Economic Growth, Fiscal Inequality and Fiscal Decentralization

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Abstract

This paper investigates the impact of inequality in geographic distribution of fiscal resources on regional economic growth under fiscal decentralization policy in the context of China's experience, using panel data for 28 provinces over the period 1987–2010. In the recent past, the structure of decentralized government in China has undergone two significant fiscal reforms: "fiscal contract responsibility system" (FRS) in 1985-1993, and "Tax Sharing System" (TSS) in 1994. I find that there are different impacts of overall fiscal inequality on economic growth pre- and post-1994. Second, I show that the fiscal decentralization could improve regional growth in China. Finally, I examine the impact of extra-budgetary funds on reduction of the gaps between economic growth of rich and poor provinces.

1 Introduction

Recent research has investigated the effect of fiscal decentralization on growth and efficient governance. The central government of China undertook a series of fiscal reforms affecting the decentralization after the Chinese economic reform in 1978,[1] which led to the transition to a market economy.

It is widely accepted in China that some of regions have development priority. The relationship between economic growth and income inequality[2] has been discussed in previous literature, but the effect of the inequality in geographic distribution of fiscal resources is underdeveloped. Because the transition to a market economy in China started late, the allocation of resources is still closely related to the behavior of different levels of governments, which makes China a good country to study.

The previous theoretical research emphasized the welfare gains from fiscal decentralization, since the central government which has imperfect information can't provide the public goods to meet the local tastes and conditions (Oates, 1972). In addition, the concept that federal agency may have their own self-interested motives is not new to the literature. Niskanen (1971) and Niskanen (1994) develop a budget-hyphen maximising model that the typical bureaucrat has personal preferences among the outcomes of the possible actions, and to choose the action within the possible set that he most prefers.

[1] The purpose of the reform substantially increased the role of market mechanisms in the system by reducing central economic planning.

[2] Income inequality is defined as across the population rather than across regions.

Weingast (2014) thinks that in the political perspective, political competition among local governments under decentralized system could limit the Leviathan nature of a central government, which could bring more benefits for economic development of regions. However, decentralization also provides more opportunities for corruption. (Fisman and Gatti, 2002).

The empirical literature mainly focuses more on the impact of fiscal decentralization on economic growth, fiscal disparity[3] and inequality in the distribution of income across regions. With respect to economic growth, the sign and magnitude of the impact of fiscal decentralization is ambiguous. Zhang and Zou (1998), using provincial panel data during 1978-1992 periods, find a negative association of economic growth with fiscal decentralization. Jin and Zou (2005) find that provincial economic growth is ambiguously related to fiscal decentralization, the sign depends on the measure of fiscal decentralization by expenditure or revenue.

With respect to fiscal disparity, Zhang (2006) investigates that fiscal decentralization could prompt the economic growth, but also lead to fiscal disparity. Finally, the fiscal decentralization could increase different types of inequality. Liu et al. (2017) find that while fiscal decentralization at the sub-provincial level in China leads to larger intra-provincial inequality, fiscal equalization efforts performed by provincial governments tend to mitigate the detrimental effect of fiscal decentralization on intra-provincial inequality.

[3]Fiscal disparity refers to the differences of fiscal revenues across regions. Tsui (2005) discusses fiscal disparity in China

Qiao et al. (2008) find that there are tradeoffs between economic growth and fiscal equality under decentralized policy.

This paper offers a new perspective on fiscal inequality and fiscal decentralization by exploring a variety of effects on economic growth during two periods (1987-1993 and 1994-2010). Furthermore, this paper also examines the performance of fiscal reform in 1994, and the impact of budgetary funds on economic growth and fiscal disparity in 1987-2010. The rest of paper is organized as follows. Section 2 offers a brief review about the economic and political background before and after the 1994 tax reform. Section 3 presents the empirical analysis with main results. Section 5 concludes the paper.

2 Fiscal Decentralization in China

The central control system dominated the first 30 years of the People's Republic of China (1949-1978). Tax collections were delegated to local government, because the tax revenues came mainly from profits of state-owned companies which are easily monitored at the local level. Since economic reform in 1978, fiscal decentralization in China has gradually become very important, since the foundation of the previous fiscal system (based on SOEs) was dramatically changed.[4] Although China still remains a centralized political system (Zhang, 2006), the structure of governance currently has the

[4]In the previous fiscal system, profits from SOEs accounted for nearly half of total government revenues and the revenue of local government were budgeted by central government. Since 1978, the SOEs were challenged by enterprises with various forms of ownership.

obvious features of fiscal decentralization, at least under traditional measurement. The process of fiscal decentralization in China has been difficult and challenging, due to a lack of experience in fiscal reform.

This paper studies two main fiscal reforms in China. The first reform started in 1985 and was called "fiscal contract responsibility system" (FRS), and second fiscal reform was termed as "Tax Sharing System" (TSS or "*fen-shuizhi*") in 1994.

In 1980, China implemented the policy of "eating from separate kitchens",[5] aiming to local and central government budgets and providing local governments with more incentives to collect tax revenues. During 1978-1987, the State Council designed a revenue-sharing arrangement whereby the local government served as the agent of central government and took responsibility for revenue collection.[6] Between 1988-1993, the "fiscal contracting system" was formally implemented. Under this system, the central government allowed the local government to retain a fixed part (fixed amount or fixed rate) of tax revenues.

Although the aim of the reform was to raise regional growth and improve the functioning of the fiscal system, there were still some problems with the fiscal reform in the late 80s and early 90s. An important problem was a con-

[5]The central and local governments have their own fiscal budgets

[6]There were three basic types of revenues under the system: central-fixed revenues, local-fixed revenues, and shared revenues. During the period 1980-84, about 80 percent of shared revenues were remitted to the central government and 20 percent were retained by local governments. Most tax revenues were collected by local governments. (Shen et al., 2012)

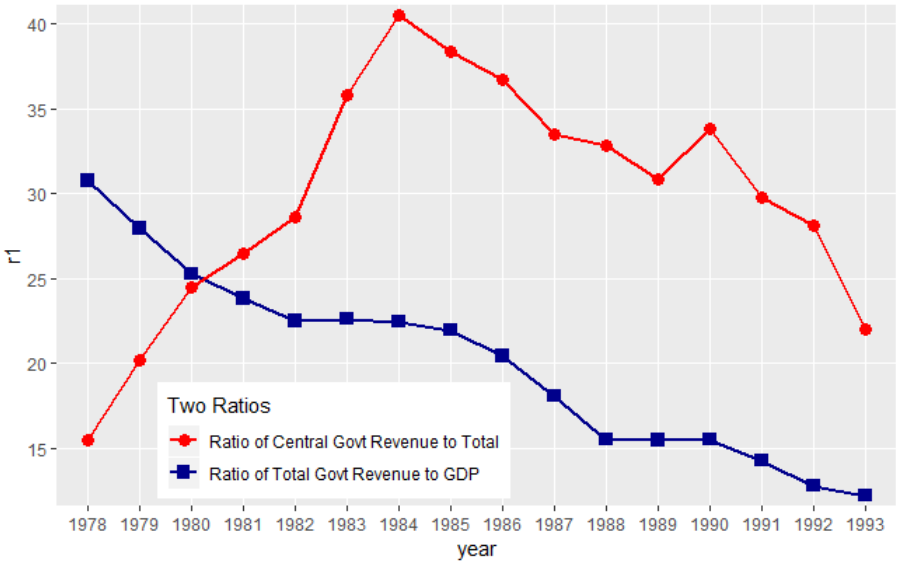
tinuing decline of "two ratios" (total budgetary revenue to GDP, and central to total budgetary revenue) as shown in (Ding et al., 2019) in Figure 2. Due to a vague assignment of revenue, local governments can retain more tax revenues to reduce the share of central government revenue without any proper central supervision. The central government's share of revenue fell from 38% in 1985 to only 22% in 1993. Local governments obtained more revenues from the fiscal contract system, particularly provinces that could contribute more to the tax revenue of central government. In addition, the system was the result of political negotiation between the central and local governments. The rich provinces in the East-coastal region could accumulate substantial revenues by retaining more tax revenues within the province, while the central government was not capable of eliminating the fiscal disparity between the rich and poor provinces during this period.

