Economic Growth, Fiscal Inequality and Fiscal Decentralization: Evidence from China *

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Abstract

This paper investigates the impact of inequality in the 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: the "Fiscal Responsibility System" (FRS) in 1987-1993, and the "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 fiscal decentralization could improve regional growth in China. Finally, this paper finds that the use of extra-budgetary funds could reduce the economic growth gap between rich and poor provinces.

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1 Introduction

Over the past decade, most developing and transitional countries have either started or intended to embark upon some specific fiscal decentralization initiative.[1] This is because many unitary countries want to pursue a more efficient and streamlined public sector or become disenchanted with the performance of centrally planning policies (Martínez-Vázquez et al., 2017). China also undertook two fiscal reforms affecting decentralization after the Chinese economic reform in 1978.[2] It is generally believed that such fiscal reforms that affect decentralization would promote China's economic development.[3] However, there still has been a debate in the decentralization literature as to whether fiscal decentralization accelerates or retards economic growth. Therefore, what kind of decentralized fiscal system is more suitable for China's economic development becomes particularly important.

Furthermore, it is widely accepted in China that some regions have development priority. The relationship between economic growth and income inequality has been discussed in previous literature, but the effect of the inequality in the geographic distribution of fiscal resources (fiscal inequality) is underdeveloped.[4] 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. In addition, the inequality in the geographical dis-

[1] According to data from Garman et al. (2001), more than 80% of the 75 developing countries analyzed has been undergoing some decentralization of authority by the beginning of the millennium.

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

[3] One of the primary policy objectives of fiscal decentralization is to foster economic growth. As an engine for economic growth, fiscal decentralization has emerged at the forefront of the policy in both developed and developing countries (Martinez-Vazquez and McNab, 2003).

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

tribution of financial resources is also closely related to the fiscal decentralization system. Martinez-Vazquez and McNab (2003) find that unfettered fiscal decentralization could lead to a concentration of resources in a few geographical locations and thus increase fiscal disparities across subnational governments.

This paper poses several research questions. First, what is the relationship between growth and inequality in the geographic distribution of fiscal resources or fiscal disparities? Second, what would happen if the fiscal decentralization system changed? Third, does fiscal decentralization foster economic growth? To address these questions, I examine how fiscal inequality and fiscal decentralization affect economic growth in two different fiscal systems. I explore the impacts of the tax sharing reform in 1994 using an event study approach.[5]

The econometric results show that the impacts of fiscal inequality and fiscal decentralization on provincial economic growth rates are different under two different fiscal systems. First, My findings show that a 10% increase in fiscal inequality and fiscal decentralization will increase economic growth by 11% and 4%, respectively, in the unfettered fiscal decentralization system (1987-1993). Second, since the 1994 tax-sharing reform, The impact of fiscal inequality on economic growth is close to zero or even negative, but the impact of fiscal decentralization is consistently positive and the magnitude of the impact of greater.

This paper adds to the vast body of work on fiscal decentralization. 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

[5]The tax-sharing system reform is nationwide, and China transitioned from a fiscal responsibility system to a tax-sharing system in 1994, so I use the event study approach in this paper.

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 maximizing 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. Weingast (2014) thinks that in the political perspective, political competition among local governments under a decentralized system could limit the Leviathan nature of a central government, which could bring more benefits for the economic development of regions. However, decentralization also provides more opportunities for corruption. (Fisman and Gatti, 2002). Moreover, the empirical literature mainly focuses more on the impact of fiscal decentralization on economic growth, fiscal disparity and inequality in the distribution of income across regions.[6] With respect to economic growth, the sign and magnitude of the impact of fiscal decentralization are ambiguous. Zhang and Zou (1998), using provincial panel data during the 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, and the sign depends on the measure of fiscal decentralization by expenditure or revenue. Therefore, how to reasonably define and measure fiscal decentralization is a challenge. This paper investigates the impact of fiscal decentralization on the economic growth in China, using a new proxy of fiscal decentralization on the expenditure side.

Furthermore, many previous studies have widely discussed the relationship between economic growth and inequality in the distribution of income.[7] However, the

[6]Fiscal disparity refers to the differences of fiscal revenues across regions Tsui (2005).

[7]The growing common belief is that there is a negative relationship between inequality and growth (Barro and McCleary, 2003)

relationship between growth and inequality of geographical distribution of fiscal resources have not been adequately discussed. Zhang (2006) investigates that fiscal decentralization could prompt economic growth but also lead to fiscal disparity. Finally, 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. Qiao et al. (2008) find that there is a tradeoff between economic growth and fiscal equality under the decentralized policy. This paper offers a new perspective on fiscal inequality by exploring a variety of effects on economic growth during two periods (1987-1993 and 1994-2010).

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 describes the key variables, data, and the empirical method. Section 5 presents main results and robustness checks. Section 6 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 the local government because the tax revenues came mainly from profits of state-owned enterprises, 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.[8] Although China still remains a centralized political system (Zhang, 2006), the structure of governance currently has the obvious features of fiscal decentralization, at least under traditional measurement. The process of fiscal decentralization in China has been challenging due to a lack of experience in fiscal reform.

In 1980, China implemented the policy of "eating from separate kitchens," aiming to local and central government budgets and providing local governments with more incentives to collect tax revenues.[9] During the period between 1978 and 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.[10] In 1987, the '"Fiscal Responsibility (Contracting) System" (FRS, 1987-1993) was formally implemented. Under the unfettered fiscal decentralization system, the central government allowed provincial governments to retain part of the tax revenues remaining after the remittance of some revenues to the central government for a certain period.

Although the reform aimed 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. The first primary problem was a continuing decline of "two ratios" (total budgetary revenue to GDP and central to total budgetary revenue). A significant level of resources shifted from the government to non-government sectors

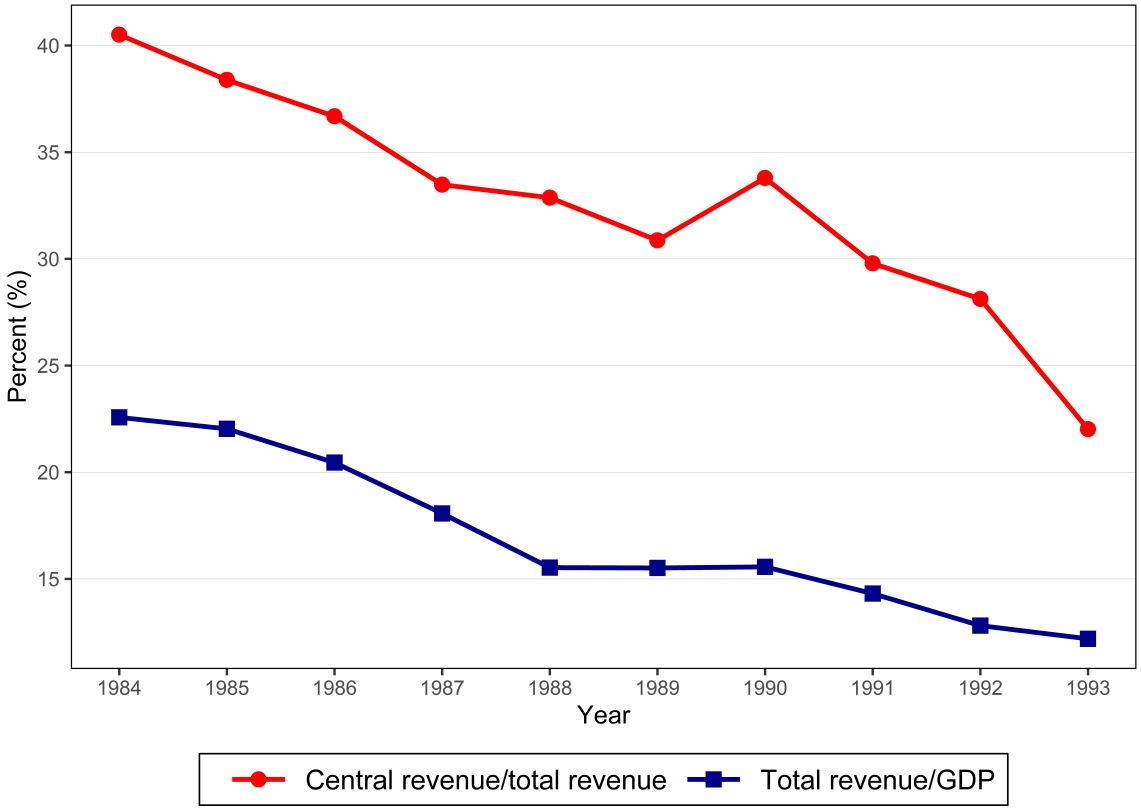
[8]In the previous fiscal system, profits from SOEs accounted for nearly half of total government revenues, and the local government's revenue was governed by the central government. Since 1978, the SOEs have been challenged by enterprises with various forms of ownership.

