

Fiscal Federalism, Fiscal Reform, and Economic Growth in China

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Abstract

Though it has been recognized that political institutions and state capacity play an important role in determining economic outcomes, for most non-Western economies we still do not have granular enough historical knowledge as to how. Here we study a particular historical episode in the case of China, which, after a period of fiscal decentralization that has been credited with leading to historically unprecedented growth rates but significant fiscal decline, recentralized the collection of tax revenues. The economic and political consequences of this new Tax Sharing System (TSS) have been debated extensively given the interest on fiscal decentralization and its interaction with political institutions and economic outcomes. The central question in this debate has been whether the TSS constitutes a significant departure from decentralization with adverse effects on fiscal federalism or whether the recentralization under the TSS corrects for the overshooting in decentralization with beneficial economic outcomes. Our approach exploits the staggered introduction of the TSS across regions and over time to causally identify the policy impact on economic outcomes. After showing traditional proxies of fiscal federalism provide unstable estimates and contradictory conclusions, we utilize a difference-in-difference approach, and find that the TSS increased per capita GDP growth rates by 17%. (JEL codes: H7, H10)

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1 Introduction

Though economic historians have recognized the very significant impact political institutions in general and the state in particular have on economic outcomes, it is clear that we do not yet really understand the nexus, especially in the non-Western parts of the world, between the various institutions of the state and its capacity to tax and spend as it implements laws, regulations, and policies. In what follows, we take seriously the recent plea by Hoffman (2015) to carry out research on what states do, with a special emphasis on gathering data on taxation and spending by local and central governments. Our focus is squarely on the late twentieth century history of fiscal decentralization and recentralization in China.¹ This focus is justified by the historically unprecedented acceleration of growth that China experienced for almost four decades now.²

The literature has credited the fiscal reforms undertaken since the early 1980s as one of the main reasons for the acceleration of Chinese growth.³ To put these reforms, which resulted in the system of fiscal federalism credited for faster growth, in historical context, it is important to note that fiscal relations between the central and subnational governments in China have undergone three distinct stages since 1949.

Between 1949 and 1979, the budget was highly centralized with only minor amounts of local discretionary spending allowed. After a period of experimentation in the 1979-1983 period, a comprehensive reform of the fiscal system, known as the *fenzao chifan* (eating from separate kitchens) or the “Fiscal Responsibility System (FRS),” introduced substantial decentralization in 1984. Under this system there was significant fiscal decline, with the share of total tax revenue transferred to the central government falling from 39 percent in 1985 to 22 percent in 1993 and overall revenue collections declining from 31 percent of GDP in 1978 to 11.2 percent in 1994.⁴

¹Recent examples of analyses of late twentieth century fiscal policy and its role in redistribution are Espuelas (2012) and Hetland (2015), who focus on Europe. Hefeker (2001) studies fiscal federalism, which is also our focus in this paper, in the German Reich.

²Of course, as Ma (2008) reminds us, Chinese economic growth is not a recent phenomenon. China had experienced high levels of growth in the first three decades of the twentieth century, but was unable to sustain it after the 1930’s.

³See Montinola et al. (1995) among others.

⁴Ahmad et al., (2002), Dabla-Norris (2005), Bahl and Martinez-Vazquez (2006). The positive connection between fiscal centralization and fiscal revenues has been observed widely across space and time. For example, Dincecco (2009) finds a similar positive connection in Europe for the period 1650-1913. Similarly, Arias (2013) documents the eighteenth century Mexican fiscal centralization that enabled a significant military buildup.

A new fiscal system was formally introduced in 1994 under the name “Tax Sharing System” (TSS or fenshuizi (tax assignment)). TSS reassigned taxes between the central and subnational governments (SNGs) with the intention of reducing the discretion of the latter in negotiating the sharing of revenues and ensuring a greater share for the former. This paper studies the income and growth consequences of the TSS by exploiting the staggered introduction of the system across regions and over time for econometric identification purposes.

The significance of TSS, which has been called a watershed event⁵ for the Chinese fiscal system, lies in the question as to whether it constitutes a divergence from the FRS that preceded it and that has been credited with placing the Chinese economy on the high growth path it followed after 1980.⁶ To put this claim in perspective note that the FRS is generally recognized as being a highly fiscally decentralized system that stands in stark contrast to the centralized system that was in place in the period 1949-1979.

Early theories of public finance—now commonly called “first generation theories of fiscal federalism”—had emphasized potential welfare gains from the decentralized finance of local public goods and services in contrast to the centralized provision of a single, uniform public output in all jurisdictions.⁷ Such gains are viewed to flow from the informational problems faced by central authorities who have only imperfect information with regard to local tastes and conditions. These gains, however, need to be contrasted with the efficiency cost of failure to internalize interjurisdictional externalities.