Realizing the shortcomings of FRS, the TSS in 1994 created a new framework of fiscal relations between the central and local governments. It is currently considered the most indispensable and significant institutional reform of intergovernmental relations since 1978.

The 1994 fiscal reform implemented a system with a specific tax assignment to replace the previous contract system. The tax-sharing reform of 1994 explicitly defined taxes as central taxes, shared taxes and local taxes. Table 1 summarizes the theoretical tax assignment in TSS.[7] The taxes main-

[7] Table 1 shows the theoretical tax assignment, the real tax assignment always has some differences.

Figure 1: The Two Ratios, 1978-1993



taining national objectives (like tariffs) are assigned as central tax; the taxes that are relevant to development of the economy are assigned as shared tax, (such as value added tax, business tax, etc.); the taxes that are suitable to be collected and freely administrated by local government are assigned to local tax.

The key of TSS is introducing the Value Added Tax (VAT) to replace the turnover-based product tax. Revenue are split into National Tax Services (NTSs) and Local Tax Services (LTSs). NTSs were organized on the basis of divisions in all provinces to collect central taxes and shared taxes. LTSs are separated to collect local taxes. Even if TSS seems to be a process of recentralization, the TSS has a simple and transparent tax assignment and eliminates the fiscal problems that FRS has.

Table 1: Tax Assignment

Taxes	Central(%)	Local(%)
Central Tax		
Tariffs	100	0
Consumption Tax	100	0
Shared Tax		
VAT	75	25
Business Tax	3	97
Stamp Tax on Security Exchange	97	3
Personal Income Tax	60	40
Company Income Tax	60	40
Local Tax		
Resource Tax	0	100
Urban Maintenance and Development Tax	0	100
Urban Land Using Tax	0	100
Agriculture and Related Tax	0	100
Tax on Contracts	0	100
Tax on the Use of Arable Land	0	100
Vehicle Purchasing Tax	0	100
Other Local Taxes	0	100

Source: Shen (2008)

On the expenditure side, the 1994 reform almost didn't change the assignment of responsibilities of local governments. Therefore, the local governments facing the decline of their own tax revenues has unchanged responsibility to deliver most public goods and services (See Figure 2), the development of the local economy, and the operation of various institutions. The poorer regions didn't have enough budget revenues from tax and faced a deficit. On the other hand, the richer regions had higher budgetary revenues from tax relative to poorer regions, but they also had more public projects that needed to be undertaken. Given that the budgetary revenue of local governments couldn't support local government spending, the transfer system and extra-budgetary funds[8] became the dominant source of the revenue of local governments. Moreover, after the 1994 fiscal reform, inequality in the geographical distribution of fiscal resources across provinces increased (See Figure 3).[9]

This paper first examines the impact of fiscal decentralization on economic growth across provinces. Several researchers have attempted to test the relationship between fiscal decentralization and economic growth with

[8]The extra-budgetary funds refers to public resources and government transactions that are not included in the annual budget or are not subject to the same general level of reporting, regulation, or audit as other public finance items. The extra-budgetary funds have been collected in accordance with the statistical reporting scheme since 1982. Since Jan 1st, 2011, management of extra budgetary funds is incorporated into management of budgetary funds.

[9]Figure 3 shows that the dispersion of local expenditure per capita across provinces still increases after 1994 fiscal reform. Comparing with FRS, the fiscal inequality across provinces are determined by differences among variety of fiscal revenues of local governments, rather than political negotiation between central government and local government.

Figure 2: SLET and SLRT, 1978-2010

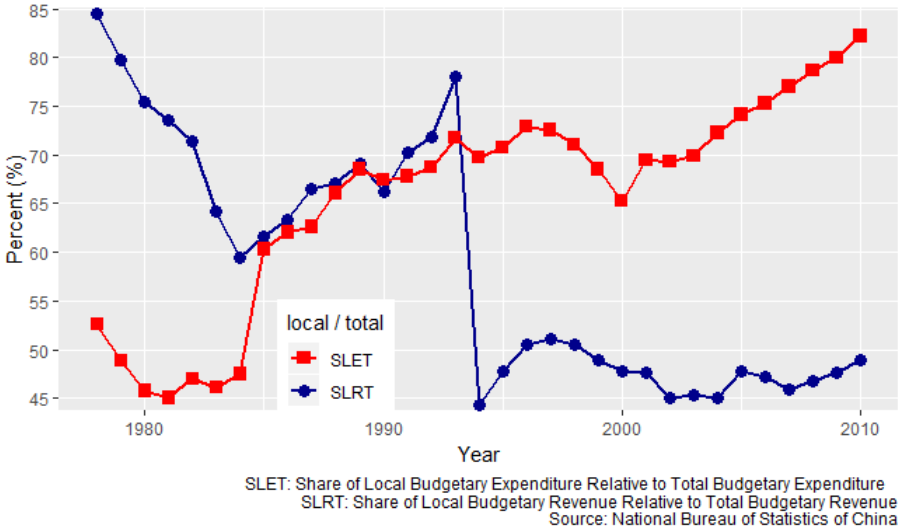
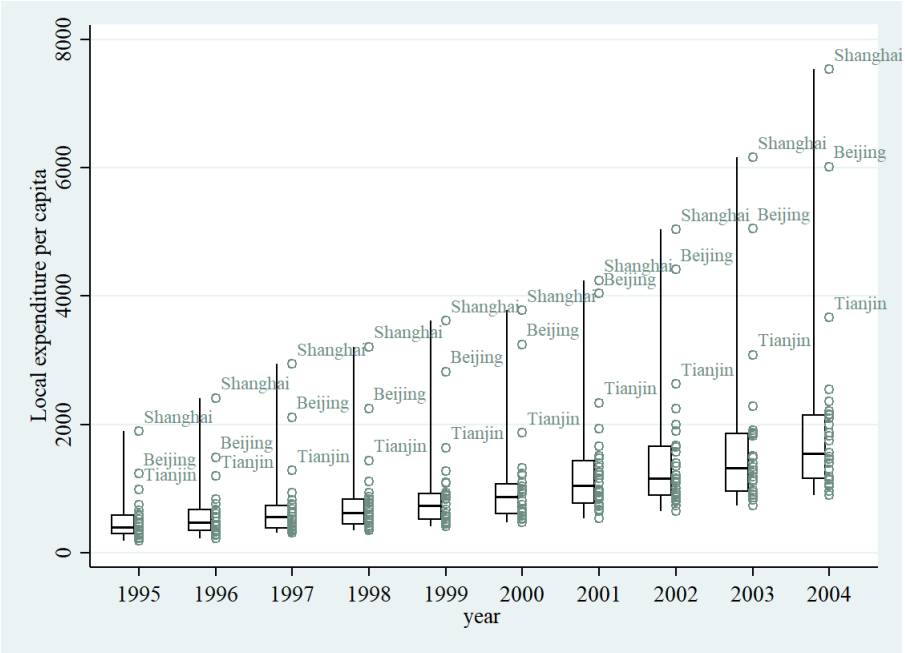
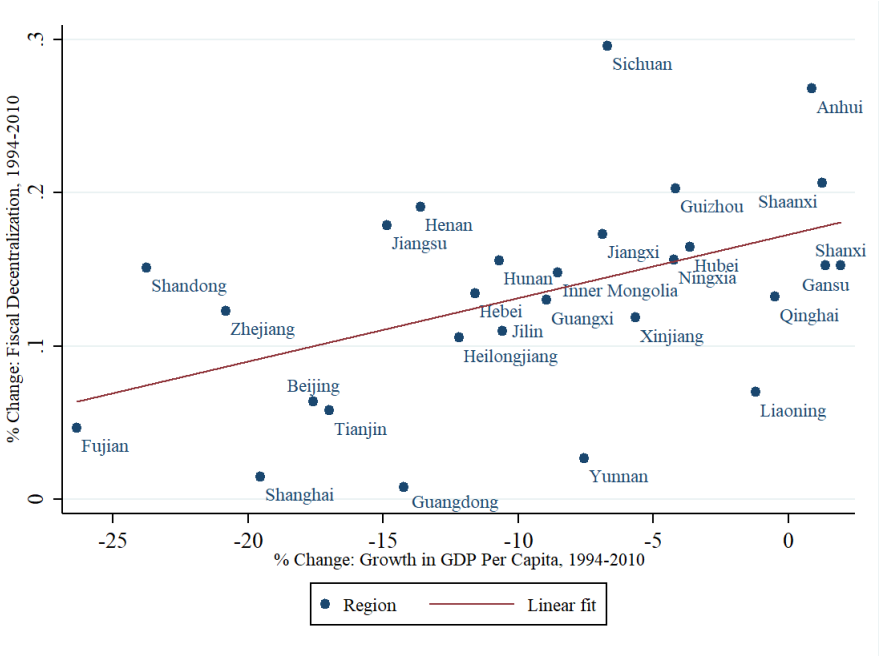


