget.

Table 19 and Table 20 further decompose $I_2$ into three parts: the size of fiscal transfers, the relationship with the distribution of overall fiscal ability, and the inequity itself. Here we measure the inequality of allocation with ordinary correlation coefficient. Because $I_2$ decomposition is robust to negatives, we specially take the earmarked remittances into account. It is obvious that the tax sharing reform significantly increases overall fiscal disparities, and the contribution value also keeps on increasing. The main reason for this is still the inequality of allocation (the correlation coefficient rises from 0.33 in 1993 to 0.70 in 2003). As for transfer schemes, in 2003 the tax rebates (the correlation coefficient is 0.71) and the earmarked subsidies (0.58) are still the most non-equalized in terms of the inequality of allocation. The general transfers (the correlation coefficient is 0.33), the subsidies to increase salary (0.32), the minority nationality region transfers (0.24) are all non-equalized in terms of allocation policy. The lowest two correlation coefficients appear in the subsidies for fee-to-tax reform and the earmarked remittances. The latter maintains negative all the way and thus exerts equalization effect to some extent. Anyway, our results are quite robust under different decompositions.

**TABLE 18.**

The contribution of fiscal transfers to fiscal disparities: $I_2$ decomposition (%)

| Time | Total Fiscal Transfers | Tax rebates | Net Original-system subsidies | Earmarked subsidies | Earmarked remittances | Factor transfers | Balancing subsidies | Other transfers |
|---|---|---|---|---|---|---|---|---|
| 1993 | 29.65 | | 5.93 | 24.35 | −4.29 | | | 3.66 |
| 1994 | 56.88 | 20.91 | 10.74 | 23.39 | −2.88 | | | 4.72 |
| 1995 | 47.44 | 18.65 | 8.60 | 20.11 | −3.10 | | | 3.18 |
| 1996 | 64.95 | 14.53 | 14.79 | 19.71 | −2.64 | | | 18.56 |
| 1997 | 51.88 | 13.84 | 13.20 | 22.07 | −2.47 | | | 5.24 |
| 1998 | 43.59 | 12.81 | 8.31 | 19.82 | −2.65 | | | 5.31 |
| 1999 | 40.23 | 13.27 | 5.30 | 20.76 | −5.00 | | | 5.91 |
| 2000 | 37.96 | 12.96 | 0.83 | 14.10 | −2.93 | 4.44 | 7.84 | 0.71 |
| 2001 | 44.54 | 11.65 | 0.35 | 15.76 | −2.23 | 10.37 | 7.53 | 1.11 |
| 2002 | 45.69 | 18.46 | −1.04 | 13.95 | −3.89 | 8.94 | 7.14 | 2.12 |
| 2003 | 43.75 | 18.05 | −1.17 | 13.82 | −4.26 | 7.53 | 8.11 | 1.69 |

**TABLE 19.**

The structure of inequality constructions of fiscal transfers: $I_2$ decomposition

| Time | Total fiscal transfers | | | Of whichTax rebates | | | Earmarked subsidies | | | Earmarked remittances | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ | Value | $\rho_k$ | $1/2 \cdot CV \cdot CV_k$ |
| 1993 | 0.061 | 0.333 | 0.934 | - | - | - | 0.050 | 0.723 | 0.320 | −0.009 | −0.211 | −0.936 |
| 1994 | 0.120 | 0.747 | 0.318 | 0.044 | 0.455 | 0.368 | 0.049 | 0.703 | 0.342 | −0.006 | −0.282 | −0.750 |
| 1995 | 0.112 | 0.712 | 0.351 | 0.044 | 0.491 | 0.392 | 0.048 | 0.697 | 0.382 | −0.007 | −0.315 | −0.607 |
| 1996 | 0.166 | 0.681 | 0.508 | 0.037 | 0.468 | 0.408 | 0.050 | 0.654 | 0.399 | −0.007 | −0.272 | −0.669 |
| 1997 | 0.137 | 0.725 | 0.424 | 0.037 | 0.487 | 0.425 | 0.058 | 0.642 | 0.453 | −0.007 | −0.274 | −0.703 |
| 1998 | 0.125 | 0.686 | 0.426 | 0.037 | 0.511 | 0.445 | 0.057 | 0.655 | 0.432 | −0.008 | −0.316 | −0.709 |
| 1999 | 0.134 | 0.661 | 0.477 | 0.044 | 0.553 | 0.545 | 0.069 | 0.640 | 0.465 | −0.017 | −0.434 | −0.880 |
| 2000 | 0.137 | 0.624 | 0.522 | 0.047 | 0.556 | 0.620 | 0.051 | 0.531 | 0.541 | −0.011 | −0.292 | −0.911 |
| 2001 | 0.174 | 0.656 | 0.551 | 0.045 | 0.563 | 0.717 | 0.061 | 0.573 | 0.617 | −0.009 | −0.222 | −0.986 |
| 2002 | 0.185 | 0.708 | 0.482 | 0.075 | 0.688 | 0.692 | 0.056 | 0.568 | 0.570 | −0.016 | −0.266 | −1.269 |
| 2003 | 0.198 | 0.704 | 0.521 | 0.082 | 0.712 | 0.768 | 0.063 | 0.580 | 0.617 | −0.019 | −0.262 | −1.538 |