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

[10]There were three basic types of revenues under the system: central-fixed revenues, local-fixed revenues, and shared revenues. During 1980-1984, 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)

as shown in Figure 1. As a result, the overall budgetary revenue in GDP decreased from 22% in 1985 to 12% in 1993. In addition, more resources shifted from the central government to local governments. As a result, the central government's share of revenue fell from 38% in 1985 to only 22% in 1993. 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 (Ding et al., 2019). Local governments obtained more revenues from the fiscal contract system, particularly provinces that could contribute more to the tax revenue of the central government.

Figure 1: The Two Ratios, 1984-1993



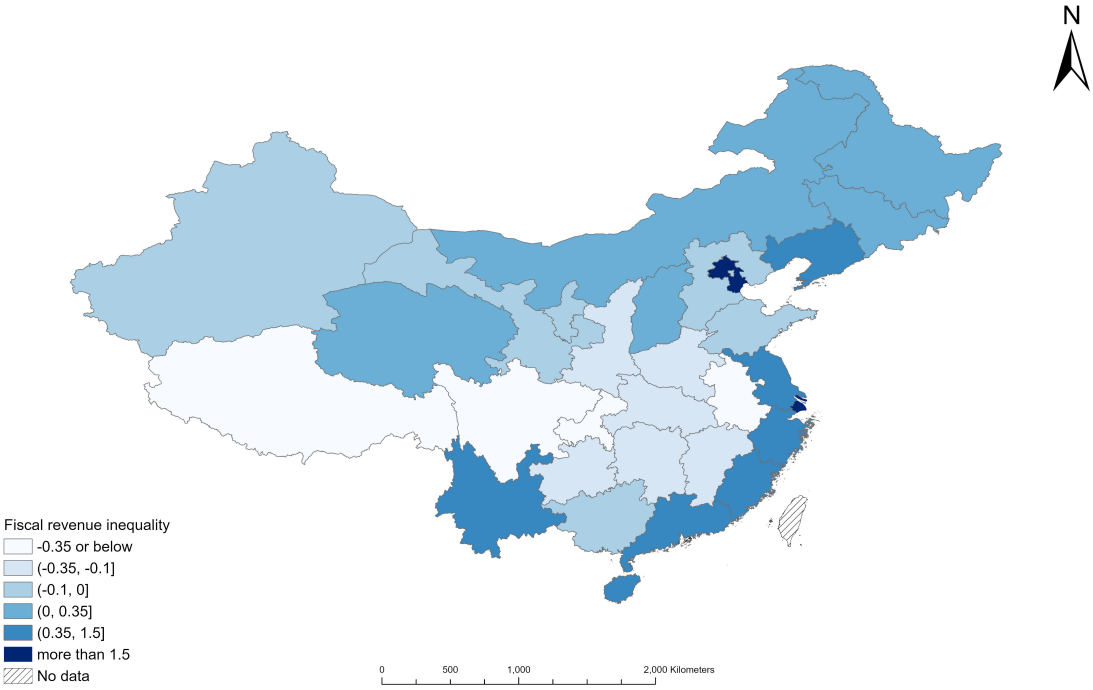
Second, the system was the result of political negotiation between the central and local governments. The rich provinces in the East-coastal region were able to have more advantageous contracts due to their development strategy and political leverage. Therefore, these rich provinces can accumulate substantial revenues by retaining more tax revenues within the province. At the same time, the central government was not capable of eliminating the fiscal disparity due to declining central revenues. Figure 2 shows the a proxy of fiscal revenue disparity that is measured by the ratio of the difference between each provincial fiscal revenue and median of fiscal revenue across provinces to the median. As a result, the levels of fiscal revenue in the East-coastal provinces are much higher than those in the central and western provinces.[11]

Third, the devolution of fiscal power grew distrust between the center and localities (Lou, 2008). On the one hand, The central government recognized that the reason for the continuing fiscal decline partly was that the local governments were unwilling to collect taxes or retain most of the province's incremental revenues. On the other hand, from the local perspective, the repeated changes in revenue-sharing rules were viewed as a sign of a lack of firm commitment at the center to building solid local finances.

Realizing the shortcomings of FRS, the central government 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 ties since 1978. The 1994 fiscal reform implemented a system with a specific tax assignment (*fenshuizhi*) to replace the previous contract system. The

[11]Unfetter fiscal decentralization could lead to the concentration of fiscal resources in few localities, thus increasing fiscal disparity (Prud'Homme, 1995). The accompanying presumption is that the more concentrated public sector will attempt to achieve a more balanced geographical distribution by directing resources from richer areas to poorer areas.

Figure 2: Fiscal Disparities in 1993



tax-sharing reform in 1994 explicitly defined taxes as central taxes, shared taxes and local taxes. The taxes maintaining 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, and corporate income tax); the taxes that are suitable to be collected and freely administrated by local government are assigned to local tax. Table 1 shows the current tax assignment in theory.[12] In addition, TSS introduced the Value Added Tax (VAT) to replace the turnover-based product tax. Revenues are split into National Tax Services (NTSs) and Local Tax Services (LTSs). NTSs were organized on the basis of divisions in all provinces to

[12]The real tax assignment could have some differences.

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.

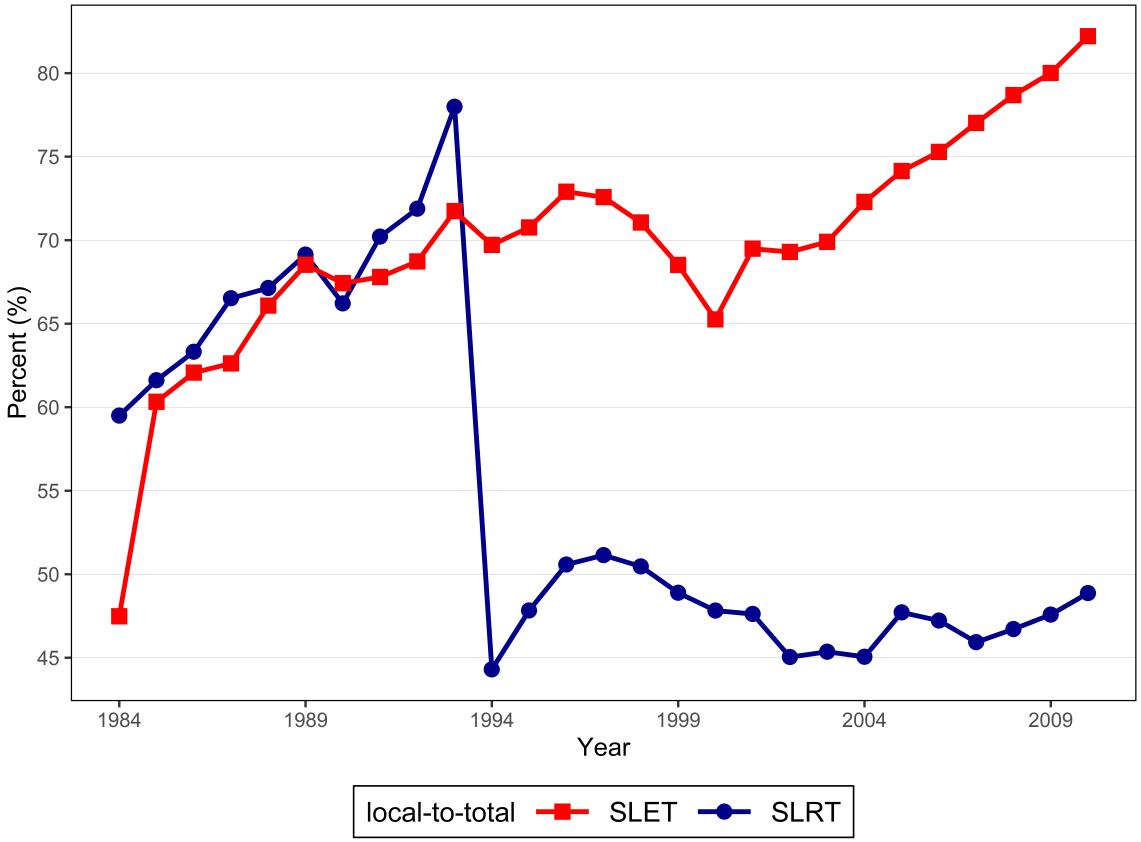
Table 1: Tax Assignment

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 have unchanged responsibility to deliver most public goods and services, the development of the local economy, and the operation of various institutions. On the one hand, poorer regions faced relatively serious deficit problems due to insufficient budgetary revenues under the fiscal system. On the other hand, although the richer regions had higher budgetary revenues from tax relative to

Figure 3: Share of local revenues and expenditures to total revenues and expenditures



Notes: SLET: Share of local budgetary expenditure relative to total budgetary expenditure. SLRT: Share of local budgetary revenue relative to total budgetary revenue.

