

CHAPTER 3. THE RELATIONSHIP BETWEEN TAX EFFORT AND FISCAL DECENTRALIZATION IN CHINA

According to fiscal decentralization theory, the relationship between tax effort and fiscal decentralization can be determined. The degree of tax effort may, however, vary with the structure of the government system, and especially with the degree of fiscal decentralization. A higher level of decentralized government expresses more responsibility to fit in with taxpayers' needs (Oates, 1972). Therefore, a responsive government (including the central and local levels) may increase its willingness to achieve higher levels of tax effort. In addition, the fiscal decentralization will influence the tax effort through the fiscal mechanism.

In order to analyze the tax effort of China's local government, the definition of the tax effort should be crucial in this study. In general, the tax effort (*TE*) is measured by the ratio of actual tax collection to the potential tax capacity and can be presented as follows:

$$TE = \frac{\text{Actual Tax Collection}}{\text{Potential Tax Capacity}} \quad (3-1)$$

However, there are several definitions of potential tax capacity, and this results in different measurements of the tax effort.

3.1 The Measurement of Potential Tax Capacity

In general, five types of measurements of potential tax capacity are suggested by different institutions or articles and include per capita personal income (PI), ¹⁶ gross

¹⁶ Per capita personal income refers to the sum of income earned from various sources by the

regional product (GRP),¹⁷ the representative tax system (RTS), the representative tax system using regression analysis (RTS/R), and total taxable resources (TTR). However, this study adopts all measurements except for the RTS due to the unavailability of some variables necessary in computing the RTS in China.¹⁸

Since the principal source of a local government's revenue is its taxpayers' income, the most obvious and widely-used measure of tax capacity is the per capita income, the average household income, or personal income in a region. The advantage of per capita income as a measure of tax capacity is its simplicity and availability. However, the disadvantage of it is that an income distribution problem generally exists and thus causes the actual tax capacity to be lower than that displayed.¹⁹

Another measure of tax capacity is gross regional product (GRP) which is defined as the total value of goods and services produced by the region's economic resources in a year, and it reflects the total amount of income that is potentially available to be taxed by the regional government. Although GRP contains the non-residents' income that a regional government can tax, it also suffers from certain

households and their members during the reference period, and is classified as income from wages and salaries, income from household operations, income from properties and income from transfers of members of the households, excluding income from selling of properties and income from borrowings.

¹⁷ Gross regional product refers to the final products of all resident units in a region during a certain period of time. Gross regional product is expressed in three different forms, i.e. value, income, and products respectively. The form of value refers to the total value of all products and services produced by all resident units during a certain period of time minus the total value of input of materials and services of the nature of non-fixed assets or the summation of the value-added of all resident units; the form of income includes all the income created by all resident units and distributed primarily to all resident and non-resident units; the form of products refers to the value of all final goods and services for final use by all resident units plus the value of net exports of goods and services during a given period of time.

¹⁸ The RTS is built on a variety of tax rates among various tax components so that it can be considered to be a more accurate measure to represent a region's true fiscal capacity. However, the measure needs to be more data intensive than other measures. The RTS will be a good method if the data can support it. Unfortunately, the detailed data the RTS needs for calculation are unavailable in China. More details regarding the measurement of RTS can be found in the U.S. Advisory Commission on Intergovernmental Relations (1962).

¹⁹ There is a big difference between per capita income in urban and rural areas. The difference will reduce the actual tax capacity because those in the rural areas may have no ability to pay tax. Hence, the actual tax capacity is lower than that displayed.

problems which result in certain inaccuracies between the GRP and the actual taxable resources.²⁰

Total Taxable Resources (TTR) is another measure of tax capacity that can adjust for the inaccuracies of GRP and is adopted by the federal government of the United States. The development of TTR came about in response to the inadequate information on per capita income and accurately reflects the relative abilities of local governments in collecting revenues. This study adopts the method provided by Compson and Navratil (1997) to estimate TTR by allocating national GRP in terms of the provincial average share of national personal income and aggregate GRP. The formulation is as follows:

$$TTR_i = 0.5 \times \left(\frac{PI_i}{PI_N} + \frac{GRP_i}{GRP_N} \right) \times GRP_N \quad (3-2)$$

In equation (3-2), TTR_i represents the i^{th} province's TTR. PI_i and PI_N represent the per capita personal income of the i^{th} province and of the whole nation, respectively. In addition, GRP_i and GRP_N represent the gross regional product of the i^{th} province of the whole nation, respectively. The advantage of the TTR method is that it provides more accurate information on actual tax capacity. Its disadvantage is that it is more data-intensive.

Since the data are insufficient for computing the tax capacity using the RTS method with regard to China, the regression analysis method (RTS/R) can be used. The RTS/R avoids the necessity of exactly defining the tax components which include standard tax bases and representative tax rates.²¹ Moreover, the regression equation

²⁰ For instance, some firms registered with a local government can have their revenue collected by another local government.