Figure 3: Dispersion of local expenditure per capita, 1995-2004



mixed results and they probably have a non-linear relationship.[10] After the 1994 fiscal reform, there is a positive correlation between fiscal decentralization and economic growth in Figure 4.[11] Second, this paper investigates the impact of fiscal inequality on regional economic growth under decentralized policy, and how the 1994 fiscal reform affects economic growth. Finally, this paper also examines the role of extra-budgetary funds in affecting economic growth and eliminating fiscal inequality in China.[12]

Figure 4: Scatterplot of % Fiscal Decentralization against Growth in GDP per capita, 1994-2010



[10] Zhang and Zou (1998), Xie et al. (1999), Lin and Liu (2000), Thiessen (2000), Martinez-Vazquez and McNab (2003), Thornton (2007) and Baskaran and Feld (2013) have different results from variety of countries and measurements of fiscal decentralization

[11] Figure 4 presents the positive relationship in the long run between percentage change of fiscal decentralization (See Equation (1)) and percentage change in growth of real GDP per capita between 1994 and 2010 across provinces.

[12] The extra-budgetary funds are flexible for local government to adjust fiscal resources.

3 Econometric strategy

3.1 Econometric specification

In this section, I discuss the empirical strategy with the objective of testing the impacts of fiscal inequality and fiscal decentralization on economic growth, alternatively using fixed effect and random effect estimation approach. Because the Hausman test reject the random effect,[13] I estimate a standard fixed effects model of the form:

$$\begin{aligned} Y_{it} =& \beta_0 + \beta_1 FD_{it} + \beta_2 D_{94} + \beta_3 IE_t + \beta_4 IE_t * D_{94} \\ &+ \beta_5 FD_{it} * D_{94} + \beta_6 Capital_{it} + \beta_t Labor_{it} + \mu_i + \nu_{it} \end{aligned} \tag{1}$$

where i represents province and t denotes year. The dependent variable Y_{it} is growth rate based on provincial-data level; FD_{it} is the fiscal decentralization indicator of a province; IE_{it} is a proxy of fiscal inequality; D_{94} is a dummy variable for the 1994 fiscal reform; $IE_t * D_{94}$ and $FD_{it} * D_{94}$ respectively are the interaction terms between each two variables; μ_i is provincial fixed effect and ν_{it} is idiosyncratic error.[14]

In order to test whether fiscal decentralization is exogenous, I use the augmented regression test[15] and assume that some variables could affect the

[13] Hausman test basically tests whether the unique errors are correlated with the regressors. The null hypothesis is they are not. P-value is 0.0026, it rejects the null hypothesis and I should use fixed effect in the model

[14] See Section 3.2 for detailed definitions of economic growth, fiscal decentralization and fiscal inequality.

[15] It is also called Durbin–Wu–Hausman test, or DWH test for short. It can easily be formed by including the residuals of each endogenous right-hand side variable, as a

fiscal decentralization including fiscal decentralization in the previous year, extra-budgetary funds, and all year dummies. The DWH test cannot reject the hypothesis of exogenous fiscal decentralization in Equation (1).[16] In addition, we could use the similar approach to test the validity of the exogenous tax rate.

3.2 Key variables of interest

In Equation (1), I use "economic growth" as the dependent variable.[17] Fiscal inequality across provinces and fiscal decentralization are two main regressors of interest in the empirical model. I introduce both fiscal decentralization and the square of fiscal decentralization to allow for a non-linear relationship between economic growth and fiscal decentralization.[18] Fiscal inequality captures the distribution of fiscal resources across provinces. Under FRS, the rich provinces with high political negotiation power could retain more fiscal revenues within their own province. After the 1994 fiscal reform, both rich and poor provinces shared a fixed amount of tax with the central government, but both of them could use extra-budgetary funds to support their public investment. Thus, the inequality in the distribution of fiscal resources under the two different fiscal systems probably have different impacts on the

function of all exogenous variables. $z = c_0 + c_1 * x_1 + c_2 * x_2 + \epsilon_1$. Then get the residuals, $y = b_0 + b_1 * z + b_2 * x3 + b_3 * z_{res} + \epsilon_2$. If the b_3 is statistically significant, OLS is not consistent.

[16] The p-value is larger than 0,05, thus it fails to reject the null hypothesis.

[17] The provincial growth rate of real GDP per capita.

[18] Thiessen (2000) finds that the possibility of a non-linear inverted U-shaped relationship for OECD countries between fiscal decentralization and economic growth

economic growth.

China's fiscal decentralization has occurred on both the revenue and expenditure sides. I choose the expenditure side as the measurement of fiscal decentralization, because the revenue side is complicated by a debate about the reallocation between local government and central government. Following Qiao et al. (2008), fiscal decentralization in this paper is expressed as the ratio of provincial government expenditure to the total expenditure in per capita terms, as follows

$$Decentralization_{it} = \frac{\frac{LX_{it}}{POP_{it}}}{\frac{LX_{it}}{POP_{it}} + \frac{CX_t}{POP_t}} \tag{2}$$

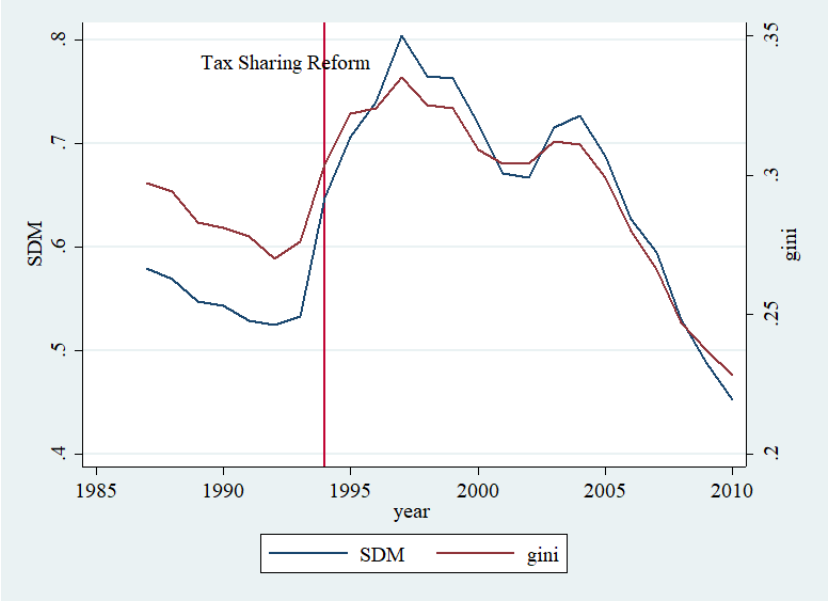
Where LX_{it} represents local government expenditure for province i in year t, CX_t represents central government expenditure in year t, POP_{it} represents population for province i in year t and POP_t represents the total population of China in year t. According to this expression of fiscal decentralization, each province in China experiences a different amount of fiscal decentralization during sample period. In addition, this measure better captures the allocation of fiscal resources between central government and local government on the expenditure side.