Source: Author's calculations using data from the National Bureau of Statistics of China.

poorer regions, they had more public projects that needed to be undertaken. Overall, Figure 3 shows that the share of local revenues to local revenues decreased dramatically from 77% in 1993 to 45% in 1994, and then maintained 45%-50% from 1994 to 2010. On the other hand, the share of local expenditure to total expenditure generally maintained an upward trend since 1994, although there was a slight decline between 1998 and 2000. Therefore, given that the budgetary revenue of local governments couldn't support their own spending, the transfer system and extra-budgetary funds

gradually became the dominant source of the revenue of local governments.[13]

3 Data and Econometric strategy

3.1 Data

Throughout my empirical analysis, the basic unit of observation is Chinese jurisdictions at the provincial level.[14] The sample includes 28 of the 31 provinces, Autonomous Regions, and Directly Administered Municipalities over 1987-2010.[15] The Hainan province is combined with Guangdong province, and the Municipality of Chongqing is combined into Sichuan Province.[16] Due to the lack of data, Tibet will be excluded from the dataset.

Most of the data are taken from various issues of China Statistical Yearbook, which provides the most details on provincial public finance (local government expenditure, different types of tax, extra-budget funds, etc.) and some essential economic variables (real GDP, Population, Investment in fixed assets), but these sources of data don't cover most of the provincial data before 1990. For this reason, I extend the data on all variables before 1990 using Compilation of Historical Statistics for Each Province,

[13]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 has been incorporated into the management of budgetary funds.

[14]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 "provinces" in this paper.

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

[16]In 1998, Hainan separated from Guangdong as a province. Since September 1996, Chongqing became a direct-controlled municipality

Autonomous Region, and the Directly Administered Municipalities 1949-1989. In addition, extra-budgetary expenditure data are taken from Financial and Economic Statistical References, Fiscal Statistics 1986-1991, and various issues of the China Statistical Yearbook.

3.2 Econometric specification

In this section, I discuss the empirical strategy with the objective of testing the heterogeneous effects of fiscal inequality and fiscal decentralization on economic growth in two fiscal systems. To capture the key of the identification throughout, we conduct an event study specification with year trend and province fixed effects:

$$\begin{aligned} Y_{it} =& \beta_0 + \beta_1 FD_{it} + \beta_2 TSR_d + \beta_3 IE_t + \beta_4 IE_t * TSR_d \\ &+ \beta_5 FD_{it} * TSR_d + \beta_6 \mathbf{X}_{it} + \mu_i + \text{trend}_t + \nu_{it} \end{aligned} \tag{1}$$

where i represents province and t denotes year. The dependent variable Y_{it} is growth rate of real GDP per capita in province i, year t; FD_{it} is the degree of fiscal decentralization on expenditure side; IE_{it} is a proxy of fiscal inequality that is invariant across provinces; TSR_d is an event dummy variable for the 1994 tax-sharing reform; $IE_t * TSR_d$ and $FD_{it} * TSR_d$ are the interaction terms of the event dummy with fiscal inequality and fiscal decentralization, respectively; μ_i is provincial fixed effect,trend_t is year trend, and ν_{it} is idiosyncratic error.[17]

In order to test whether fiscal decentralization is exogenous, I use the augmented regression test[18] and assume that some variables could affect the fiscal decentraliza-

[17]The definitions in detail of economic growth, fiscal decentralization and fiscal inequality will be discussed later (See Section 3.3).

[18]It is also called Durbin–Wu–Hausman test, or the DWH test for short. It can easily be formed

tion, 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).[19] In addition, I could use a similar approach to test the validity of the exogenous tax rate.

Martinez-Vazquez and McNab (2003) argue that the impact of fiscal inequality on economic growth is not precise because of omitted variable bias and reciprocal causation. To address the endogeneity of fiscal inequality, I use the ratio of extra-budgetary expenditure per capita to budgetary expenditure per capita as an instrument (denoted by "Extra"). The typical procedure is to regress IE_t on $Extra_{it}$ and use the fitted values $\widehat{IE_t}$ in the second stage regression, which yields consistent estimates of the specification (1).

3.3 Key variables of interest

In Equation (1), I use "economic growth" as the dependent variable.[20] The cross-sectional invariant fiscal inequality and the degree of fiscal decentralization are two main regressors of interest in the specification. Fiscal inequality captures the distribution of fiscal resources across provinces, so it is invariant across provinces. Under the FRS, the rich provinces with high political negotiation power could retain more fiscal revenues within their province. After the 1994 fiscal reform, both rich and poor provinces shared a fixed amount of tax with the central government, so they probably relied more on the transfers of the central government. Re-centralized sys-

by including the residuals of each endogenous right-hand-side variable as a 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.

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

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

tems could create inequitable distributions of public resources by favoring politically important jurisdictions over jurisdictions with greater needs but of less political importance (Martinez-Vazquez and McNab, 2003). In addition, they could use the extra-budgetary funds to support their public spending. For example, richer provinces are more likely to be able to raise extra-budgetary funds from more enterprises. Poorer provinces also make more frequent use of this type of financing to shorten the inequality in budgetary resources.

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 different degrees of fiscal decentralization during the sample period. Besides, this measure better captures the allocation of fiscal resources between the central and local governments on the expenditure side.

I consider two individual-invariant measures of inequality of fiscal resources across

provinces.[21] The first measure is the coefficient of variation (defined as the ratio of the standard deviation to the mean of provincial government expenditure per capita). The second is the Gini coefficient of provincial government expenditure per capita.[22]

Finally, I also introduce capital and labor as two basic control variables driving economic growth.[23] In addition, I add the effective tax rate at the provincial level in the specification to approximate the allocations between public and private sectors. Table A2 provides detailed definitions of all variables, and summary statistics for the outcome variables and independent variables are shown in Table 2.

Table 2: Summary Statistics

Variable	Mean	Standard deviation	Median	Min	Max
Growth	0.1588	0.0760	0.1488	-0.0152	0.4603
Decentralization	0.72	0.10	0.73	0.49	0.93
CV	0.63	0.10	0.64	0.45	0.80
Gini	0.29	0.03	0.30	0.23	0.34
Capital	0.2171	0.1547	0.2052	-0.2291	0.9716
Labor	0.0179	0.0248	0.0161	-0.0884	0.2222
Tax	7.33	3.38	6.42	2.84	20.90
Taxsq	65.18	66.72	41.24	8.06	436.80
Extra budget	0.38	0.29	0.30	0.01	1.55

Notes: For definitions of these variables, see Table A2 in the Appendix.

[21]The inequality of fiscal resources across provinces represents the overall distribution of local government expenditure per capita, so these two measurements of inequality are the same across provinces in the same year.

[22]Provincial expenditure per capita in these two measurements is denoted by $\frac{LX_{it}}{POP_{it}}$