²¹ Since the statutory tax base may be the same across all the regions or may change between regions, it is not a simple task to define standard tax bases for other tax components. In addition, the representative (or average) tax rate is measured as follows: take the sum of the revenue generated across all regions for each tax component and divide this amount by the standard tax base for this item

can explain the relationship between revenue collection and the explanatory variables for the tax base using a statistical procedure. The disadvantages of RTS/R are that it is relatively more complex than per capita income and that the policy-makers may not know the statistical techniques that would raise their suspicions.²² This study uses two explanatory variables in the fixed effects model of per capita provincial revenue (*PCPR*). One is the amount of per capita retail trade turnover (*PCTURN*) employed by Martinez-Vazquez and Boex (1997a). The other is the ratio of industry output to GRP (*GRPINP*) proposed by Martinez-Vazquez and Boex (1997b). The empirical model of per capita provincial revenue (*PCPR*) can be described as follows:

$$PCPR_{i,t} = \lambda_i + \gamma_1 \times PCTURN_{i,t} + \gamma_2 \times GRPINP_{i,t} + e_{i,t} \quad (3-3)$$

In this study, we use the data set for China's 31 provinces during 1996-2004 to estimate equation (3-3), and then obtain the estimate for the provincial tax revenue and use it as the amount of the tax capacity for each province. The estimation results after considering several statistical tests take the form of equation (3-4).²³

$$\hat{PCPR}_{i,t} = \hat{\lambda}_i + 3246.29^{***} \times PCTURN_{i,t} - 450.03 \times GRPINP_{i,t} \quad (3-4)$$

3.2 Comparing the Tax Effort Index among Provinces in China

This study calculates each province's tax effort index based on equation (3-1). Since four types of measurements of the potential tax capacity mentioned above are

aggregated across all regions.

²² The decision as to which measure should be used should take into account the shortcomings because the situation where the policy-makers abandon the more suitable measure due to their failing to understand if it frequently exists.

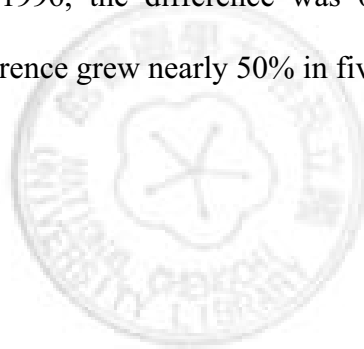
²³ The *F*-statistic of the Hausman test is 6.61 suggesting that the study should adopt the fixed effects model. Furthermore, the chi-square of the *LM* test is 297.04 implying that the panel model should be adopted rather than the classical model. The adjusted *R*² is 0.93605 and the *t*-values for the coefficients of *PCTURN* and *GRPINP* are 27.91 and -1.679, respectively. The estimated λ_i s are available upon request. The symbols *** and ** indicate statistical significance at the 1% and 5% significance levels, respectively.

adopted in this study, four types of the tax effort index for each province in China during 1996-2004 are calculated, and the indices from 1996 to 2004 are shown in Tables 3-6. In the case of the tax effort index with a per capita income (*PI*) as the tax capacity (see Table 3), it is shown that the degree of tax effort (denoted as *TE-PI*) of most provinces is increasing, except for Hainan and Yunnan. And Hainan shows the U-trend. However, the tax effort index of Yunnan is decreasing, even if it is always in the top five. In addition, Shanghai, Beijing, Guangdong and Tianjin were in the top five from 1996 to 2004. In 2004, Zhejiang replaced Liaoning as the 4th highest tax effort province in China and saw the highest increase in the tax effort among all regions during this period. Contrarily, Tibet, Hubei, and Jiangxi had a lower tax effort from 1996 to 2004. Moreover, the difference of tax effort between the highest and the lowest is expanding. In 1996, the difference is 0.265%, but it expanded to 0.309% in 2004.

In the case where GRP is used as the tax capacity, the tax effort index is denoted as *TE-GRP* (see Table 4). It is shown that most regions increased their tax efforts except for Heilongjiang, Hainan, and Yunnan during 1996-2004. In addition, regions with higher tax efforts in 1996 included Beijing, Shanghai, Yunnan, Tianjin and Guangdong. Guizhou replaced Tianjin into the top five group in 1998. In addition, Ningxia replaced Yunnan in the top five regions. In 2004, Guizhou replaced Tianjin as one of the top five regions. By contrast, Shandong, Hunan, Hubei, Henan and Hebei all had lower tax efforts in both 1996 and 2004. Tibet was the region with the lowest tax effort from 2002 to 2004. Moreover, the difference of tax effort between the highest and the lowest was also expanding. In 1996, the difference was 0.091%, but it expanded to 0.0117% in 2000, in particular, the difference was 0.126% in 2003.

In addition, when TTR was adopted to calculate the tax effort index denoted as

TE-TTR (see Table 5), the tax effort index of most provinces is obviously smaller than the other measure and exhibits a stable or rising trend except for Yunnan. In addition, Shandong, Jiangsu, Sichuan, Yunan, Guangdong and Henan are always found to be among the top five regions in terms of tax effort during the research period. Jiangsu replaced Yunan in the top five regions in 1999, and Yunan never was among the top five regions starting from 1999. Similarly, Zhejiang replaced Sichuan in the top five regions in 2001, and Sichuan never was among the top five regions since 1999. However, Tianjin, Inner Mongolia, Jilin, Hainan, Chongqing, Tibet, Gansu, Qinghai, Xinjiang and Ningxia were usually among the regions with the lowest tax effort, especially Tibet. Moreover, the difference of tax effort between the highest and the lowest still expanded. In 1996, the difference was 0.0198%, but it expanded to 0.0307% in 2001. The difference grew nearly 50% in five years.