Note: Value stands for contribution value $I_2 = \sum_{k=1}^{K} \left(\rho_k \omega_k \sqrt{I_2 I_{2k}}\right)$. $\omega_i$ is the same as before, not reported here. For negative income (e.g. earmarked remittances), $I_2 = \sum_{k=1}^{K} \rho_k \omega_k \cdot 1/2 \cdot CV \cdot CV_k$. (below is the same)

**TABLE 20.**

The structure of inequality constructions of factors transfers: $I_2$ decomposition

| Time | Total factor transfers | | | General transfers | | | Subsidies to increase salary | | |
|---|---|---|---|---|---|---|---|---|---|
| | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ |
| 2000 | 0.016 | 0.340 | 0.584 | 0.012 | 0.347 | 0.876 | 0.004 | 0.217 | 0.480 |
| 2001 | 0.040 | 0.427 | 0.569 | 0.016 | 0.382 | 0.965 | 0.012 | 0.285 | 0.452 |
| 2002 | 0.036 | 0.368 | 0.499 | 0.017 | 0.384 | 0.903 | 0.018 | 0.314 | 0.515 |
| 2003 | 0.034 | 0.340 | 0.510 | 0.014 | 0.334 | 0.805 | 0.018 | 0.315 | 0.548 |
| | Minority nationality region transfers | | | Subsidies for fee-to-tax reform | | | Subsidies to poor and remote regions | | |
| Time | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ | Value | $\rho_k$ | $\sqrt{I_2 I_{2k}}$ |
| 2001 | 0.002 | 0.224 | 1.953 | 0.000 | −0.040 | 0.623 | 0.011 | 0.413 | 1.413 |
| 2002 | 0.001 | 0.182 | 2.026 | 0.000 | −0.009 | 0.492 | - | - | - |
| 2003 | 0.002 | 0.240 | 2.503 | 0.000 | 0.012 | 0.390 | - | - | - |

## 8. CONCLUSION

Using fiscal data at the county level from 1993 to 2003 and adjusting price differences across regions, the robust empirical findings have the following important implications.

Firstly, there are huge fiscal disparities across regions, and this kind of inequality takes on a lasting upward trend. Inequality is relatively steady in middle and late 1990s, and then speeds up significantly after that. It is mainly because the growth rate of fiscal ability at the lower percentiles increases at a relatively higher speed during middle and late 1990s, but the trend is reversed after 1998. The huge and widening fiscal gaps across regions are the result of unbalanced economy development in China. It is also the key factor that restricts the later balanced development. In China, public services like basic education, health care, social security, etc, are mainly provided by county-level governments. Therefore, fiscal gaps inevitably lead to the huge inequality of public services utilized by residents across regions. The inequality in economic welfare may even be much greater than what it shows only from the inequality indices of individual income in China. In order to achieve the elementary equalization of fiscal capacity across regions, the reform of fiscal transfer system still has a long way to go.

Secondly, the persistence of fiscal disparities is very high, and also takes on an upward trend. The persistence in fiscal inequality is even higher within agricultural counties than that of non-agricultural counties, and within the western and eastern counties than the middle counties. This reveals that county-level fiscal capacity in China is mainly determined by some relatively steady factors like economy development, geographical position, natural condition, etc. In order to equalize fiscal capacity across

regions, the main channel is through transfers from upper government, especially the central government. That is to say, the transfer policy of upper governments should pay more attention to fiscal inequality and its persistence, and try to make it exert more equalization effect.

Thirdly, the middle counties are mostly in the lower fiscal capacity percentiles, while the proportion of the western counties that located in higher fiscal capacity percentiles is greater, even more than the eastern counties. The western and eastern counties disperse more widely. Their inequality indexes are higher and persistence is also higher. This indicates that the traditional policy border for regional development (i.e. the eastern, the middle and the western) is too broad at least from the view of fiscal equalization. According to the principle that residents of different regions in the same country should be treated equally by public finance, we should break down the traditional policy border and pay more attention directly to county government with the least fiscal ability.