Second generation theories of fiscal federalism, on the other hand, emphasize the benefits decentralization affords and centralization imposes from a political and institutional perspective. Thus, centralized fiscal systems are viewed as leading to extortionary behavior on the part of the central government, whereas competition among decentralized governments would limit the capacities of the monopolist central government and foster local economic development, affording more accountability and better outcomes for the citizenry.⁸ Not every decentralized fiscal system would, however, lead to beneficial outcomes. Soft budget constraints faced by SNGs, mismatches in responsibility and resources, and local capture can easily derail a decentralized system giving rise to

⁵See World Bank (2002).

⁶See Montinola et al. (1995) and Jin et al. (2005) among others. Du and Deng (2017) study one particular case of Chinese state intervention, in this case in food markets, in this period (1979-2006) of wide-ranging fiscal reforms.

⁷See Oates (1972 and 2005) for a formulation of this view. See Brueckner (2005) for theoretical work that links federalism with growth.

⁸See Brennan and Buchanan (1980), Besley and Coate (2003), and Weingast (1995).

opportunities for increased local rents and corruption.⁹

Under the FRS, the second generation theorists of fiscal federalism see the Chinese central government as delegating economic policy-making and significant fiscal authority with hard budget constraints to the SNGs.¹⁰ Given their new policy authority and facing fiscal incentives to promote reform, a number of SNGs adopted pro-market policies. Under the FRS, SNGs raised their own tax revenue negotiating contracts with the central government. Many of these contracts allowed SNGs to share 50 percent of all revenue raised up to a pre-specified revenue level and then the SNG to retain all of revenue that exceeded this level. As Jin et al., (2005) show, the average province faced a marginal tax retention rate of 89 percent while 68 percent of all provinces faced a marginal retention rate of 100 percent. Facing strong fiscal incentives to promote reform, many SNGs experienced high rates of economic growth. With the reforms proving successful, the central government devolved additional incentives and political power to the SNGs, which then acted as a counterbalance to the political power of the central government.

Yet, the sharp decline in central government revenues experienced under the FRS led to a rethinking of the fiscal system. As Montinola et al., (1995) put it with the FRS there was “overshooting in decentralization.” The crucial question that emerged with the TSS reform package was whether this meant a recentralization to the extent of a reversal to the old system or a move to further the process of rationalization of market institutions. The former outcome would threaten the crucial political component that supported the success of the economic reforms, whereas the latter outcome would be a shift towards a formal fiscal federalism that promised to resolve the coordination problems associated with an overly weak central government without endangering the benefits that accrue from decentralization.

The debate on whether the TSS reversed the decentralization course started by the FRS is still ongoing. The literature has taken two paths to answer this question. One path taken focuses on the elements of the new fiscal regime introduced by the TSS and compares these with either those of the FRS or of an ideal decentralized regime. The other tries to determine empirically whether the two regimes led to differences in economic outcomes. Thus, within the former literature, Zhang (1999), for instance, views the 1994 reform as stemming budgetary decline, but leaving the actual pattern of revenue distribution and spending responsibilities between the central government and the SNGs fundamentally unchanged. Weingast (2009) perceives TSS as continuing the

⁹See Blanchard and Shleifer (2000), Haggard and Webb (2004) and Weingast (2014).

¹⁰Montinola et al., (1995), Oi (1992), Shirk (1993), and Weingast (2014).

market-preserving federalism initiated by the FRS. However, Wong (2000) sees the TSS as recentralization and emphasizes the fiscal problems (unclear expenditure assignments, unfunded mandates) that continue to plague the fiscal relations between the center and the provinces.

The empirical literature on the subject includes Zhang and Zou (1998) who, using a province-level panel data set for China for the 1978–1992 period, find that fiscal decentralization is inversely associated with provincial economic growth. Lin and Liu (2000), on the other hand, examine a similar province-level panel data set for China for the longer 1970–1993 period and find evidence that fiscal decentralization is associated positively with economic growth. Jin and Zou (2005) use a panel data set for 30 Chinese provinces covering the FRS and TSS periods of 1979–1993 and 1994–1999. They provide evidence that provincial economic growth is negatively associated with expenditure decentralization and positively associated with revenue decentralization in the 1979–1993 FRS phase. Further, they find that in the 1994–1999 TSS phase, there is no statistically significant relationship between provincial economic growth and expenditure decentralization, while there is a highly significantly association between provincial economic growth and revenue decentralization. Finally, Ding (2008), focusing on the TSS period of 1994–2002, finds a positive association between province level economic growth and various measures of fiscal decentralization.