I consider three individual-invariant measures of inequality of fiscal resources across province.[19] The first is the standard deviation of provincial

[19]The inequality of fiscal resources across provinces should capture the total distribution of local government expenditure per capita, therefore these three measurements of inequality are same across provinces in same year.

expenditure per capita. The second is the ratio of the standard deviation to the mean of provincial government expenditure. The third is the Gini coefficient of provincial government expenditure.[20] Figure 5 shows that the last two measurements of fiscal inequality during sample period. These variables are intended to capture the effect of a change in the inequality of geographically fiscal resources on economic growth.

Figure 5: SDM and Gini, 1987-2010



Besides fiscal decentralization and inequality of fiscal resources, I introduce capital and labor as two basic control variables driving economic growth.[21] Moreover, I include the tax rate at the provincial level to approximate the allocations between public and private sectors. In addition, I use

[20] Provincial expenditure per capita in these three measurements is $\frac{LX_{it}}{POP_{it}}$

[21] Many papers about links between fiscal decentralization and economic growth employ Barro (1990) endogenous growth. (for example, Zhang and Zou (1998))

a time dummy variable "dum94d" denoted by D_{94} in econometric model for dataset before 1994 set to 0 and after 1994 set to 1, to distinguish the effects of the 1994 tax sharing fiscal reform on economic growth.

In summary, the definitions of all variables are summarized in Table 2.

Table 2: Data descriptive statistics

Variable	Definition
Growth	Percent growth rate of real GDP per capita
Decentralization	Per capita provincial fiscal expenditure as a percentage of total per capita fiscal expenditure, which is the sum of per capita central fiscal expenditure and per capita provincial expenditure.
Inequality	(1) Standard deviation of local expenditure per capita. (2) The ratio of the standard deviation in (1) to the average of local expenditure per capita. (3) Gini coefficient of local expenditure per capita.
Tax	Tax rate: provincial total tax revenue as a percentage of total provincial GDP
Extra Budget	The ratio of extra-budgetary expenditure to budgetary expenditure
Labor	Growth rate of labor
Capital	Growth rate of capital investment

3.3 Data

Throughout my empirical analysis, the basic unit of observation is Chinese jurisdictions at the provincial level.[22] The sample includes 28 of the

[22]These jurisdictions at provincial level includes 23 provinces, five autonomous regions, four direct-controlled municipalities (Beijing, Tianjin, Shanghai, and Chongqing), and two the special administrative regions of Hong Kong and Macau. For convenience, these jurisdictions are called as "province" in this paper.

31 provinces, Autonomous Regions, and Directly Administered Municipalities over 1987-2010.[23] The Hainan province is combined with Guangdong province and the Municipality of Chongqing is combined into Sichuan Province.[24] Due to the lack of data, Tibet will be totally excluded from the dataset. Table 3 provides summary statistics for the outcome variables and the main independent variables of interest.

Table 3: Data descriptive statistics

Variable	Mean	Standard deviation	Median	Min	Max
Growth	15.88	7.60	14.88	-1.52	46.03
Decentralization	0.72	0.10	0.73	0.49	0.93
Decentralizationsq	0.53	0.14	0.53	0.24	0.87
Tax	7.33	3.38	6.42	2.84	20.90
Taxsq	65.18	66.72	41.24	8.06	436.80
Labor	1.80	2.64	1.64	-11.06	24.98
Capital	21.71	15.47	20.52	-22.91	97.16
Extra budget	0.38	0.29	0.30	0.01	1.55
sd	952.53	873.31	655.50	103.33	2990.54
sdm	0.63	0.10	0.64	0.45	0.80
Gini	0.29	0.03	0.30	0.23	0.34

Most of data are taken from various issues of China Statistical Yearbook, which provides the most detailed on provincial public finance (local government expenditure, different types of tax, extra-budget funds, etc.) and some basic economic variables (real GDP, Population, Investment in fixed assets), but these sources of data don't cover most of provincial data before 1990. For

[23]These 31 jurisdictions exclude Hong Kong, Macau and Taiwan

[24]In 1998, Hainan separated from Guangdong as province. Since September 1996, Chongqing became the direct-controlled municipalities

this reason, I extend the data on all variables before 1990 using Compilation of Historical Statistics for Each Province, Autonomous Region, and the Directly Administered Municipalities 1949-1989. Extra-budgetary expenditure data are taken from Financial and Economic Statistical References, Fiscal Statistics 1986-1991 and various issues of the China Statistical Yearbook.

4 Empirical findings

4.1 Baseline results

Table 4 presents the main results of the fixed and random effects estimation of the baseline specification for three different proxies of fiscal inequality (as defined in Table 2).[25] Columns (1) (3) and (5) include provincial fixed effects. The three measures of fiscal inequality are: standard deviation of local government expenditure is in columns (1) and (2), standard deviation over mean of local government expenditure in in columns (3) and (4) and Gini coefficient of local government expenditure is in columns (5) and (6).

The results are summarized as follows: First, the impact of fiscal inequality on economic growth are different pre- and post-1994 fiscal reform . Before 1994 fiscal reform, the impact of fiscal inequality measured by three different proxies on growth is statistically significant and positive. To interpret the magnitude of the estimates, note that standard deviation[26] has a mean near

[25] The three proxies of fiscal inequality including sd, sdm and gini are defined in Table 2.
[26] Standard deviation of local expenditure per capita

953, so that estimate in column (1) implies that the increase of 100 (10.5%)[27] in sd causes the increase of 4.6% in economic growth. The average of sdm[28]

Table 4: FE and RE estimates of fiscal inequality on economic growth

Dependent variable: Growth rate	(1) FE	(2) RE	(3) FE	(4) RE	(5) FE	(6) RE
sd	0.046***	0.050***				
	(0.009)	(0.009)				
sdm			97.728***	92.901***		
			(10.922)	(11.132)		
gini					332.718***	312.509***
					(37.917)	(37.963)
Decentralization	23.414***	0.944	29.135***	4.240	37.206***	7.179**
	(5.453)	(3.206)	(5.577)	(2.906)	(5.862)	(3.201)
Tax	-0.472***	-0.390***	-0.357***	-0.369***	-0.556***	-0.489***
	(0.144)	(0.092)	(0.137)	(0.096)	(0.142)	(0.102)
Labor	0.083	0.079	0.073	0.073	0.076	0.066
	(0.110)	(0.114)	(0.108)	(0.112)	(0.105)	(0.110)
Capital	0.198***	0.208***	0.230***	0.242***	0.240***	0.255***
	(0.020)	(0.019)	(0.019)	(0.018)	(0.020)	(0.019)
dum94d	-7.489**	-6.266**	37.880***	43.055***	71.348***	77.910***
	(3.036)	(3.035)	(6.909)	(7.721)	(10.862)	(11.783)
Inequality* dum94d	-0.046***	-0.050***	-90.767***	-95.251***	-298.114***	-311.707***
	(0.009)	(0.009)	(11.220)	(11.768)	(37.689)	(38.967)
Decentralization* dum94d	12.348***	11.364***	8.2489**	7.285**	8.515**	7.338**
	(3.640)	(3.785)	(3.227)	(3.560)	(3.237)	(3.528)
R-squared	0.3443	0.4008	0.3645	0.441	0.3454	0.4390
Number of observations	672	672	672	672	672	672

Note: The dependent variable is growth rate that is indicated on the top of column of variables. In columns (1)-(6), measures of fiscal inequality are sd (standard deviation of local government expenditure), sdm (the ratio of standard deviation over mean of local government expenditure) and gini (Gini coefficient of local government expenditure) respectively. The estimation approach is indicated on the top of each column. Inequality*dum94d and Decentralization*dum94d are interaction terms between two variables. Standard errors are clustered at the province level for all regressions.
*significance at 10% level; **significance at 5% level; ***significance at 1% level

and gini[29] respectively are 0.63 and 0.29, so column (3) implies that increase

[27] the average of sd is about 953. $(\frac{953+100}{953} - 1) * 100\% = 10.5\%$

[28] sdm: ratio of standard deviation to mean of local expenditure per capita.