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Table 3: The Region's Tax Effort Index with Per Capita Income in 1996 and 2004

	1996		1997		1998		1999		2000		2001		2002		2003		2004	
	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank
Beijing	0.261	2	0.288	2	0.280	2	0.319	2	0.300	1	0.342	2	0.322	2	0.315	2	0.332	2
Tianjin	0.175	5	0.168	4	0.154	6	0.176	4	0.185	3	0.208	4	0.184	4	0.196	5	0.197	5
Hebei	0.077	25	0.078	26	0.082	25	0.085	24	0.087	27	0.100	23	0.097	20	0.099	23	0.107	20
Shanxi	0.113	8	0.113	11	0.115	8	0.114	13	0.106	16	0.120	14	0.108	14	0.114	15	0.132	11
Inner Mongolia	0.101	13	0.102	17	0.100	17	0.097	18	0.102	18	0.104	20	0.097	23	0.103	18	0.118	15
Liaoning	0.156	6	0.162	5	0.162	5	0.167	5	0.170	5	0.192	6	0.167	6	0.166	6	0.168	7
Jilin	0.087	21	0.092	19	0.094	19	0.097	19	0.099	20	0.105	17	0.090	24	0.092	27	0.085	30
Heilongjiang	0.107	11	0.106	14	0.109	12	0.113	14	0.126	9	0.128	13	0.119	11	0.117	13	0.110	18
Shanghai	0.309	1	0.357	1	0.332	1	0.323	1	0.295	2	0.342	1	0.330	1	0.356	1	0.377	1
Jiangsu	0.088	20	0.091	20	0.093	20	0.102	16	0.123	10	0.154	9	0.141	8	0.162	7	0.172	6
Zhejiang	0.099	15	0.101	18	0.107	14	0.122	9	0.141	7	0.202	5	0.180	5	0.209	4	0.208	4
Anhui	0.078	24	0.087	22	0.088	21	0.088	22	0.103	17	0.100	22	0.089	25	0.094	24	0.094	25
Fujian	0.112	9	0.117	10	0.115	10	0.130	7	0.134	8	0.156	8	0.133	9	0.136	9	0.131	12
Jiangxi	0.075	26	0.074	28	0.077	28	0.076	30	0.082	29	0.091	27	0.081	30	0.092	26	0.094	27
Shandong	0.092	18	0.104	16	0.109	13	0.118	10	0.118	12	0.139	11	0.127	10	0.133	10	0.130	13
Henan	0.074	27	0.079	25	0.077	27	0.080	27	0.090	26	0.094	26	0.088	26	0.093	25	0.094	24
Hubei	0.070	30	0.070	30	0.076	29	0.081	26	0.084	28	0.091	29	0.081	29	0.083	30	0.086	29
Hunan	0.079	23	0.078	27	0.078	26	0.077	28	0.081	30	0.086	30	0.087	27	0.091	28	0.094	26
Guangdong	0.184	3	0.158	6	0.171	3	0.212	3	0.176	4	0.274	3	0.235	3	0.247	3	0.227	3
Guangxi	0.070	28	0.073	29	0.073	30	0.077	29	0.093	24	0.113	16	0.097	22	0.103	19	0.104	22
Hainan	0.135	7	0.123	9	0.120	7	0.124	8	0.117	14	0.119	15	0.108	15	0.116	14	0.120	14
Chongqing	0.070	29	0.082	24	0.084	24	0.085	25	0.090	25	0.102	21	0.104	16	0.110	16	0.117	17
Sichuan	0.095	17	0.089	21	0.087	22	0.088	21	0.094	23	0.091	28	0.085	28	0.089	29	0.091	28
Guizhou	0.086	22	0.085	23	0.087	23	0.087	23	0.108	15	0.100	24	0.100	18	0.101	21	0.110	19
Yunnan	0.180	4	0.173	3	0.163	4	0.163	6	0.161	6	0.163	7	0.153	7	0.153	8	0.151	8
Tibet	0.044	31	0.055	31	0.059	31	0.066	31	0.071	31	0.072	31	0.069	31	0.066	31	0.068	31
Shaanxi	0.104	12	0.112	12	0.115	9	0.118	11	0.120	11	0.130	12	0.119	12	0.127	11	0.135	9
Gansu	0.100	14	0.104	15	0.103	15	0.099	17	0.097	21	0.104	19	0.097	21	0.099	22	0.102	23
Qinghai	0.096	16	0.143	7	0.097	18	0.096	20	0.100	19	0.098	25	0.098	19	0.102	20	0.106	21
Ningxia	0.108	10	0.131	8	0.113	11	0.116	12	0.118	13	0.146	10	0.114	13	0.120	12	0.134	10
Xinjiang	0.090	19	0.111	13	0.102	16	0.103	15	0.096	22	0.105	18	0.102	17	0.107	17	0.117	16