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

4 Stylized facts in China

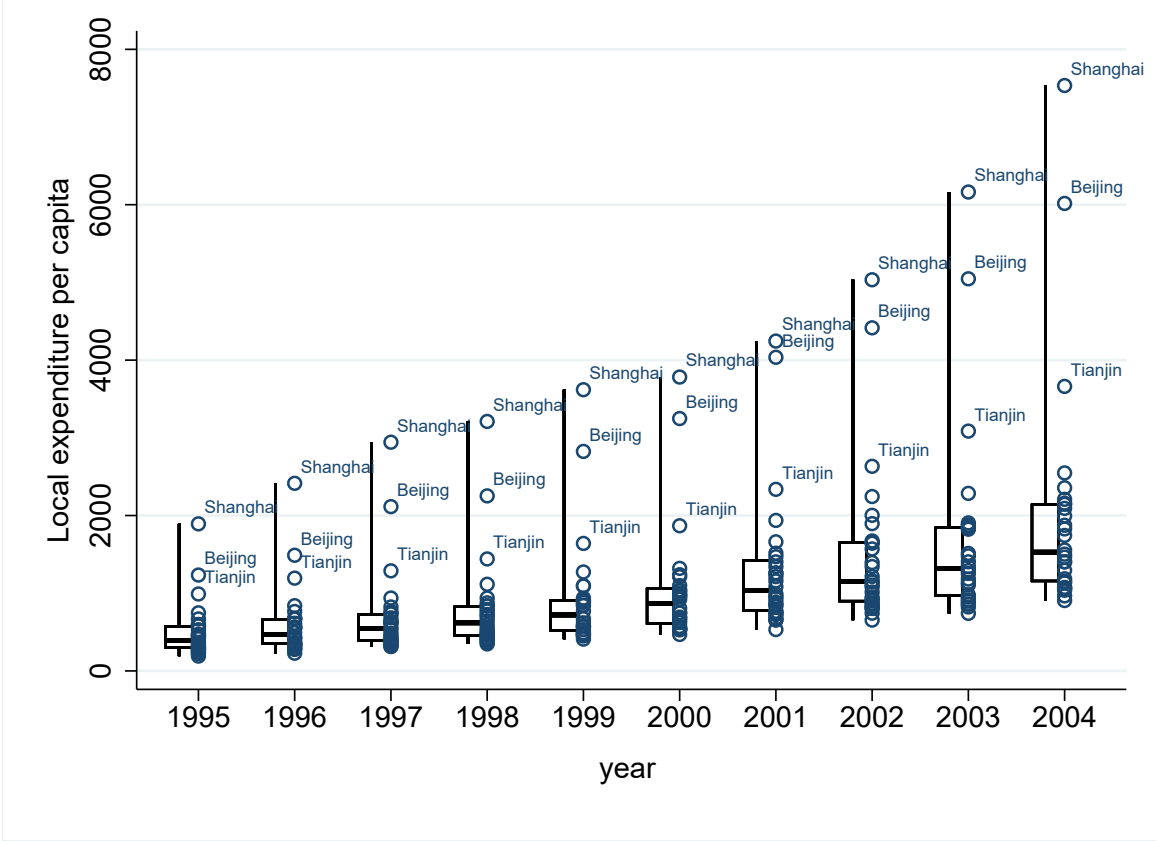
This section presents stylized facts on economic growth, fiscal decentralization, and fiscal inequality in China over time, particularly after the 1994 tax-sharing reform. We use the panel data consolidated at the provincial level for the period 1987-2010.

Figure 4: The Trend of Fiscal Decentralization over time, 1987-2010

Fact1. Fiscal decentralization of expenditures generally has an upward trend in China, regardless of the fiscal system. The average fiscal decentralization increases from 0.65 in 1987 to the 0.82 in 2010 as shown in Figure 4. The 1994 tax-sharing reform changed the revenue assignment, but the expenditure assignment

remained intact. Shen et al. (2012) show that the actual division of expenditure responsibilities among sub-provincial governments is left to the discretion of each level of government after 1994 in the absence of specific central government guidelines. Therefore, local governments have relatively greater power in fiscal expenditures.

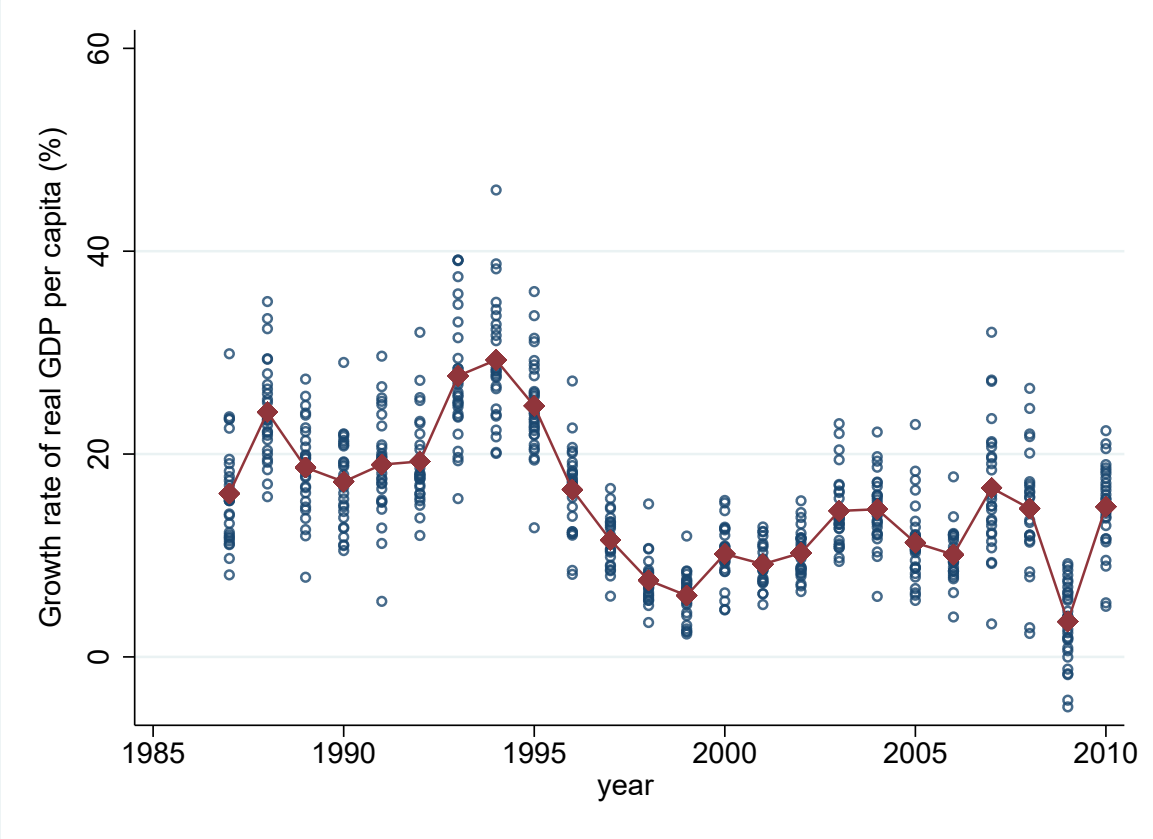
Figure 5: Dispersion of local expenditure per capita, 1995-2004



Fact2. The inequality in the distribution of fiscal expenditure continues to expand after the 1994 reform. Figure 5 shows that the dispersion of local expenditure per capita across provinces still increases. The per capita local expenditure of three direct-administered municipalities, including Beijing, Shanghai, and Tianjin, is much higher than that of other provinces. The tax-sharing system could

create inequitable distributions of public resources by favoring politically important jurisdictions over jurisdictions with greater needs but of less political importance (Martinez-Vazquez and McNab, 2003). In addition, Wu and Wang (2013) find that provincial governments may have "grabbed" central grants for self-interests.

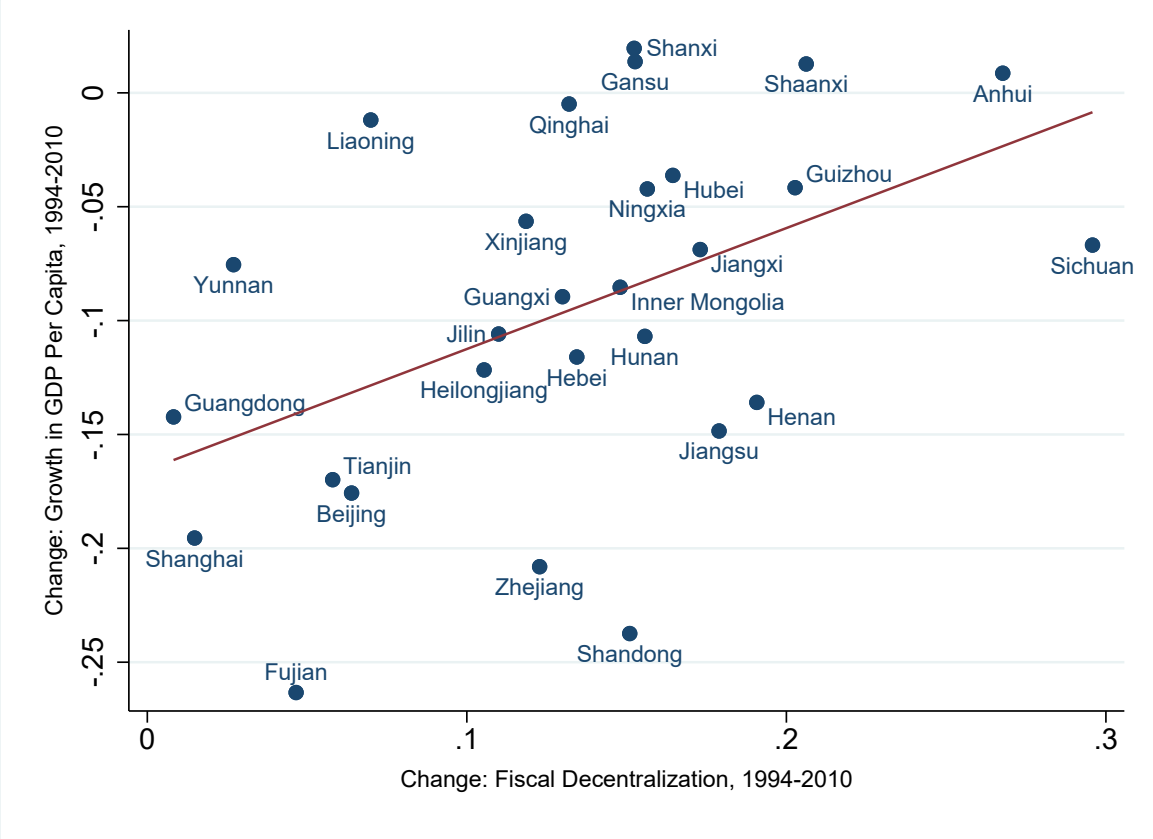
Figure 6: The Trend of Economic growth over time, 1987-2010