[29] gini: Gini coefficient of local expenditure per capita.

of 0.1 (15.86%)[30] in sdm causes the increase of 9.77% in economic growth and column (5) implies that increase of 0.01 (3.45%)[31] in gini causes the increase of 3.33% in economic growth. These results of estimation provide statistical support to the theoretical model (Qiao et al., 2008) that the lower equality in the distribution of fiscal resources could lead to higher regional growth before the 1994 tax share reform, because the richer provinces retaining more revenues within own province and use these fiscal resources to develop the economy. However, after 1994 fiscal reform, the impact of fiscal inequality on economic growth is close to zero for all of three proxies of fiscal inequality[32]. Therefore, fiscal inequality has a positive effect on economic growth during pre-1994 fiscal reform, but not after 1994 fiscal reform.

Second, fiscal decentralization has a positive and statistically significant effect on economic growth rate of per capita GDP during pre-and post-1994 fiscal reform, which contrasts the results obtained by Zhang and Zou (1998).[33] It should be noted that Zhang and Zou (1998) use a different econometric specification and cover different time periods. Column (1) of Table 4 indicates that 1% increase in fiscal decentralization leads to a 0.234% increase

[30] $(\frac{0.63+0.1}{0.63} - 1) * 100\% = 15.87\%$

[31] $(\frac{0.29+0.01}{0.29} - 1) * 100\% = 3.45\%$

[32] In econometric model, $\beta_0 Inequality_{it} + \beta_1 Inequality_{it} * dum94d$. During pre-1994 fiscal reform, impact of inequality is $\beta_0 > 0$. During post-1994 fiscal reform, impact of inequality is $\beta_0 + \beta_1 \approx 0$

[33] They find that a higher degree of fiscal decentralization of government spending is associated with lower provincial economic growth in 1978–1992. The measurement of fiscal decentralization in this paper is ratio of provincial budgetary spending to central budgetary spending. Although this paper also considered about terms per capita and extra-budgetary expenditure, they are different from my measurements of fiscal decentralization as well

in economic growth in the sample of pre-reform years, but leads to a 0.357% increase in economic growth after 1994 fiscal reform.[34] The positive relationship is consistent with the logic of China's fiscal reform that fiscal decentralization could improve economic growth. However, the estimates indicate that the curve didn't attain a level of fiscal decentralization that maximizes economic growth.[35]

Third, the level of the tax rate has a negative effect on economic growth. In column (1), an increase of 10% in the tax rate causes a decrease of 4.72% in economic growth. Too many resources shifted from the private sector to the public sector could be detrimental to the regional growth. As expected, the coefficient of the capital stock is statistically significant and positive. Unexpectedly the coefficient of the labor force is not significant but still positive. These results are also consistent with Zhang and Zou (1998) based on the theory of neoclassical growth model.

A series of regression results are reported in columns (3)-(6) to test whether different measures of fiscal inequality could affect the results. In columns (3) and (4), I use the standard deviation over mean for local expenditure per capita to represent inequality. Although the coefficient of fiscal inequality becomes larger, the result is maintained that fiscal inequality has a positive impact on the regional growth rate before 1994, while after the

[34] That is, 0.357%=0.234%+0.123%.

[35] Because non-linear inverted U-shaped between the fiscal decentralization and economic growth shows existence of optimum level of fiscal decentralization that China's economy didn't reach in the sample of period

1994 reform the impact is close to zero. Coefficients of other variables have the same signs. In columns (5) and (6), I obtained the same results using the Gini coefficient of local expenditure per capita to measure fiscal inequality.

In summary, the overall result of China's decentralization policy is higher but not optimal economic growth. As more fiscal resources are shifted from poorer to richer regions, economic growth is improved before 1994 but not after 1994.[36]

4.2 Instrument Variables

As Martinez-Vazquez and McNab (2003) argue, the impact of fiscal inequality on economic growth probably is not precise, due to the exclusion of some control variables resulting in omitted variable biases. This is because fiscal inequality is determined by some variables across provincial governments which also relate to economic development and growth.

Previous studies about fiscal decentralization in China didn't pay attention to the role of extra-budgetary funds. Zhang and Zou (1998) treated the extra-budgetary funds the same as budgetary funds. Lin and Liu (2000) completely ignored them. Following Qiao et al. (2008) concerning the potential endogenous problem of fiscal inequality, I consider using the ratio of extra-budgetary expenditure to budgetary expenditure as an instrument to control for informal fiscal channels across provinces.[37]

[36]From my estimates in column (1), the impact of fiscal inequality on growth yields: 0.046-0.046*dum94d. It is close to zero after 1994.

[37]Extra-budgetary funds could provide more flexible choice in the use of the funds,

The idea of instruments exploits variation of fiscal resources from informal channels of the extra-budgetary funds that are uncorrelated with unobserved determinants of economic growth. Wong (2000) points out that extra-budgetary funds are a category of budgetary funds that local governments are allowed to set aside from budgetary allocations, so extra-budgetary funds provide different types of local expenditure that provincial governments need. The existence of extra-budgetary funds could worsen equality because the richer provinces probably have more enterprises, which bring more fiscal resources in extra-budgetary and budgetary funds.[38] On the other hand, the extra-budgetary funds give more flexibility to poorer provinces that could reduce the differences with richer provinces.[39]

To test the validity of the instruments, I report F- statistics of first stage regression for different specifications in Table 5. The F-statistics in all specifications are far more than 10, so there is not a problem of weak instruments.[40]

The 2SLS estimates of the impact of fiscal inequality on economic growth before 1994 fiscal reform are similar to OLS estimates. An increase of 100 (10.5%) in sd causes an increase of 5.57% in economic growth that is larger than the 4.6% in OLS estimation. After the 1994 fiscal reform, the impact of fiscal inequality becomes negative but is still close to zero, which means that

because they usually lacks specificity and detailed criteria (Qiao et al., 2008)

[38]Correlation coefficient between GDP per capita and local expenditure per capita is more than 0.9, so the rich provinces refer to the provinces have both of them.

[39]The extra-budgetary funds include Administrative fees, revenues of government fund, revenues of state-owned enterprises and so on.

[40]The bigger F-statistic is better. F-statistic above 10 to 20 are considered relatively safe.

Table 5: 2SLS estimates of effect of fiscal inequality (sd) on growth

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Growth rate	FE	FE	FE	RE	RE
sd	0.0557***	0.0651***	0.0636***	0.0610***	0.0672***
	(0.0172)	(0.0166)	(0..0176)	(0.0179)	(0.0176)
Decentralization	23.6411***	27.3668***	19.1458***	-0.7546	8.5805***
	(6.2035)	(5.9133)	(7.4141)	(3.8102)	(3.1130)
Tax	-0.3677	-0.3341	-1.0380***	-0.3172**	-0.3048**
	(0.2281)	(0.2195)	(0.3855)	(0.1435)	(0.1344)
Tax Square			0.0370**		
			(0.0161)		
Labor	0.0885	0.1153	0.1025	0.1158	0.1475
	(0.1134)	(0.1126)	(0.1150)	(0.1184)	(0.1159962)
Capital	0.1963***	0.1871***	0.1927***	0.2204***	0.2093***
	(0.0208)	(0.0201)	(0.0213)	(0.0203)	(0.0204)
dum94d	-6.0275*	4.4490	-8.7518**	-6.2715	5.9288*
	(3.5835)	(3.3679)	(4.2985)	(4.0402)	(3.0631)
Inequality*	-0.0567***	-0.0656***	-0.0645***	-0.0622***	-0.0678***
dum94d	(0.0173)	(0.0167)	(0.0177)	(0.0179)	(0.0176)
Decentralization*	13.3677***		18.6236***	16.7567***	
dum94d	(3.7993)		(4.9293)	(4.220356)	
Instrument (First Stage)	F-Stats	F-Stats	F-Stats		
Extra-budget Funds	120.00	122.14	120.83		
Interaction Term	136.90	139.02	136.78		
R-squared	0.3326	0.3442	0.3343	0.3892	0.3868
Number of observations	672	672	672	672	672

Note: The dependent variable is growth rate that is indicated on the top of column of variables. In columns (1)-(5), fiscal inequality is denoted by sd (standard deviation of local government expenditure). The estimation approach is indicated on the top of each column. Inequality*dum94d and Decentralization*dum94d are interaction terms between two variables. In columns (2) and (5), I only use interaction term between fiscal inequality and the 1994 dummy (Inequality*dum94d). Columns (1) and (4) adds the interaction term between fiscal decentralization and the 1994 dummy. Column (3) adds tax square term. Standard errors are clustered at the province level for all regressions.