Table 4: The Region's Tax Effort Index with GRP in 1996 and 2004

	1996		1997		1998		1999		2000		2001		2002		2003		2004	
	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank
Beijing	0.125	1	0.130	1	0.123	1	0.145	1	0.150	1	0.167	1	0.163	1	0.161	1	0.170	1
Tianjin	0.071	4	0.069	4	0.063	6	0.072	5	0.076	5	0.084	4	0.073	5	0.073	5	0.069	6
Hebei	0.038	26	0.038	27	0.038	27	0.039	29	0.037	30	0.039	29	0.038	28	0.036	30	0.035	30
Shanxi	0.056	9	0.056	10	0.056	11	0.061	9	0.059	10	0.064	9	0.061	9	0.060	11	0.063	9
Inner Mongolia	0.052	11	0.056	11	0.055	12	0.056	12	0.055	13	0.053	18	0.050	18	0.050	20	0.053	16
Liaoning	0.062	7	0.062	7	0.058	9	0.059	11	0.057	12	0.064	11	0.059	11	0.060	10	0.060	10
Jilin	0.048	15	0.049	14	0.049	15	0.050	16	0.050	19	0.052	19	0.048	21	0.050	19	0.044	22
Heilongjiang	0.049	14	0.047	17	0.047	17	0.051	15	0.050	18	0.051	21	0.049	20	0.045	23	0.041	25
Shanghai	0.106	2	0.110	2	0.099	2	0.109	2	0.110	2	0.124	2	0.122	2	0.138	2	0.142	2
Jiangsu	0.035	29	0.037	29	0.036	28	0.041	26	0.048	22	0.055	17	0.051	16	0.055	14	0.054	15
Zhejiang	0.038	24	0.040	23	0.042	21	0.048	19	0.060	9	0.079	6	0.068	7	0.072	6	0.066	7
Anhui	0.042	20	0.045	19	0.046	18	0.047	21	0.048	23	0.050	24	0.044	25	0.045	25	0.043	23
Fujian	0.043	19	0.044	20	0.041	23	0.046	22	0.049	20	0.056	15	0.048	22	0.048	21	0.045	21
Jiangxi	0.042	21	0.042	21	0.041	24	0.041	25	0.043	27	0.047	26	0.041	26	0.043	26	0.042	24
Shandong	0.036	28	0.040	24	0.041	22	0.045	23	0.046	25	0.052	20	0.046	23	0.045	24	0.041	26
Henan	0.034	30	0.037	28	0.036	29	0.038	30	0.038	29	0.040	27	0.039	27	0.038	29	0.035	29
Hubei	0.034	31	0.033	31	0.035	30	0.039	28	0.039	28	0.039	28	0.037	29	0.038	28	0.038	28
Hunan	0.037	27	0.035	30	0.034	31	0.035	31	0.033	31	0.037	31	0.037	30	0.040	27	0.039	27
Guangdong	0.067	5	0.068	5	0.065	5	0.079	3	0.083	3	0.095	3	0.084	3	0.081	3	0.074	3
Guangxi	0.039	23	0.040	25	0.045	20	0.049	17	0.050	17	0.062	12	0.052	15	0.054	16	0.049	18
Hainan	0.066	6	0.061	8	0.060	7	0.062	8	0.061	8	0.064	10	0.058	12	0.060	9	0.058	12
Chongqing	0.038	25	0.040	26	0.041	25	0.044	24	0.047	24	0.050	23	0.050	17	0.053	17	0.054	14
Sichuan	0.043	18	0.046	18	0.045	19	0.048	20	0.049	21	0.049	25	0.046	24	0.047	22	0.045	20
Guizhou	0.061	8	0.064	6	0.065	4	0.066	6	0.067	6	0.071	8	0.070	6	0.069	7	0.071	4
Yunnan	0.079	3	0.082	3	0.076	3	0.078	4	0.078	4	0.079	7	0.076	4	0.075	4	0.071	5
Tibet	0.041	22	0.041	22	0.039	26	0.041	27	0.043	26	0.039	30	0.036	31	0.035	31	0.034	31
Shaanxi	0.051	13	0.053	12	0.057	10	0.060	10	0.059	11	0.062	13	0.061	10	0.060	12	0.059	11
Gansu	0.051	12	0.053	13	0.053	13	0.053	14	0.053	14	0.056	14	0.056	14	0.055	15	0.053	17
Qinghai	0.047	17	0.048	16	0.048	16	0.048	18	0.050	16	0.050	22	0.050	19	0.050	18	0.048	19
Ningxia	0.054	10	0.058	9	0.059	8	0.063	7	0.067	7	0.080	5	0.065	8	0.063	8	0.066	8
Xinjiang	0.048	16	0.048	15	0.051	14	0.053	13	0.052	15	0.055	16	0.058	13	0.056	13	0.056	13

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Table 5: The Region's Tax Effort Index with TTR in 1996 and 2004