Fact3. The level of economic growth on average after the 1994 reform is lower than before 1994. Figure 6 show that the average economic growth rate dropped from over 20% before 1994 to around 10% after 1994. The local governments rely more on the transfer payments of central government or extra-budgetary funds, which probably retards rapid growth of China's economy. These provinces with

greater needs for the resources cannot get enough revenues by themselves through formal channels.

Figure 7: Scatterplot of % Fiscal Decentralization against Growth in GDP per capita, 1994-2010



Fact4. Change in fiscal decentralization is positively associated with change in economic growth between 1994 and 2010. Figure 7 shows change in expenditure fiscal decentralization is positive for all provinces, and the economic growth rates decreased for most provinces since the 1994 tax-sharing reform. However, there is positive relationship between fiscal decentralization and economic growth in China since 1994.

5 Empirical findings

5.1 Baseline results

Table 3 presents the results of our baseline specification (See Equation (1)), using the coefficient of variation (CV) of per capita local government expenditure to measure fiscal inequality.[24] In column (2), I start the estimation by controlling for province-specific fixed effects and year trends, not including interaction terms of the 1994 event dummy (TSR) with fiscal inequality and fiscal decentralization. The results show that the overall effect of fiscal inequality on economic growth is positive but not statistically significant. The coefficients of the 1994 event dummy and fiscal decentralization are respectively significantly negative and positive. It turns out that the economic growth is relatively lower in the TSS than in FRS on average. In addition, fiscal decentralization could accelerate economic growth. Quantitatively, after the 1994 reforms, the economic growth rate dropped by 7.84% on average. An increase in fiscal decentralization by 10% would increase the economic growth rate by 4.152%. Column (2) takes a further step to add the CV interacted with the 1994 event dummy (TSR). In column (3), I add the interaction term of fiscal decentralization with the TSR. The results are summarized as follows: First, the impact of fiscal inequality on economic growth is different pre-and post-1994 fiscal reform. Before the 1994 fiscal reform, the impact of fiscal inequality on growth is statistically significant and positive. I find that an increase in the fiscal inequality by 10% would approximately increase the economic growth by 10.11%. However, after the 1994 reform, I find that the impact of fiscal inequality on economic growth is

[24]The two proxies of fiscal inequality, including CV and Gini, are defined in Table A2.

negative, but the magnitude of impact is tiny and close to zero. Second, the impact of fiscal decentralization on economic growth is consistently positive pre-and post-1994 fiscal reform. An increase in fiscal decentralization by 10% would increase the economic growth by 3.42% before the 1994 reform. In addition, After the reform, a 10% increase in fiscal decentralization would increase economic growth by 0.84% more than before 1994.

In Table 4, I use the Gini coefficient to measure fiscal inequality as a robustness check. The preliminary results in Table 4 are consistent with previous findings in Table 3. The main findings are summarized as follows: first, the 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. The richer provinces have more advantageous contracts due to their development strategy and political leverage to retain more revenues within their province. Thus, the unfettered fiscal decentralization system could allow the local governments in the eastern coastal areas to have sufficient resources to match the available public projects, thus eventually leading to China's economy booming at the end of the last century. However, after the 1994 fiscal reform, the impact of fiscal inequality measured by two fiscal inequality proxies on economic growth is close to zero. The local government could be more dependent on the transfer payment of the central government. However, the transfer payment function depends on political preferences or the goal of redistribution across provinces rather than whether the provinces have greater needs for fiscal resources. Therefore, fiscal inequality is positively associated with economic growth before the 1994 fiscal reform, but the effect becomes tiny after 1994.

Table 3: OLS results: The effect of fiscal inequality on economic growth

	Dependent variable: Growth rate		
	(1)	(2)	(3)
CV	0.0613	1.0115***	1.0107***
	(0.0400)	(0.1180)	(0.1145)
CV × TSR		-1.1129***	-1.0950***
		(0.1368)	(0.1334)
TSR	-0.0784***	0.6201***	0.5493***
	(0.0136)	(0.0880)	(0.0898)
Decentralization	0.4152***	0.3853***	0.3419***
	(0.0582)	(0.0570)	(0.0553)
Decentralization × TSR			0.0836**
			(0.0318)
Labor	0.1162	0.1101	0.0903
	(0.1074)	(0.1014)	(0.1033
Capital	0.2156***	0.2481***	0.2510***
	(0.0203)	(0.0223)	(0.0224)
Tax	-0.0087***	-0.0046***	-0.0043***
	(0.0017)	(0.0014)	(0.0014)
N	672	672	672
R^2	0.396	0.470	0.472
Province FE	YES	YES	YES
Year trend	YES	YES	YES

Note: The dependent variable is the growth rate that is indicated on the top of all columns. Fiscal inequality is measured by the coefficient of variance of local government expenditure per capita. "CV × TSR" and "Decentralization × TSR" represent the 1994 reform dummy interacted with inequality and decentralization, respectively. Standard errors are clustered at the province level for all regressions (in parentheses). Levels of significance: *10%, **5%, ***1%.

Second, fiscal decentralization has a positive and statistically significant effect on the economic growth rate during both pre-and post-1994 fiscal reform periods. The positive relationship is consistent with the logic of China's fiscal reform. A basic premise of the development of China's economy in view of the failure of the central planning model was to decentralize decision-making. Local governments more

Table 4: OLS results: alternative measurement of fiscal inequality

	Dependent variable: Growth rate		
	(1)	(2)	(3)
Gini	0.4132**	3.2334***	3.2206***
	(0.1494)	(0.3879)	(0.3774)
Gini × TSR		-3.2605***	-3.1826***
		(0.4236)	(0.4141)
TSR	-0.0895**	0.8846***	0.8044***
	(0.0140)	(0.1281)	(0.1283)
Decentralization	0.4442***	0.4206***	0.3807***
	(0.0615)	(0.0596)	(0.0581)
Decentralization × TSR			0.0797**
			(0.0339)
Labor	0.1187	0.1017	0.0829
	(0.1066)	(0.1012)	(0.1030)
Capital	0.2140***	0.2469***	0.2492***
	(0.0201)	(0.0220)	(0.0221)
Tax	-0.0081***	-0.0066***	-0.0063***
	(0.0016)	(0.0015)	(0.0014)
N	672	672	672
R^2	0.399	0.462	0.464
Province FE	YES	YES	YES
Year trend	YES	YES	YES

Note: The dependent variable is the growth rate that is indicated on the top of all columns. Fiscal inequality is measured by Gini coefficient of local government expenditure per capita. "Gini × TSR" and "Decentralization × TSR" represent the 1994 reform dummy interacted with inequality and decentralization, respectively. Standard errors are clustered at the province level for all regressions (in parentheses). Levels of significance: *10%, **5%, ***1%.

effectively provide public goods and make public investments than the central government, thus promoting economic development. Therefore, fiscal decentralization on the expenditure side could increase provincial economic growth rates regardless of fiscal systems, which contrasts the results obtained by Zhang and Zou (1998).[25].

[25]They find that a higher degree of fiscal decentralization of government spending is associated

However, it should be noted that Zhang and Zou (1998) use a different econometric specification and cover different time periods.

Third, the level of the effective tax rate has a negative effect on economic growth. Tax enforcement could shift more resources from the private sector to the public sector, which is detrimental to regional growth. In addition, as expected, the coefficient of the capital stock growth 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 the neoclassical growth model.