*significance at 10% level; **significance at 5% level; ***significance at 1% level

Table 6: 2SLS estimates of effect of fiscal inequality (sdm & gini) on growth

Dependent variable:	(1)	(2)	(3)	(4)
Growth rate	FE	RE	FE	RE
sdm	116.991***	136.382***		
	(37.906)	(40.667)		
gini			544.033***	679.625***
			(190.281)	(238.947)
Decentralization	36.670***	2.530	45.765***	7.713**
	(6.417)	(3.264)	(8.151)	(3.158)
Tax	-0.184	-0.217	-0.318	-0.294*
	(0.276)	(0.164)	(0.262)	(0.178)
Labor	0.089	0.123	0.085	0.116
	(0.112)	(0.122)	(0.107)	(0.118)
Capital	0.240***	0.272***	0.262***	0.307***
	(0.021)	(0.021)	(0.026)	(0.030)
dum94d	40.560**	51.801**	125.881**	165.891**
	(20.149)	(23.282)	(51.827)	(68.541)
Inequality*dum94d	-100.533***	-121.257***	-487.814**	-627.061***
	(35.120)	(39.453)	(178.008)	(233.097)
Decentralization*dum94d	11.243***	13.728***	8.621**	10.689***
	(3.695)	(3.723)	(3.940)	(4.041)
Instrument (First Stage)	F-Stats		F-Stats	
Extra-budget Funds	60.25		49.40	
Interaction Term	869.88		1795.10	
R-squared	0.3022	0.4093	0.2907	0.3785
Number of observations	672	672	672	672

Note: The dependent variable is growth rate that is indicated on the top of column of variables. In columns (1)-(4), measures of fiscal inequality are represented by sdm (the ratio of standard deviation over mean of local government expenditure) and gini (Gini coefficient of local government expenditure) respectively. The estimation approach is indicated on the top of each column. Inequality*dum94d and Decentralization*dum94d are interaction terms between two variables. Standard errors are clustered at the province level for all regressions.
*significance at 10% level; **significance at 5% level; ***significance at 1% level

an increase of 100 (10.5%) in sd causes a decrease of 0.1%.[41] One difference is that the coefficient of the tax rate becomes statistically insignificant but is still negative, and other results are similar to column (1) in Table 4. Column (3) of Table 5 reports a specification with a tax rate square term. The negative and significant coefficient for tax and the positive and significant coefficient for the tax square term indicates a non-linear and negative relationship between economic growth and tax which has a "U" curve shape.[42]

In Table 6, I use two other proxies of fiscal inequality as a robustness check. As expected, most of regression results are consistent with the results in Table 5. The impact of fiscal inequality on the growth rate is close to zero, but it is significant and positive when I change the measurement of fiscal inequality. The impact of fiscal decentralization on economic growth is significantly positive, while the magnitude of the positive impact is larger after 1994 fiscal reform, which also is consistent with the results of estimates in Table 5.

4.3 Effect of extra-budgetary funds

The availability of extra-budgetary could provide more flexible opportunities to adjust fiscal resources by provincial government themselves. For instance, the rich provinces could have a relatively higher ability to raise their own

[41] Impact of fiscal inequality: 0.0557-0.0567*dum94d. It is 0.0557 before 1994 but is 0.001 after 1994.

[42] When the maximum tax rate and minimum tax rate are 2.84% and 20.9%, impact of tax rate on economic growth: $-1.038 * Tax + 0.037 * Tax^2$, respectively are -2.65% and -5.53%, so tax rate has non-linear but still negative effect on economic growth

extra-budgetary to invest local public projects, although they get more revenues from the budgetary side based on the tax assignment after 1994. On the other hand, the poor provinces also could reduce the fiscal inequality to create more extra-budgetary funds. So, the impacts of extra-budgetary on economic growth or fiscal inequality probably are ambiguous before and after the 1994 fiscal reform.

Table 7: Estimates of effect of budgetary expenditure on economic growth

Dependent variable: Growth rate		(1) FE	(2) RE	(3) FE	(4) RE	(5) FE	(6) RE
Decentralization		30.90***	19.45***	34.50***	22.10***	33.31***	19.17***
		(5.251)	(4.014)	(5.151)	(3.930)	(5.339)	(4.133)
Tax		-1.652***	-0.965***	-1.921***	-1.235***	-1.866***	-1.276***
		(0.398)	(0.374)	(0.391)	(0.372)	(0.369)	(0.360)
Tax Square		0.0349*	0.0153	0.0493**	0.0284	0.0461**	0.0315*
		(0.0182)	(0.0172)	(0.0192)	(0.0176)	(0.0177)	(0.0163)
Labor		0.107	0.0928	0.0878	0.0808	0.100	0.0937
		(0.107)	(0.109)	(0.108)	(0.110)	(0.109)	(0.110)
Capital		0.203***	0.223***	0.202***	0.224***	0.203***	0.226***
		(0.0191)	(0.0176)	(0.0194)	(0.0171)	(0.0194)	(0.0165)
Large dummy (Only)	Median	0.213	-1.686				
		(1.084)	(1.151)				
	Mean			-2.655	-3.954***		
				(1.782)	(1.125)		
	Third Quartile					-2.609	-3.426**
						(1.883)	(1.476)
dum94d		-9.279***	-7.220***	-10.36***	-8.523***	-9.685***	-7.726***
		(1.105)	(0.920)	(0.964)	(0.870)	(0.995)	(0.885)
dum94d *Large dummy		0.936	0.466	3.592***	3.031***	2.917**	2.746**
		(1.212)	(1.074)	(1.2390)	(1.171)	(1.275)	(1.150)
R-squared		0.3307	0.3760	0.3490	0.3856	0.3529	0.3806
Number of observations		672	672	672	672	672	672

Note: The dependent variable is growth rate that is indicated on the top of column of variables. In columns (1)-(6), Large dummy (only) that takes the value of 1 for observations for which the budgetary expenditure of provincial government is larger than some threshold, like mean, median and third quartile. Standard errors are clustered at the province level for all regressions.
*significance at 10% level; **significance at 5% level; ***significance at 1% level

I begin by first testing the effect of extra-budgetary funds. Are extra-budgetary funds used to alleviate differences of regional growth between the richer and poorer provinces?I set up a dummy variable, "large dummy

(only)"[43] that takes the value of 1 for observations for which the provincial government expenditure is larger than some threshold.[44] Otherwise, the dummy takes the value of 0. In Table 7, the provincial government expenditure only represents budgetary funds. In Table 8, the provincial government expenditures not only include budgetary expenditure, but also the extra-budgetary expenditure of local government. By comparing the estimates of Tables 7 and 8, I investigate the impact of extra-budgetary funds on economic growth before and after fiscal reform. Based on three different dummy variables (Large Dummy in Tables 7 and 8), I examine how extra-budgetary funds affect economic growth for governments above or below the threshold.

In Table 7, the coefficient of "large dummy" represents a different impact between governments with budgetary expenditure above thresholds and governments with budgetary expenditure below thresholds.[45] In column (4) of Table 7, the coefficient of large dummy indicates that economic growth of "rich" governments is 3.954 percentage points lower than the growth of "poor" governments. In column (6), the coefficient of large dummy indicates that the growth of "rich" governments is 3.426 percentage points lower than the growth of "poor" governments. The coefficients of large dummy are negative but not statistically significant in most other columns of Table 7.

[43] Large dummy (only) refers to budgetary expenditure of local government, excluding extra-budgetary expenditure

[44] Because I consider about the heterogeneous effect of fiscal inequality, three variant of thresholds refer to median, mean and third quartile of budgetary expenditure of local government.