	1996		1997		1998		1999		2000		2001		2002		2003		2004	
	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank
Beijing	0.005	18	0.006	17	0.006	18	0.007	17	0.007	17	0.007	17	0.007	14	0.008	17	0.008	15
Tianjin	0.003	26	0.003	27	0.002	27	0.003	27	0.003	26	0.003	26	0.003	27	0.003	27	0.003	27
Hebei	0.008	9	0.008	10	0.008	9	0.009	8	0.009	10	0.010	9	0.010	9	0.011	9	0.011	7
Shanxi	0.006	17	0.006	18	0.006	17	0.006	18	0.005	20	0.006	19	0.005	20	0.006	21	0.007	18
Inner Mongolia	0.004	23	0.004	25	0.004	25	0.004	25	0.004	25	0.004	25	0.004	25	0.004	25	0.004	23
Liaoning	0.010	6	0.011	6	0.011	6	0.011	6	0.011	6	0.012	6	0.011	7	0.011	7	0.011	8
Jilin	0.004	24	0.004	24	0.004	24	0.004	23	0.004	23	0.004	23	0.004	24	0.004	24	0.004	26
Heilongjiang	0.006	14	0.006	15	0.006	15	0.007	14	0.007	14	0.007	16	0.007	17	0.007	18	0.006	20
Shanghai	0.007	11	0.008	9	0.008	11	0.008	12	0.008	12	0.009	11	0.008	12	0.010	10	0.010	10
Jiangsu	0.010	7	0.010	7	0.010	7	0.012	5	0.014	3	0.017	3	0.015	3	0.019	3	0.018	2
Zhejiang	0.007	12	0.007	12	0.007	12	0.009	10	0.010	8	0.014	4	0.013	4	0.016	4	0.015	4
Anhui	0.008	10	0.008	8	0.008	8	0.009	9	0.009	9	0.010	10	0.009	11	0.010	12	0.009	12
Fujian	0.006	16	0.006	16	0.006	16	0.007	16	0.007	15	0.008	15	0.007	16	0.008	15	0.007	17
Jiangxi	0.005	20	0.005	21	0.005	20	0.005	21	0.005	21	0.006	20	0.005	21	0.006	20	0.006	21
Shandong	0.012	2	0.014	2	0.014	2	0.016	2	0.016	2	0.018	2	0.017	2	0.019	2	0.017	3
Henan	0.010	5	0.011	5	0.011	4	0.012	4	0.012	4	0.013	5	0.012	5	0.014	5	0.013	5
Hubei	0.006	13	0.006	13	0.007	13	0.008	13	0.008	13	0.008	14	0.007	13	0.008	14	0.008	13
Hunan	0.008	8	0.008	11	0.008	10	0.008	11	0.008	11	0.009	12	0.009	10	0.010	11	0.009	11
Guangdong	0.020	1	0.017	1	0.019	1	0.024	1	0.023	1	0.031	1	0.027	1	0.031	1	0.027	1
Guangxi	0.005	19	0.005	19	0.005	19	0.006	19	0.006	18	0.008	13	0.007	15	0.008	13	0.008	14
Hainan	0.002	28	0.002	28	0.001	28	0.002	28	0.001	28	0.001	28	0.001	28	0.002	28	0.002	28
Chongqing	0.004	25	0.004	23	0.004	23	0.004	22	0.004	22	0.005	22	0.005	22	0.006	22	0.006	22
Sichuan	0.012	3	0.012	3	0.011	3	0.012	3	0.012	5	0.012	7	0.011	6	0.012	6	0.012	6
Guizhou	0.005	21	0.005	20	0.005	21	0.005	20	0.006	19	0.006	21	0.006	19	0.006	19	0.007	19
Yunnan	0.012	4	0.011	4	0.011	5	0.011	7	0.011	7	0.011	8	0.010	8	0.011	8	0.010	9
Tibet	0.0002	31	0.0002	31	0.0002	31	0.0003	31	0.0003	31	0.0003	31	0.0003	31	0.0003	31	0.0003	31
Shaanxi	0.006	15	0.006	14	0.007	14	0.007	15	0.007	16	0.007	18	0.007	18	0.008	16	0.008	16
Gansu	0.004	22	0.004	22	0.004	22	0.004	24	0.004	24	0.004	24	0.004	23	0.004	23	0.004	24
Qinghai	0.001	30	0.001	29	0.001	30	0.001	30	0.001	30	0.001	30	0.001	30	0.001	30	0.001	30
Ningxia	0.001	29	0.001	30	0.001	29	0.001	29	0.001	29	0.001	29	0.001	29	0.001	29	0.001	29
Xinjiang	0.002	27	0.003	26	0.003	26	0.003	26	0.003	27	0.003	27	0.003	26	0.003	26	0.004	25

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Table 6: The Region's Tax Effort Index with RTS/R in 1996 and 2004