The questions that existing empirical studies of the growth consequences raise are mainly twofold. First, as it is now clearly recognized the appropriate measurement of fiscal decentralization is a difficult task given the complexity of intergovernmental relations.¹¹ The empirical literature typically uses the share of subnational government expenditure or revenue in consolidated general government expenditure or revenue as a proxy for the degree of fiscal decentralization. However, it was recognized very early on¹² that such proxies have very limited use as they do not take into account the vertical structure of decision-making and, thereby, misrepresent the degree of fiscal decentralization. As a result, in empirical studies both cross-country comparisons and descriptions of long-term trends might be seriously distorted. It is, for instance, not clear whether an observed increase in the SNG share of total public expenditure or revenue implies fiscal decentralization in the sense of the devolution of decision-making powers to the SNGs. A fundamental question that arises here is the extent to which SNGs can keep local tax revenue instead of transferring it to the the central government and the autonomy they

¹¹See, Stegarescu (2005) for an insightful discussion.

¹²See, for instance, Oates (1972).

may have in making spending decisions.

In what follows, we move beyond the existing literature in this respect by first showing that the same reform package, the TSS, resulted in the two most commonly used measures of fiscal federalism, namely the SNGs' share of total public revenue and expenditure, moving in opposite directions. This highlights the problem with using endogenous variables to proxy for the object of interest, fiscal federalism. Instead, to analyze the effects of the TSS we exploit the quasi-natural experiment afforded by the staggered introduction of the TSS which resulted in certain regions in China starting the reform earlier than other regions, and use a difference in difference strategy to identify the impact of this reform on economic activity.¹³ This approach also allows us to deal with the second question raised by the existing empirical literature, namely that of causality. As the extant literature leaves unanswered the omitted variable bias in its empirical strategy, it is commonly recognized that the results obtained so far can only be used to establish associations between the economic outcomes investigated and measures of fiscal policy employed, but not a causal relationship between policy and economic outcomes. The difference-in-difference approach we adopt provides a more satisfactory method in establishing causality.

The major results we obtain include the finding that the TSS treatment increased growth rates by economically meaningful amounts, with estimates that are robust to alternative specifications and controls. When we expand our view beyond the traditional focus solely on growth rates, we find that the TSS has significant implications for levels of economic activity as well. While methods based on endogenous proxies for fiscal federalism are unstable and unreliable, our preferred approach using difference-in-difference estimation tells a consistent and compelling story. The TSS reform increased levels of economic activity, with highly significant estimates that are robust to alternative controls and inferential assumptions.

The plan of the paper is as follows. In the next section we provide a more detailed discussion of the institutional and policy background for the TSS. Section 3 presents our empirical analysis with the main results. Section 4 concludes the paper.

¹³Ivanov (2016) is a recent excellent example of the use of a quasi-natural experiment to tease out causality using a methodologically sound identification strategy.

2 The Background

The “watershed” tax reform of TSS arose in an institutional setting the most important fiscal element of which was the FRS that was introduced in 1984. This system shifted the collection of most tax revenue to local governments under a fiscal contract with the central government. A typical fiscal contract allowed a given Chinese province share 50 percent of the revenues it raised up to a certain level with the central government. Any revenues the province raised beyond that level were retained by the province. In most cases, the central government, however, was not able to monitor tax collection at the local level and was forced to renegotiate revenue shares with the local governments who hid resources from it in extra-budgetary funds. At the same time, the main taxpayers, the state-owned enterprises (SOEs), experienced substantial declines in profitability when prices adjusted to newly established markets, reducing tax revenues. With SOEs in financial difficulty, a significant share of safety net expenditures (unemployment insurance, subsidies for housing and fuel, etc.) was shifted from the SOEs to the local governments that now faced higher local expenditures. Thus, while overall tax revenues were in decline, expenditure burdens of local governments were on the rise.

The 1994 tax reform, the TSS, was introduced mainly two improve the so-called “two ratios”- the ratio of budgetary revenue to GDP and the ratio of central budgetary revenue to total budgetary revenue. The major elements of the new system were as follows.¹⁴ First, in an attempt to reduce the complexity of the tax system due to the proliferation of taxes after 1984, the number of taxes was cut down from 32 to 18. Second, surtaxes were eliminated and the top marginal income tax rate for enterprises was cut from 55 percent to 33 percent with tax rate schedule being unified to subject all enterprises to the same regime. Third, to reduce the incentive to hide revenues from the central government through deals with enterprises, SNGs were assigned the full income tax revenues. Fourth, the VAT system was expanded with VAT remaining a central government tax but to allow SNGs to share in the growth of their lost tax base, the central government committed to giving back 30 percent of its increased revenue from VAT and consumption tax (CT) each year. Fifth, a national tax system was established to collect central government revenues with a separate local tax system to collect local taxes. Finally and perhaps for our purposes most importantly, the central government committed to rebating to each province an amount equal to the reduction in the local tax base due to TSS. This last element was a compromise made by the central government

¹⁴Bahl and Marinez-Vazquez (2006), Wong (2000), and Zhang (1999).

to win the support of the SNGs for the new system. The central government announced that the special transfer mechanism, called shui shou fan huan (tax repayment) would differ from normal central grants in that its expenditure would not be subject to central control. As a result, even though with the TSS the collection of the majority tax revenue was to be transferred from the provinces to the center, the central government would allow the provinces to claim automatically much of these funds.