[45] In this section, for convenience, The governments with budgetary expenditure above thresholds are called "rich" province relative to another governments.

Table 8: Estimates of effect of total expenditure on economic growth

Dependent variable: Growth rate		(1) FE	(2) RE	(3) FE	(4) RE	(5) FE	(6) RE
Decentralization		30.06***	13.54***	32.28***	17.00***	30.98***	14.00***
		(5.042)	(3.794)	(5.061)	(3.845)	(5.306)	(4.502)
Tax		-1.778***	-1.098***	-1.940***	-1.258***	-1.699***	-1.127***
		(0.410)	(0.398)	(0.389)	(0.382)	(0.411)	(0.397)
Tax Square		0.0418**	0.0234	0.0490***	0.0296*	0.0396**	0.0252
		(0.0191)	(0.0180)	(0.0176)	(0.0167)	(0.0187)	(0.0176)
Labor		0.0822	0.0871	0.0922	0.0795	0.0944	0.0851
		(0.107)	(0.109)	(0.107)	(0.110)	(0.107)	(0.109)
Capital		0.202***	0.229***	0.206***	0.231***	0.205***	0.229***
		(0.0197)	(0.0167)	(0.0198)	(0.0175)	(0.0194)	(0.0175)
Large dummy (Total)	Median	0.0861	-1.286				
		(1.261)	(1.142)				
	Mean			-1.884	-2.883***		
				(1.493)	(1.086)		
	Third Quartile					-0.970	-1.899
						(1.280)	(1.183)
dum94d		-9.497***	-7.079***	-10.24***	-8.195***	-9.245***	-7.362***
		(1.023)	(0.914)	(1.042)	(0.951)	(1.075)	(0.974)
dum94d *Large dummy		2.353*	1.787	3.619***	3.371***	2.298*	2.668***
		(1.370)	(1.269)	(1.311)	(1.232)	(1.216)	(1.147)
R-squared		0.3277	0.3742	0.3454	0.3815	0.3437	0.3771
Number of observations		672	672	672	672	672	672

Note: The dependent variable is growth rate that is indicated on the top of column of variables. In columns (1)-(6), Large dummy (total) that takes the value of 1 for observations for which the total provincial government expenditure (budgetary expenditure+extra-budgetary expenditure) is larger than some threshold, like mean, median and third quartile. Standard errors are clustered at the province level for all regressions. *significance at 10% level; **significance at 5% level; ***significance at 1% level

After the 1994 fiscal reform, economic growth of "rich" provinces have a huge change relative to "poor" provinces.[46] In columns (4) and (6), the "rich" provinces have a lower growth rate but the difference of economic growth between of them is reduced after 1994 fiscal reform. In columns (3) and (5), the growth rate of rich regions is even slightly higher than the growth rate of poor regions when the provincial fixed effect is included. Therefore, the tax sharing reform in 1994 is better for the development of "rich" provinces. However, the coefficient of the 1994 dummy is significant and negative in all columns, which means that the overall effect of 1994 fiscal reform is negative on the economic growth of China.

Local government expenditures in Table 8 include budgetary and extra-budgetary terms rather than only budgetary expenditure in Table 8.[47] Comparing with differences between coefficients of large dummy in Tables 7 and 8, the "rich" provinces have lower growth but reduce the gap after using extra-budgetary funds, which means that if the central government promises that provincial governments can use the extra-budgetary expenditure, such a policy reduces the gaps between economic growth between them before 1994. After the 1994 fiscal reform, the impact of extra-budgetary expenditure brings much higher economic growth of "rich" provinces relative to "poor" provinces, compared with results that exclude extra-budgetary terms

[46]The difference of economic growth between "rich" and "poor" governments: $\beta_1 + \beta_2 * dum94d$. Before 1994, the difference is β_1. After 1994, the difference is $\beta_1 + \beta_2$.

[47]Large dummy (total) represents the total expenditure of local government that is sum of budgetary expenditure and extra-budgetary expenditure of local government.

in Table 7.

5 Conclusion

In this paper, I estimate that the impacts of fiscal inequality among provinces on their economic growth. The results indicate a significant and positive effect before 1994. After the 1994 fiscal reform, the impact is close to zero. Second, the impact of fiscal decentralization on economic growth is positive and statistically significant, but the magnitude of the impact is larger after 1994. Third, I find that the 1994 fiscal reform slows down the economic growth. Finally, I find that the impact of extra-budgetary funds eliminate the differences in economic growth between the "rich" and "poor" provinces, and the impact of extra-budgetary could bring higher growth rate of "rich" provinces relative to "poor" provinces after the 1994 fiscal reform.

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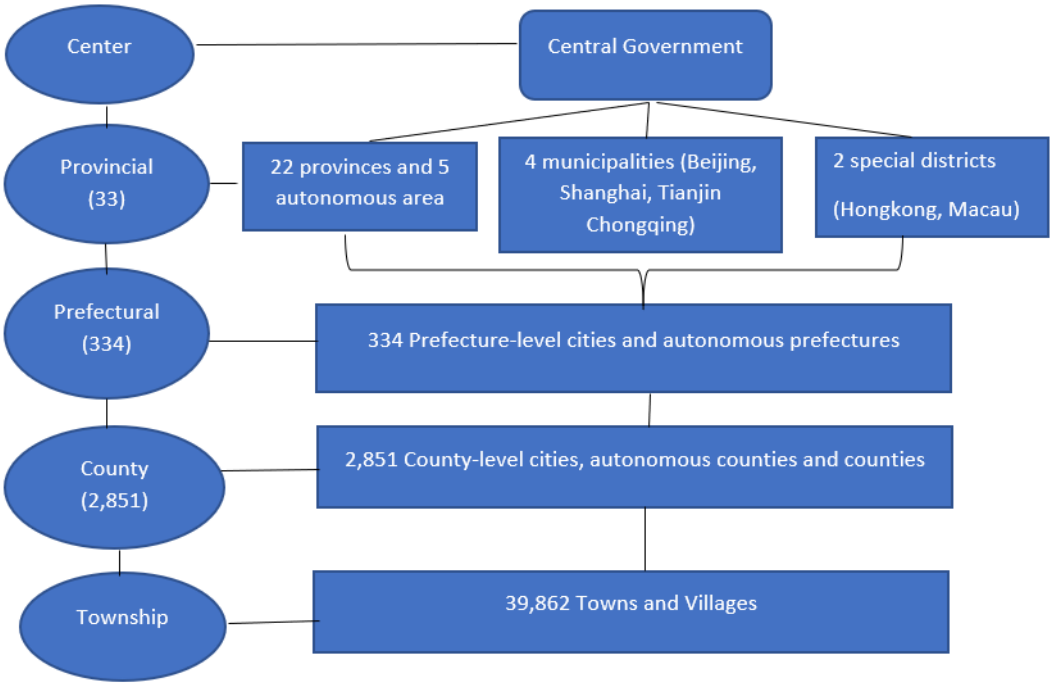
Appendix

A.1 Institutional Background of China

The local government in China is segmented into a four-level hierarchy. China remains a unitary political system. There remains weakness of horizontal accountability of local administrations.

Figure A1: Structure of Chinese Government



Source: China Statistical Yearbook in 2016

A.2 Maps and Figures

In this section, I present maps displaying geographic distribution of real GDP by province in 1994 and 2010 and the geographic distribution of degree of fiscal distribution in 1994 and 2010. The measurement of degree of fiscal distribution is used by the Equation (1).