	1996		1997		1998		1999		2000		2001		2002		2003		2004	
	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank	tax effort	rank
Beijing	0.799	2	0.837	2	0.783	1	0.920	1	0.961	1	1.061	1	1.027	1	1.028	2	1.107	1
Tianjin	0.498	3	0.491	3	0.438	3	0.514	4	0.554	4	0.612	4	0.539	4	0.551	4	0.540	4
Hebei	0.166	18	0.180	19	0.190	19	0.200	21	0.208	22	0.227	23	0.228	22	0.228	25	0.230	24
Shanxi	0.253	7	0.285	7	0.289	8	0.313	7	0.307	10	0.366	8	0.360	7	0.384	8	0.436	6
Inner Mongolia	0.174	17	0.202	16	0.206	16	0.227	16	0.240	17	0.243	21	0.243	20	0.266	19	0.308	13
Liaoning	0.360	5	0.378	5	0.350	5	0.372	5	0.382	6	0.423	6	0.393	6	0.411	6	0.405	8
Jilin	0.188	15	0.212	14	0.202	17	0.222	18	0.250	15	0.260	17	0.253	18	0.274	17	0.255	21
Heilongjiang	0.240	9	0.245	10	0.261	9	0.297	9	0.326	7	0.334	11	0.325	10	0.317	12	0.300	15
Shanghai	0.836	1	0.845	1	0.744	2	0.816	2	0.816	2	0.916	2	0.908	2	1.061	1	1.105	2
Jiangsu	0.203	12	0.221	12	0.221	13	0.254	12	0.308	9	0.365	9	0.348	8	0.407	7	0.409	7
Zhejiang	0.246	8	0.270	8	0.289	7	0.337	6	0.427	5	0.561	5	0.494	5	0.534	5	0.504	5
Anhui	0.142	24	0.170	20	0.178	21	0.187	24	0.200	25	0.217	25	0.202	27	0.225	27	0.216	28
Fujian	0.234	11	0.254	9	0.243	10	0.276	10	0.305	11	0.355	10	0.317	11	0.324	11	0.306	14
Jiangxi	0.141	25	0.154	26	0.167	25	0.170	27	0.176	28	0.201	28	0.187	28	0.221	28	0.221	27
Shandong	0.188	16	0.217	13	0.229	11	0.255	11	0.274	13	0.314	13	0.292	13	0.302	14	0.290	16
Henan	0.116	29	0.136	29	0.137	30	0.150	30	0.164	29	0.181	29	0.184	30	0.207	29	0.196	30
Hubei	0.147	22	0.157	24	0.178	23	0.207	20	0.221	21	0.232	22	0.225	23	0.227	26	0.226	26
Hunan	0.133	27	0.140	28	0.146	28	0.152	29	0.156	30	0.177	30	0.186	29	0.205	30	0.202	29
Guangdong	0.414	4	0.430	4	0.422	4	0.526	3	0.562	3	0.666	3	0.601	3	0.608	3	0.571	3
Guangxi	0.143	23	0.148	27	0.161	27	0.184	25	0.208	23	0.262	15	0.230	21	0.246	22	0.237	22
Hainan	0.237	10	0.222	11	0.221	12	0.233	14	0.233	18	0.257	18	0.243	19	0.267	18	0.263	20
Chongqing	0.138	26	0.162	23	0.178	22	0.196	22	0.223	19	0.249	20	0.262	17	0.293	15	0.308	12
Sichuan	0.148	21	0.163	22	0.169	24	0.188	23	0.206	24	0.218	24	0.211	26	0.230	23	0.229	25
Guizhou	0.112	30	0.124	30	0.140	29	0.156	28	0.183	27	0.201	27	0.221	24	0.249	21	0.275	19
Yunnan	0.280	6	0.300	6	0.305	6	0.309	8	0.316	8	0.329	12	0.332	9	0.350	9	0.345	10
Tibet	0.096	31	0.106	31	0.119	31	0.130	31	0.147	31	0.145	31	0.144	31	0.155	31	0.154	31
Shaanxi	0.157	19	0.182	18	0.194	18	0.226	17	0.244	16	0.274	14	0.283	14	0.311	13	0.319	11
Gansu	0.133	28	0.154	25	0.161	26	0.176	26	0.185	26	0.204	26	0.216	25	0.230	24	0.235	23
Qinghai	0.190	13	0.199	17	0.208	15	0.227	15	0.261	14	0.262	16	0.270	15	0.286	16	0.285	18
Ningxia	0.188	14	0.211	15	0.220	14	0.253	13	0.297	12	0.371	7	0.315	12	0.337	10	0.362	9
Xinjiang	0.157	20	0.168	21	0.184	20	0.209	19	0.222	20	0.252	19	0.269	16	0.265	20	0.287	17

By using equation (3-4) to predict the tax capacity of all regions and further calculate their tax effort denoted as $TE-RTS/R$, it is shown in Table 6 that the tax effort index of both Shanghai and Beijing exceeded one in 2003 and 2004,²⁴ implying that the collection of tax revenue exceeded the tax capacity in that year. This also means that these local governments had a higher tax effort when collecting tax. Shanghai, Beijing, Guangdong and Tianjin always had a higher tax effort than other regions, but Jiangxi, Gansu, Tibet, Henan and Hunan usually had a lower tax effort during the research period. Zhejiang replaced Liaoning in the top-five group in 2000, and it has appeared in the top-five regions since 2000. Furthermore, the difference of tax effort between the highest and the lowest expanded as well. The difference was 0.740% in 1996, but it expanded to 0.916% in 2001. In particular, the difference grew to 0.953% in 2004.

In summary, Shanghai, Guangdong and Yunnan always have a higher tax effort and Tibet always has a lower tax effort no matter what measurements are adopted. This conclusion might be associated with the degree of fiscal decentralization of the regions (see Section 3.4). The rest of this section will focus on the relationship between the tax effort and fiscal decentralization of the regions.

3.3 The Difference between Tax Effort and Tax Capacity

The study compresses the relation between tax effort and tax capacity of each province in four measures as shown in Figure 4. It is defined that a region belongs to a “high tax effort” if its tax effort is higher than the average level in a year. Similarly, a region is categorized as a “low tax effort” if its tax effort is lower than the average level in a year. The definition of “high or low tax capacity” is the same as that of the tax effort. When per capita income is adopted as tax capacity, Yunnan, has high tax

²⁴ The tax effort of Beijing also exceeds 1 in 2001 and 2002.

effort and low tax capacity. Jilin, Jiangsu and Xinjiang have low tax effort and high tax capacity. Provinces which have low tax effort and low tax capacity include the following: Shaanxi, Gansu, Inner Mongolia, Ningxia Anhui, Jiangxi, Henan, Hunan, Guangxi, Chongqing, Qinghai, Tibet, Sichuan, etc. Several provinces have both a high tax effort and tax capacity. For instance, this situation is observed in Guangdong, Shanghai, Tianjin, Liaoning, Beijing, etc. The distribution of provinces concentrates primarily on two categories, the high tax effort under high tax capacity and the low effort under low tax capacity.

However, when using GRP as a tax capacity, the distribution is more uniform than above. Yunnan, Shaanxi, Ningxia, etc. have a high tax effort and a low tax capacity. Some provinces have a low tax effort and a low tax capacity. For instance, Gansu, Qinghai, Chongqing, Inner Mongolia, Ningxia and Tibet all exhibit this trend. In addition, several provinces have a low tax effort and a high tax capacity including Heilongjiang, Jiangsu, Hubei, etc. However, Liaoning, Guangdong and Shanghai have a high tax effort and tax capacity.