In summary, the overall result of China's decentralization policy can promote economic growth. However, as more fiscal resources are concentrated in the few regions, economic growth can be accelerated before 1994 but dramatically retarded after 1994.

5.2 Instrument Variables

As Martinez-Vazquez and McNab (2003) argued, 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 or reciprocal causation. First, fiscal inequality is determined by some variables across provincial governments, which also relate to economic development and growth. Second, there might be reciprocal causation between economic growth and fiscal inequality. On the one hand, the inequality in the distribution of fiscal resources could affect economic growth. On the other hand,

with lower provincial economic growth in 1978–1992. The measurement of fiscal decentralization in this paper is the ratio of provincial budgetary spending to central budgetary spending. Although this paper also considered terms per capita and extra-budgetary expenditure, they are different from my measurements of fiscal decentralization as well

high economic growth could increase the fiscal revenue of the local government, which thus may also exacerbate fiscal inequality.

Previous studies related to fiscal decentralization in China did not pay much more 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.[26]

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.[27] On the other hand, the extra-budgetary funds give more flexibility to poorer provinces that could reduce the differences with richer provinces.[28]

Table 5 compares The two-stage least squares results with OLS results. Columns (1) and (3) in Table 5 are the same as column 3 in Tables 3 and 4, respectively. The

[26]Extra-budgetary funds could provide more flexible choice in the use of the funds because they usually lack specificity and detailed criteria (Qiao et al., 2008)

[27]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.

[28]The extra-budgetary funds include Administrative fees, revenues of government fund, revenues of state-owned enterprises and other nontax revenues.

Table 5: 2SLS estimates of effect of fiscal inequality on economic growth

	Dependent variable: Growth rate			
	(1)	(2)	(3)	(4)
	OLS	2SLS	OLS	2SLS
CV	1.0107***	1.1699***		
	(0.1145)	(0.3791)		
Gini			3.2206***	5.4403***
			(0.3774)	(1.9028)
CV × TSR	-1.0950***	-1.0053***		
	(0.1334)	(0.3512)		
Gini × TSR			-3.1826***	-4.8781***
			(0.4141)	(1.7801)
TSR	0.5493***	0.4056**	0.8044***	1.2588**
	(0.0898)	(0.2015)	(0.1283)	(0.5183)
Decentralization	0.3419***	0.3667***	0.3807***	0.4576***
	(0.0553)	(0.0642)	(0.0581)	(0.0815)
Decentralization × TSR	0.0836**	0.1124***	0.0797**	0.0862**
	(0.0318)	(0.0369)	(0.0339)	(0.0394)
Capital	0.2510***	0.2396***	0.2492***	0.2618***
	(0.0224)	(0.0214)	(0.0221)	(0.0257)
Labor	0.0903	0.0886	0.0829	0.0854
	(0.1033)	(0.1124)	(0.1030)	(0.1066)
Tax	-0.0043***	-0.0018	-0.0063***	-0.0032
	(0.0014)	(0.0028)	(0.0014)	(0.0026)
Instrument (First Stage)		F-Stats		F-Stats
Extra-budget		140.05		92.15
Interaction Term		216.08		482.48
N	672	672	672	672
R^2	0.472	0.4491	0.464	0.4331

Note: The dependent variable is the growth rate that is indicated on the top of all columns. In columns (1) and(2), fiscal inequality is measured by CV (the ratio of standard deviation over the mean of local government expenditure). In columns (3) and (4), fiscal inequality is measured by Gini (Gini coefficient of local government expenditure). Columns (1) and (3) show the results using OLS estimation. In columns (2) and (4) show the results using 2SLS estimation. All columns include province-specific fixed effects and year trends. Standard errors are clustered at the province level for all regressions (in parentheses). Levels of significance: *10%, **5%, ***1%.

two-stage least squares second-stage results are given in columns (2) and (4), which are consistent with OLS results. In columns (2) (3), the impact of fiscal inequality (measured by CV and Gini) on economic growth is significant and positive before 1994, and the impact becomes very tiny after 1994. Fiscal decentralization is positively associated with economic growth during two periods, but the magnitude of

impact becomes larger after the 1994 reform. Quantitatively, column (2) shows that an increase in fiscal inequality (CV) by 10% would increase the economic growth by 11.70%. However, the impact is close to zero (0.165) after 1994. In addition, an increase in fiscal decentralization by 10% would increase the economic growth by 3.67% before 1994, and the magnitude of impact becomes greater and is 4.79% after 1994.

5.3 Effect of the extra-budget

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 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.

I would test whether the use of extra-budgetary funds can alleviate differences in regional growth between the richer and poorer provinces. I set up a dummy variable, "HEP" that takes the value of 1 for observations for which the budgetary expenditure per capita of the provincial government is larger than some threshold, including median, mean , and third quartile.[29] Otherwise, the dummy takes the value of 0. In Table 6, the coefficient of HEP represents a different impact between governments with budgetary expenditure above thresholds and governments with

[29] "HEP" only refers to budgetary expenditure of local government, excluding extra-budgetary expenditure in Table 6. I consider the heterogeneous effect of fiscal inequality, so three different thresholds are used in this paper, including median, mean and third quartile of budgetary expenditure of the local government.

Table 6: heterogeneous effects of budgetary expenditure on economic growth

		Dependent variable: Growth rate		
		(1)	(2)	(3)
TSR		-0.0748***	-0.0822***	-0.0760***
		(0.0141)	(0.0130)	(0.0125)
HEP dummy **I**[LX per capita>S]	Median	-0.0047		
		(0.0102)		
	Mean		-0.0339	
			(0.0205)	
	Third quartile			-0.0319
				(0.0193)
HEP dummy× TSR		0.0124	0.0384***	0.0316**
		(0.0122)	(0.0117)	(0.0128)
Decentralization		0.4038***	0.4560***	0.4356***
		(0.0565)	(0.0475)	(0.0537)
Tax		-0.0162***	-0.0187***	-0.0184***
		(0.0039)	(0.0038)	(0.0035)
Taxsq		0.0003*	0.0005**	0.0004***
		(0.0002)	(0.0002)	(0.0002)
Capital		0.2147***	0.2169***	0.2171***
		(0.0210)	(0.0211)	(0.0216)
Labor		0.1260	0.1114	0.1241
		(0.1090)	(0.1101)	(0.1096)
N		672	672	672
R^2		0.3986	0.4087	0.4041

Note: The dependent variable is growth rate that is indicated on the top of all columns. In columns (1)-(3), HEP represents the dummy that takes the value of 1 for observations for which the budgetary expenditure per capita of provincial government is larger than some threshold, such as mean, median and third quartile. Standard errors are clustered at the province level for all regressions (in parentheses). Levels of significance: *10%, **5%, ***1%.

budgetary expenditure below thresholds before 1994.[30] In columns (1)-(3) of Table 6, the coefficient of HEP are negative but not statistically significant. It turns out that there is not significant difference in growth rate between "rich" and "poor" regions before 1994. However, after the 1994 fiscal reform, economic growth of "rich"

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

provinces have a huge change relative to "poor" provinces. The coefficients of the "HEP × TSR" are positive and statistically significant if I use mean and third quartile as the thresholds.[31] Results in columns (2) and (3) show that the above-mean "rich" provinces have a 3.84% higher growth rate than the below-mean "poor" provinces, and "rich" provinces above the third quartile only have a 3.16% higher growth rate than "poor" provinces below the third quartile.

In Table 7, the total provincial government expenditure includes not only budgetary expenditure but also the extra-budgetary expenditure of the local government. Therefore, I set up another dummy variable, "HEP2" that takes the value of 1 for observations for which the total expenditure per capita of the provincial government is larger than some threshold, including median, mean, and third quartile.[32] The estimated coefficients of "HEP2" are negative but not statistically significant, which indicates that there is no difference in growth rates between governments with total expenditure above thresholds and governments with total expenditure below thresholds before 1994. Furthermore, comparing the estimates of Tables 6 and 7, I explore the impact of the use of extra-budgetary funds on economic growth pre-and post- the 1994 fiscal reform.

We find that the difference in economic growth between the above-mean "rich" provinces and the below-mean "poor" provinces remains the same because the coefficients of "HEP × TSR" and "HEP2 × TSR" are similar in columns (2) of Tables 6 and 7, respectively. Therefore, the use of extra-budgetary funds cannot eliminate gap in economic growth between the above-mean "rich" provinces and the below-mean

[31] In the dataset, median<mean<Third quartile

[32] HEP2 represents the total expenditure per capita of local government that is the sum of budgetary and extra-budgetary expenditures per capita of the local government.