Figure A2: Real GDP by Province in 1994

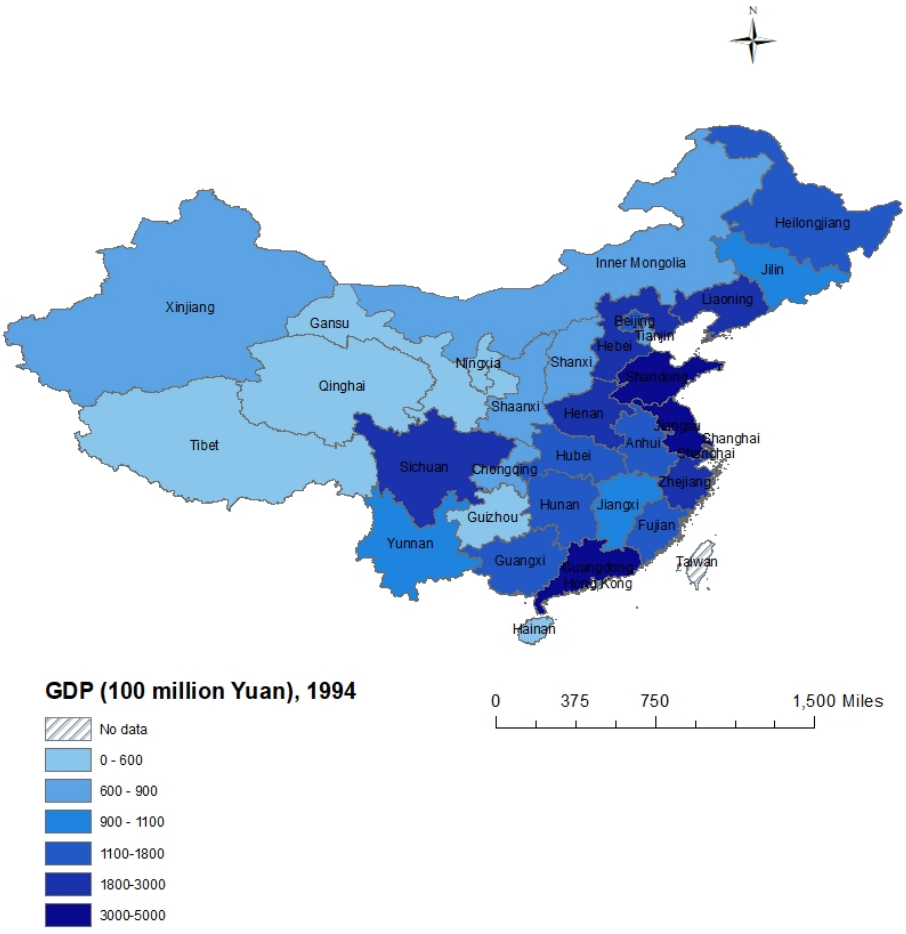


Figure A3: Real GDP by Province in 1994

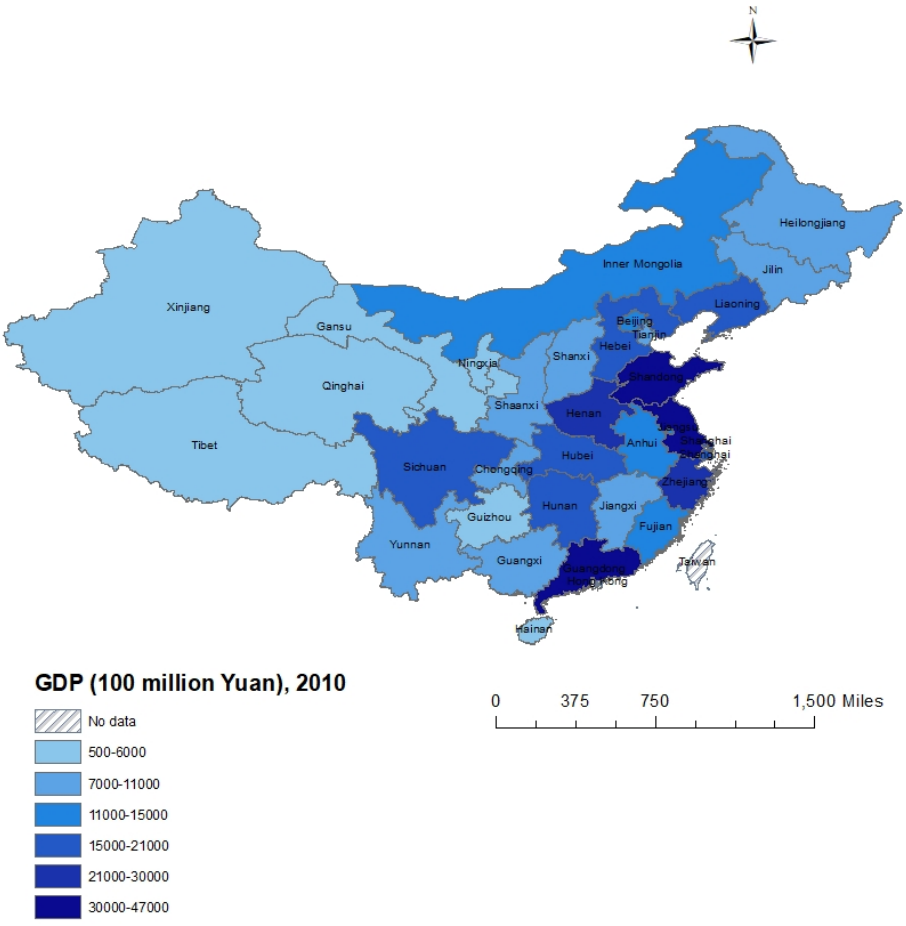


Figure A4: Fiscal Decentralization by Province in 1994

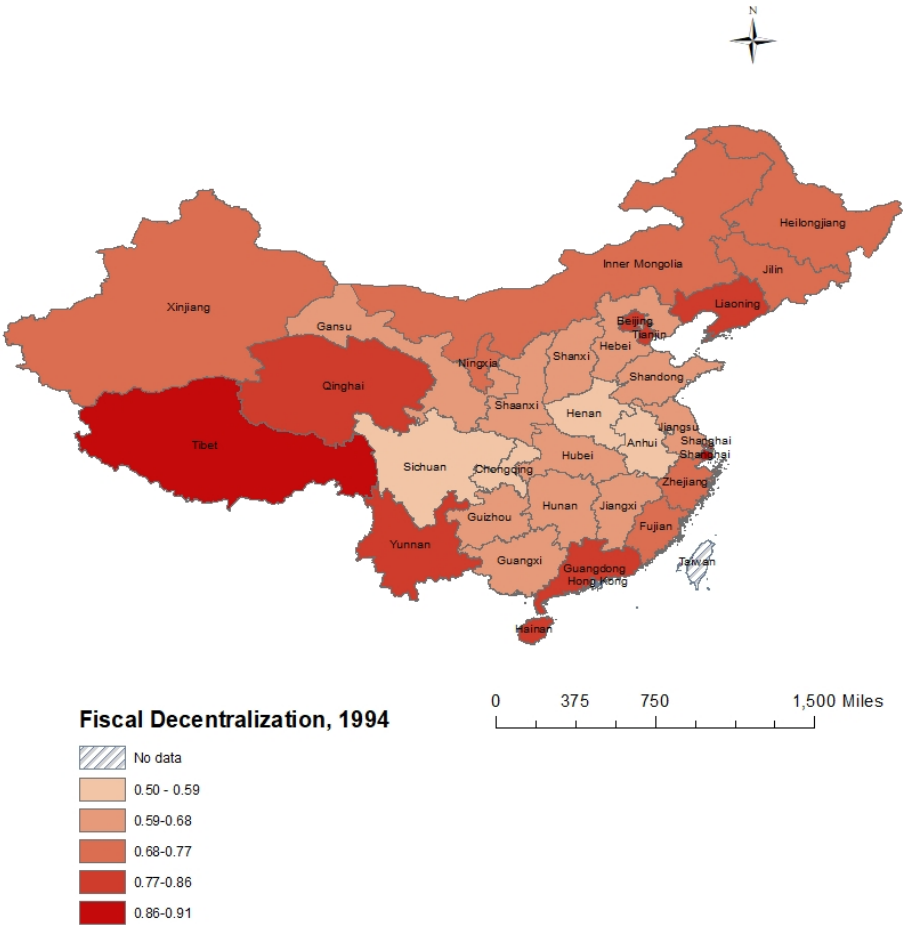


Figure A5: Fiscal Decentralization by Province in 2010