Fourthly, fiscal transfers from upper government to county government do not play a role in narrowing the fiscal gaps. On the contrary, they even significantly aggravate fiscal disparities. Their contributions to overall fiscal disparities increase greatly and explain about a half of the overall fiscal disparities at the county level after the 1994 tax sharing reform. The earmarked subsidies and tax rebates are the first two non-equalized schemes. Their effects take on a downward trend, but they still account for a majority of non-equalization effects of fiscal transfers in 2003. The earmarked remittances are the only transfers that exert some equalization effect. The ever-increasing factor transfers during 2000-2003 which was designed to narrow the fiscal gaps do not achieve their policy goals. The main reason for this is that at present the allocation of factor transfers mainly concerns factors related to population supported by fiscal budget, while neglecting total population. Some poorer counties with big rural population gain relatively less than richer urban regions. Indeed, almost all factor transfers have some equalization effects during 2002-2003 in terms of population supported by fiscal budget.

Finally, the ultimate reason for fiscal transfers' non-equalization effects is the inequality of allocation. Regions with stronger fiscal ability gain more from upper government, while weaker ones gain less. The Gini correlation coefficient of total transfers maintains a very high level, and also takes on an upward trend. The enlarging size of transfers also magnifies their inequality contribution. We find that the inequality of allocation plays a key role in deciding whether a transfer scheme is non-equalized or not and how large it is. In terms of the inequality of allocation, the earmarked subsidies locate at the top of the list, and then the tax rebates, the minority nationality region transfers, the subsidies to increase salary, the general transfers, and

the subsidies for fee-to-tax reform. The earmarked remittances are at the bottom.

Our study indicates that it is necessary to reconsider upper government's objectives of fiscal transfers, and give more weights to the goal of equalizing fiscal ability. It seems very urgent that the segmental and random fiscal transfer system at present should be reformed in a more coherent way to enhance the stability and predictability of local fiscal revenue, and to form a steady and sustainable multi-level fiscal system. In order to ensure every citizen including rural residents enjoys the same amount of public services, upper governments should pay more attention to the total population within jurisdiction when allocating fiscal transfers, not only those population supported by fiscal budget.

## APPENDIX

The equivalence of $I_2$ decomposition and Shorrocks (1982) decomposition can be proved as follows:

$$
\begin{aligned}
& E(Y-\mu)^2 = E[(Y-\mu)(Y-\mu)] \\
\Rightarrow\ & E(Y-\mu)^2 = E[(Y-\mu)(Y_1-\mu_1+\cdots+Y_K-\mu_K)] \\
\Rightarrow\ & E(Y-\mu)^2 = E[(Y-\mu)(Y_1-\mu_1)]+\cdots+E[(Y-\mu)(Y_K-\mu_K)] \\
\Rightarrow\ & \sigma^2 = Cov(Y,Y_1)+\cdots+Cov(Y,Y_K) \\
\Rightarrow\ & \sigma = \rho_1\sigma_1+\cdots+\rho_K\sigma_K \\
\Rightarrow\ & CV = \rho_1\frac{\mu_1}{\mu}CV_1+\cdots+\rho_k\frac{\mu_K}{\mu}CV_K \\
\Rightarrow\ & \frac{1}{2}CV^2 = \rho_1\omega_i\sqrt{\frac{1}{2}CV^2\frac{1}{2}CV_1^2}+\cdots+\rho_K\omega_K\sqrt{\frac{1}{2}CV^2\frac{1}{2}CV_K^2} \\
& (\text{if } CV>0; CV_1\cdots CV_K>0) \\
\Rightarrow\ & I_2 = \rho_1\omega_1\sqrt{I_2I_{21}}+\cdots+\rho_K\omega_K\sqrt{I_2I_{2K}}
\end{aligned}
$$

and:

$$
\begin{aligned}
& I_2 = \frac{1}{2}CV^2 = \frac{1}{2}\rho_1\frac{\mu_1}{\mu}CV\cdot CV_1+\cdots+\frac{1}{2}\rho_K\frac{\mu_K}{\mu}CV\cdot CV_K \\
\Longleftrightarrow\ & 1 = \rho_1\frac{\mu_1}{\mu}\frac{CV_1}{CV}+\cdots+\rho_K\frac{\mu_K}{\mu}\frac{CV_K}{CV} \\
\Longleftrightarrow\ & 1 = \rho_1\frac{\sigma_1}{\sigma}+\cdots+\rho_K\frac{\sigma_K}{\sigma} = \sum_{k=1}^{K}s_k
\end{aligned}
$$

This is just the Shorrocks (1982) decomposition.

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