If TTR is used as tax capacity, Beijing and Tianjin are different from the other measures and become a low tax effort. They have a low tax effort and a high tax capacity. Some provinces have a high tax effort and a low tax capacity, for instance, Yunan, Hebei, Hunan, etc. Several provinces have a low tax effort and a low tax capacity including Shaanxi, Gansu, Inner Mongolia, Ningxia, Qinghai, Chongqing, Tibet, etc. The provinces which have a high tax effort and a tax capacity include Guangdong, Shanghai, and Liaoning. When using RTS/R as a tax capacity, Yunnan and Shanxi have a high tax effort and a low tax capacity. Gansu, Qinghai, Chongqing, Inner Mongolia and Tibet also have a low tax effort and a low tax capacity. However, Jiangsu still has

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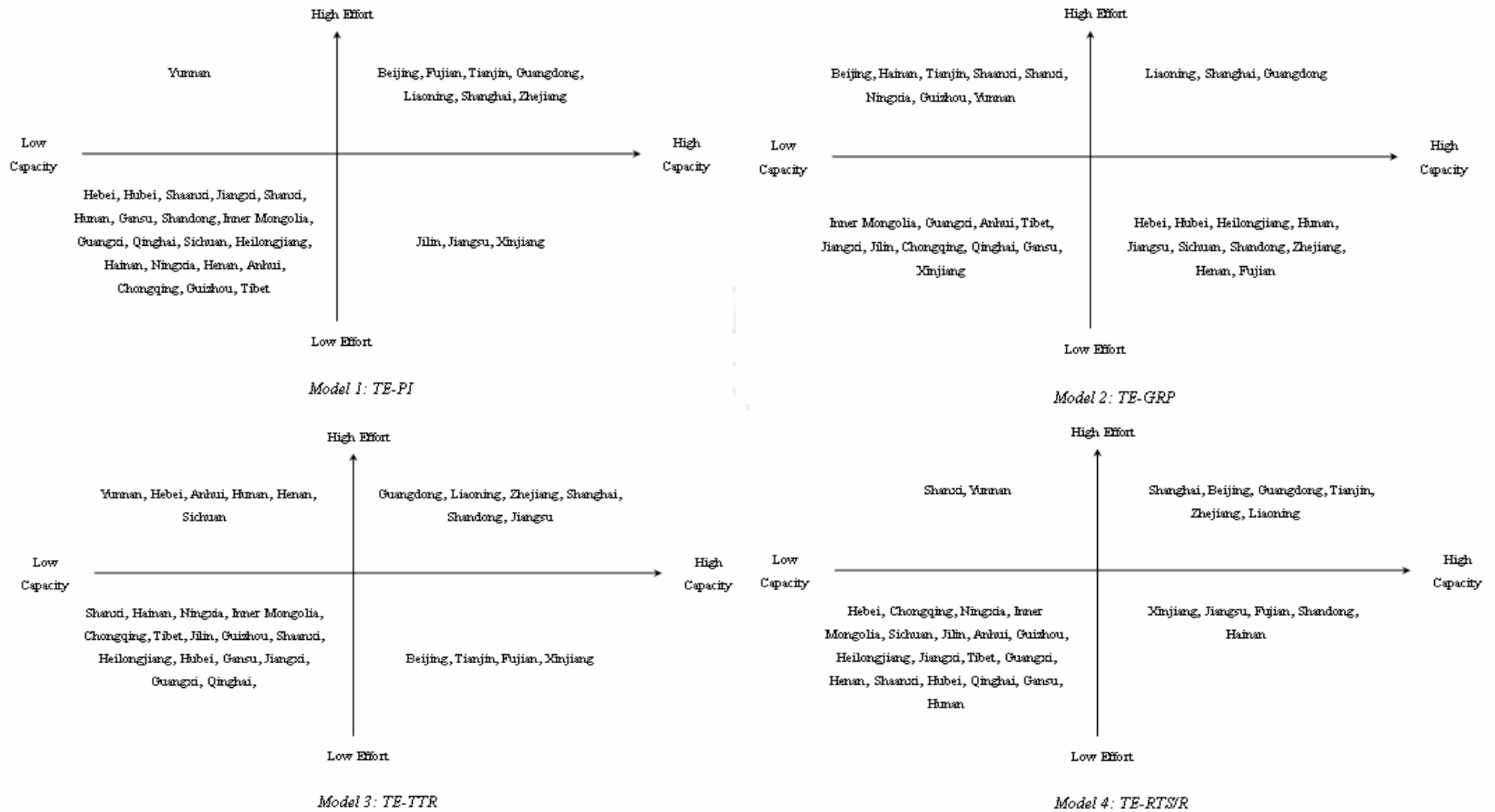
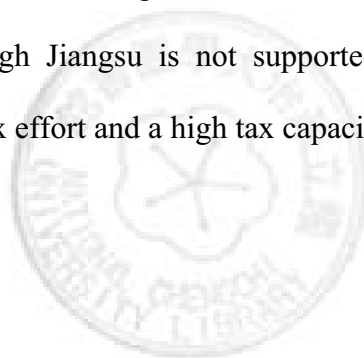


Figure 4: Tax Capacity and Tax Effort Characteristics in Different Definition of Tax Effort

a high tax capacity and a tax effort. Hainan, Gansu, Qinghai and Ningxia have a low tax effort and a low tax capacity. In addition, the provinces which have a high tax effort and a tax capacity include Guangdong, Shanghai and Liaoning.