Table 7: Heterogeneous effects of total expenditure on economic growth

		Dependent variable: Growth rate		
		(1)	(2)	(3)
TSR		-0.0741***	-0.0819***	-0.0732***
		(0.0121)	(0.0135)	(0.0129)
HEP2 dummy **I**[(LX+LEX) per capita>S']	Median	-0.0004		
		(0.0130)		
	Mean		-0.0237	
			(0.0151)	
	Third Quartile			-0.0142
				(0.0134)
Large dummy × TSR		0.0168	0.0394***	0.0247*
		(0.0139)	(0.0138)	(0.0129)
Decentralization		0.3965***	0.4265***	0.4017***
		(0.0604)	(0.0567)	(0.0611)
Tax		-0.0174***	-0.0190***	-0.0165***
		(0.0040)	(0.0038)	(0.0041)
Taxsq		0.0004**	0.0005***	0.0004**
		(0.0002)	(0.0002)	(0.0002)
Capital		0.2159***	0.2202***	0.2169***
		(0.0218)	(0.0214)	(0.0208)
Labor		0.1032	0.1149	0.1168
		(0.1068)	(0.1077)	(0.1087)
N		672	672	672
R^2		0.4053	0.4082	0.4010

Note: The dependent variable is growth rate that is indicated on the top of all columns. In columns (1)-(3), HEP2 represents the dummy that takes the value of 1 for observations for which the total provincial government expenditure per capita (budgetary expenditure plus extra-budgetary expenditure) is larger than some threshold, such as mean, median and third quartile. Standard errors are clustered at the province level for all regressions (in parentheses). Levels of significance: *10%, **5%, ***1%.

"poor" provinces. However, results in column (3) present that the gap in economic growth between the above-third-quartile "rich" provinces and the above-third-quartile "poor" provinces is reduced by using extra-budgetary funds because the coefficient of interaction term in Table 7 is relatively smaller than that in Table 6. Qualitatively, the use of extra-budgetary funds could reduce the gap in economic growth between the above-third-quartile "rich" and above-third-quartile "poor" provinces from 3.16%

to 2.47% sine 1994. Therefore, the central government allows provincial governments to use the extra-budgetary expenditure, which has reduced the gaps between economic growth between the top 25% and bottom 75% provinces since 1994. Thus, after the 1994 fiscal reform, the use of extra-budgetary expenditure can reduce the difference between economic growth rates of "rich" provinces and "poor" provinces, compared with results without extra-budgetary terms in Table 6.

6 Conclusion

This study explores a reform in 1994 involving China's fiscal decentralization. This nationwide reform has had a large impact on the fiscal revenue assignment between central and local governments, thus influencing the Chinese economy to a considerable extent. This paper conducts an event-study approach to examine the impact of the distribution of fiscal resources across provinces and fiscal decentralization on economic growth in two different fiscal systems, using the provincial-level data from the years 1987–2010. The "event" is the switch from the fiscal responsibility system (FRS, 1987-1993), which allows local governments to retain most of the tax revenue and leads to the problem of the uneven distribution of fiscal resources across regions to the tax sharing system (TSS, 1994-present). The latter changed the revenue assignment but did not change the expenditure assignment of local governments. This led to a deficit in local governments, which is funded by the central government; thus, after the TSS, local governments had to rely more on how the central government allocates fiscal resources.[33]

[33] Zhao and Zhang (2020) find that the local governments under the tax-sharing system have incentives to lower tax enforcement while obtaining more revenues from the land transactions (land lease revenues) to remove the problem of deficits.

To quantify the distribution of fiscal resources across the provinces, I construct a measure of "fiscal inequality" and correct for potential endogeneity in the measure by using the ratio of extra-budgetary expenditure to budgetary expenditure as an instrument. I find that fiscal inequality accelerated economic growth across the provinces under the 1987-93 FRS system, but not after the TSS 1994 reform. One reason for this is that the 1994 tax-sharing system created an inequitable distribution of public resources by favoring politically important provinces over provinces with greater needs but of less political importance (Martinez-Vazquez and McNab, 2003). Additionally, I also construct a measure of fiscal decentralization. I find that the impact of fiscal decentralization on economic growth is positive both pre-and post-1994 reform. One explanation for this is the classical fiscal decentralization theories (Oates, 1972, 1993) that argue that local governments more effectively provide public goods and make public investments than the central government. Qualitatively, my findings show that a 10% increase in fiscal inequality and fiscal decentralization would increase economic growth by 11% and 4%, respectively, before 1994. In addition, since 1994, The impact of fiscal inequality would be close to zero or even negative, but the impact of fiscal decentralization would increase to 5%. Finally, I show that the use of extra-budgetary funds could eliminate the difference in economic growth between "rich" and "poor" provinces.

Fundamentally, our results add to the literature by providing strong evidence from the world's largest developing country on the relationship between the central and local governments is closely related to economic development. In addition, the impacts of fiscal decentralization and fiscal inequality also are associated with financial relations between different levels of government. This study has been a first step toward

understanding China's fiscal federalism. Much remains to be done. Further efforts should investigate the mechanisms of fiscal decentralization and fiscal inequality on economic growth. It would be interesting, in particular, to uncover any links between local political, economic, and social institutions in the context of China's background. Such analyses would undoubtedly be of great benefit in exploiting which specific fiscal reforms implemented could promote the local economic development.

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Appendix: Supplementary Tables and Figures

Table A1: China Central and Local General Public Budget, 1994 (100 million yuan)

Level of government	Government expenditure	Government revenue	Deficit (surplus)
Total	5792.62	5218.10	574.52
Central	1754.43	2906.50	-1152.07
Local	4038.19	2311.60	1726.59

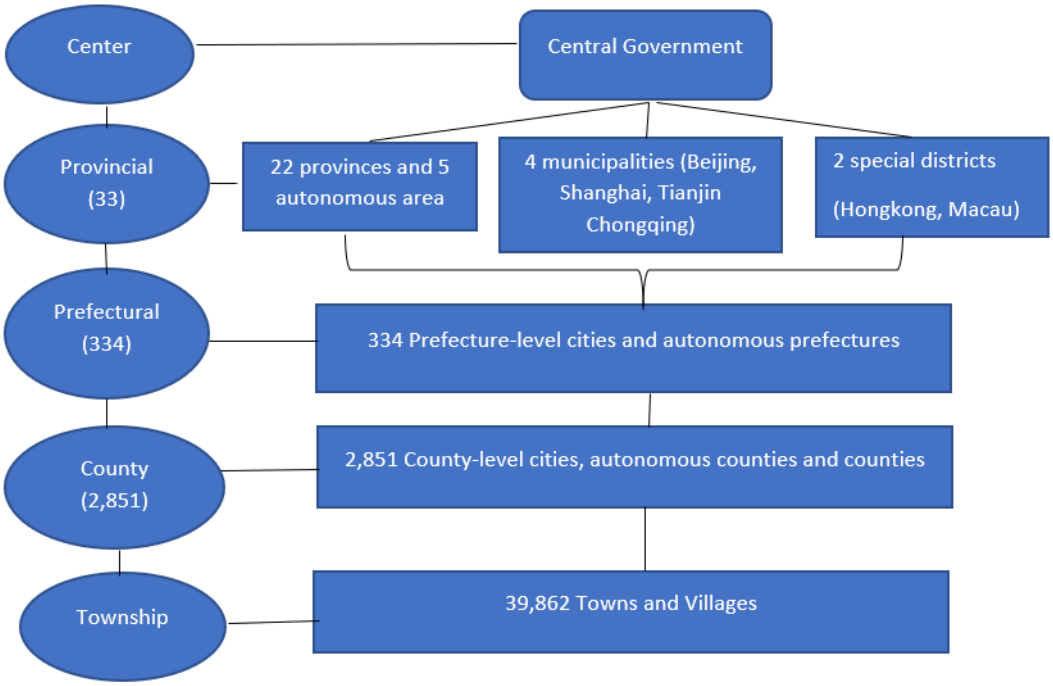
Source: Author's calculations using data from the National Bureau of Statistics of China.

Table A2: Variable Definitions

Variable	Definition
Growth	Growth rate of real GDP per capita at the provincial level
Decentralization	The ratio of per capita local budgetary expenditure to the sum of The ratio of per capita local budgetary expenditure and per capita central budgetary expenditure.
Inequality	(1) The coefficient of variation defined as the ratio of the standard to the mean of per capita local budgetary expenditure. (2) Gini coefficient of per capita local budgetary expenditure.
Tax	Effective tax rate: provincial total tax revenue as a percentage of total provincial GDP
Extra Budget	The ratio of extra-budgetary expenditure to public budgetary expenditure
Labor	Growth rate of labor force
Capital	Growth rate of capital investment

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

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

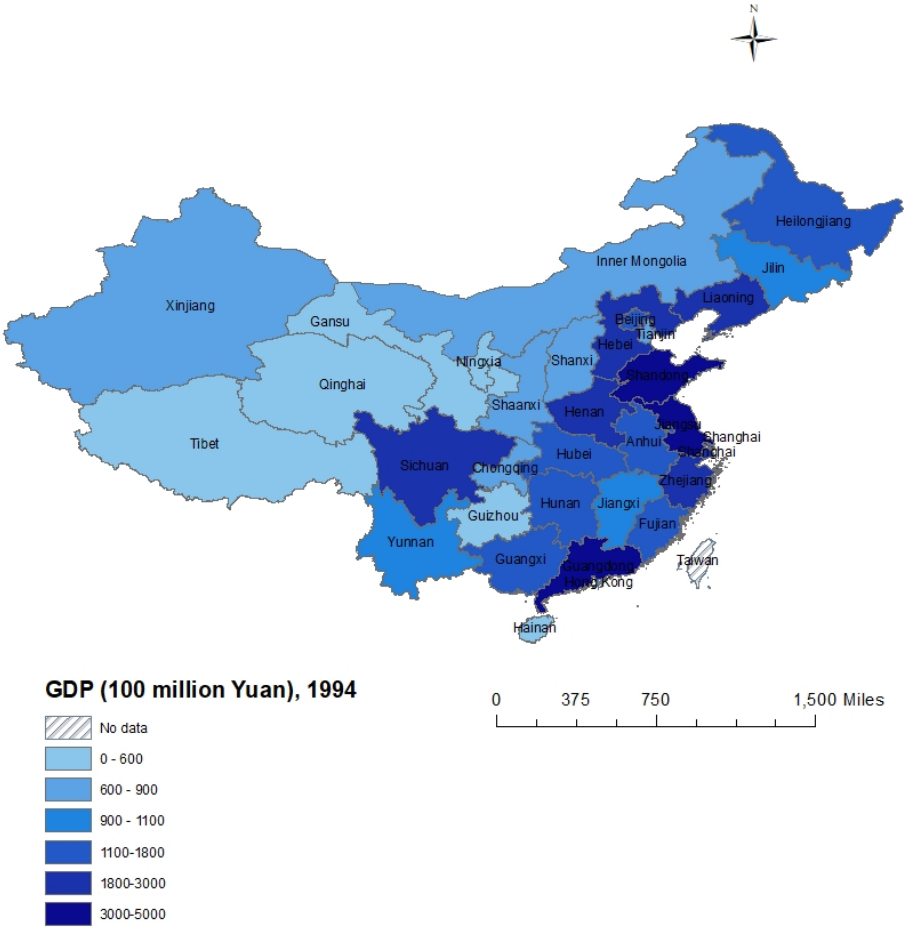


Figure A3: Real GDP by Province in 1994

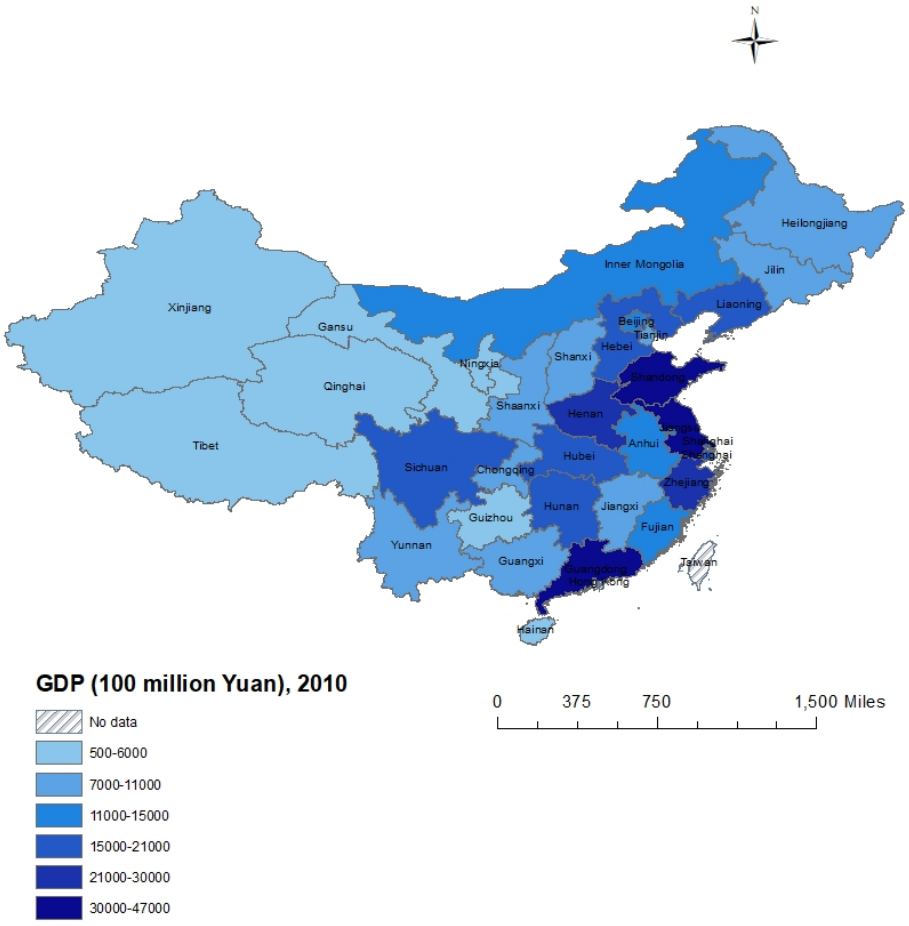


Figure A4: Fiscal Decentralization by Province in 1994

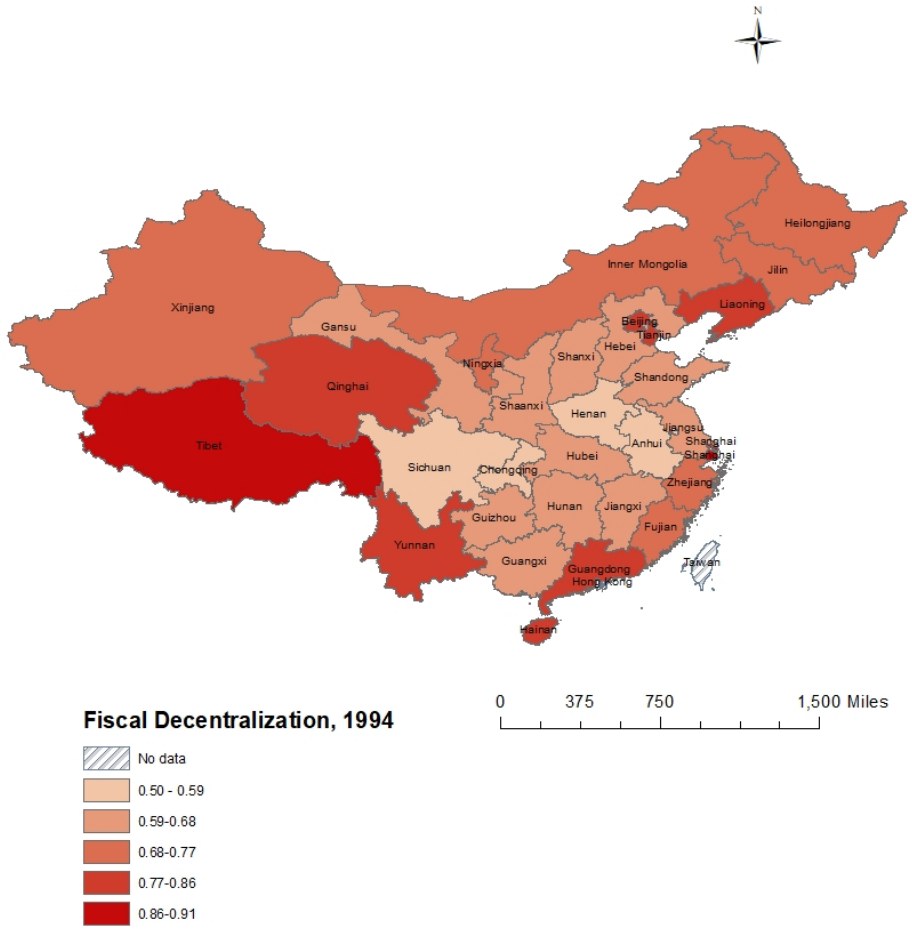


Figure A5: Fiscal Decentralization by Province in 2010