In summary, this study finds that Liaoning, Guangdong and Shanghai have a high tax effort and a high tax capacity in four measures. Therefore, this study knows that the four provinces have good performances because they collect hardly what they can collect. Gansu, Qinghai, Chongqing, Inner Mongolia and Tibet have a low tax effort and a low tax capacity in four measures. In addition, Yunan has a high tax effort and a low capacity. Those provinces express the consistent results so this study can ensure the conclusion. Moreover, Jiangsu has a low tax effort and a high tax capacity in three measures. Although Jiangsu is not supported by all measures, it still is strongly proved as a low tax effort and a high tax capacity.



3.4 The Relationship between Tax Effort and Fiscal Decentralization

China's current fiscal decentralization has experienced two major fiscal reforms during the reform period. The first fiscal reform started in 1985 and became known as the "Fiscal Responsibility System (FRS)", and the second reform took place in 1994 and was called the "Tax Sharing System (TSS)". The major goals of the TSS were to distribute each sort of tax to fit in the jurisdictions (central or provincial government) that collect that sort of tax more easily.

This study adopts revenue-autonomy to represent the degree of fiscal decentralization to explore the issue regarding fiscal decentralization. In China's current fiscal system, the regional governments have to submit a part of their revenues to the central government. Therefore, it is assumed to have a higher revenue-autonomy and a higher degree of fiscal decentralization if a regional government is able to retain more revenue to use.

This study uses a data set for 31 provinces during 1996-2004 to calculate the degree of fiscal decentralization. If the index is higher, it indicates that the province has a higher level of fiscal autonomy and that the province has a greater share of retained revenue in total revenue. The fiscal decentralization (FD) is defined as follows:

$$FD_{i,t} = (RR_{i,t} - SUBMIT_{i,t}) / (RR_{i,t} - SUBMIT_{i,t} + TRANS_{i,t}) \quad (3-5)$$

In equation (3-5), $FD_{i,t}$ is defined as region i 's share of retained revenue in total revenue of period t . In addition, $RR_{i,t}$ represents region i 's revenue in period t , $SUBMIT_{i,t}$ is the amount region i should submit to the central government in period t , and $TRANS_{i,t}$ is the transfer from the central government to region i in period t .

The degree of fiscal decentralization from 1996 to 2004 for China's 31 regions is calculated based on equation (3-5) and the results are shown in Table 7. It is observed that Fujian, Shandong and Guangdong have a higher degree of fiscal decentralization and were among the top ten regions in both years. In particular, Guangdong's degrees of fiscal decentralization in 1996 and 2004 both exceeded 70 percent. In addition, Beijing was the region with the highest degree of fiscal decentralization in 2004. By contrast, in both years, Tibet, Qinghai and Ningxia had the lowest degree of fiscal decentralization.

In order to explore the relationship between fiscal decentralization and tax effort, this study adopts the Pearson correlation coefficient and Spearman rank order correlation coefficient to analyze this issue. According to Table 7, it is shown that by using the Pearson correlation coefficient, fiscal decentralization exhibits a positive relationship with all types of tax effort indices. All coefficients are positive and range from 0.74 to 0.05. However, from using the Spearman rank order correlation coefficient, it is shown that the fiscal decentralization has a positive relationship with all types of tax effort indices, except for the *TE-GRP* (-0.02). All coefficients range from 0.69 to -0.02.

To sum up, this finding could propose a hypothesis that there is a positive relationship between fiscal decentralization and tax effort in China after 1994. Therefore, this study uses an empirical model to accurately examine the influence of fiscal decentralization on each region's tax effort in China.

Table 7: The Region's Fiscal Decentralization in 1996 and 2004

Regions	1996		2004	
	FD	Rank	FD	Rank
Beijing	55.77	12	77.73	1
Tianjin	45.94	21	58.23	8
Hebei	56.54	11	47.40	10
Shanxi	59.04	7	45.85	11
Inner Mongolia	44.04	24	33.24	26
Liaoning	49.93	17	49.53	9
Jilin	51.26	16	31.63	27
Heilongjiang	57.66	9	37.86	22
Shanghai	43.55	26	71.43	3
Jiangsu	45.87	22	67.17	5
Zhejiang	43.92	25	67.49	4
Anhui	59.19	6	42.60	15
Fujian	66.77	3	62.18	7
Jiangxi	57.89	8	41.45	18
Shandong	60.89	4	65.65	6
Henan	57.58	10	44.51	12
Hubei	49.80	18	40.60	19
Hunan	54.23	15	39.64	20
Guangdong	71.87	1	71.46	2
Guangxi	55.34	13	43.50	13
Hainan	67.36	2	42.14	16
Chongqing	41.75	27	43.47	14
Sichuan	60.30	5	41.50	17
Guizhou	47.32	19	34.04	25
Yunnan	46.44	20	38.76	21
Tibet	5.56	31	6.71	31
Shaanxi	54.86	14	37.73	23
Gansu	44.90	23	27.00	28
Qinghai	30.19	30	16.55	30
Ningxia	41.30	29	26.73	29
Xinjiang	41.47	28	34.91	24

Correlation Coefficient: FD v.s. TE Index

	Pearson ¹	Spearman ²	Pearson ¹	Spearman ²
<i>TE-PI</i>	0.16	0.13	0.74	0.61
<i>TE-GRP</i>	0.05	-0.02	0.54	0.30
<i>TE-TTR</i>	0.55	0.51	0.68	0.69
<i>TE-RTS/R</i>	0.10	0.11	0.67	0.51

Notes: 1. Pearson represents the Pearson correlation coefficient.

2. Spearman represents the Spearman rank-order correlation coefficient.