The current view of the informal literature on the effects of TSS two decades after its introduction is that it was successful in increasing tax revenue collection, simplifying the tax structure, and the recentralization of the revenues. However, revenue sharing with the SNGs continues to be ad hoc. Perhaps more importantly for the question of the devolution of decision-making powers to local governments, the TSS does not appear to have constituted a significant de facto break with the FRS: as the World Bank (2002, p.26) puts it “the TSS reform did not address the issue of extra-budgetary revenues, but instead gave implicit support to redoubled efforts by local governments to seek supplementary resources to support local economic development, in the process undermining the authority of the budget.” However, to go beyond the informal literature and to determine the consequences of the TSS for economic outcomes requires a formal empirical analysis that takes seriously the concern for the causal effects of the fiscal reform of 1994. This is where we turn in the next section.

3 Empirical Analysis

In this section, we study the effects of 1994 tax reform empirically. The policy change that the TSS ushered in poses a unique experience for analyzing the impact of fiscal federalism because of the scale of institutional adjustment as well as the staggered implementation across localities.

In what follows, we will show that focusing on endogenous measures of the stance of fiscal federalism can be deeply misleading. The ratio of revenues received by the local government to total revenues received by the central government and the ratio of expenditures by the local government to total expenditures by central government are typically assumed to be proxies for fiscal federalism, but in the case of China, these two measures move in extreme opposite directions during the policy period under consideration, suggesting they cannot both be proxies for fiscal federalism. This merely highlights the problem with using endogenous variables to proxy for the object of interest, fiscal federalism.

Instead, we exploit a quasi-natural experiment in the rollout and implementation of the TSS. Specifically, we take advantage of the fact that the reform was carried out in two stages: the country was divided into two groups, one, denoted as Group A, implemented the reform in 1992, the other, denoted as Group B, followed in 1994. Group A consisted of nine regions, including Zhejiang Province, Liaoning Province, Xinjiang Autonomous region, Tianjin municipality, Shenyang City, Dalian City, Qingdao City, Wuhan City, and Chongqing City.¹⁵ Both Shenyang and Dalian belongs to Liaoning Province, Qingdao belongs to Shandong Province, Wuhan belongs to Hubei Province and Chongqing was a city affiliated to Sichuan Province until 1997. This staggered introduction of the TSS allows us to use a difference-in-difference strategy to identify the impact of the reform on economic activity. While the process of selection of localities was not purely random, the pre-trends of observable characteristics suggest that there are no noticeable trend differences between the localities that received the treatment and those that did not. As such, we treat the application of treatment as random, and interpret the difference-in-difference estimates as the true impact of the TSS on local economic growth.

Our empirical approach begins by first following the traditional path in the fiscal federalism literature by considering the impact of fiscal federalism using typical proxy variables on growth rates at the locality level. Using this approach, we find conflicting results in the case of China, with revenue-based proxies of fiscal federalism implying that greater fiscal decentralization leads to lower growth rates, but expenditure-based proxies of fiscal federalism imply higher growth rates. These results are robust to the inclusion of controls for possible omitted variables, with the estimated effects becoming larger in magnitude once controls for locality heterogeneity are included. Furthermore, point estimates vary wildly (and lose statistical significance) when the sample is split in to before and after reform periods. These results justify the concern over the use of endogenous proxies for fiscal federalism. We then estimate the impact of the TSS by exploiting the unique policy environment and utilizing a difference-in-difference (DD) approach. Our DD estimation results suggest that policy treatment did increase economic growth. In our preferred specification, treatment increased per capita growth by 2.1%, representing a 17% increase in per capita growth relative to the FRS period.

We then extend the literature even further by considering the effect of this policy experiment on the level of economic activity. Once again, endogenous proxies for fiscal federalism tell conflicting stories, none of which are robust to sample period selection. When we exploit the natural experiment, however, our DD estimation identifies a signifi-

¹⁵Shu-Ki and Yuk-Shing (1994).

cant and robust effect of treatment on the level of economic activity. We find that policy treatment increased the level of economic activity by 12%. For the median per capita income 1657 yuan in 1991, this would represent an increase of 203 yuan per capita.

3.1 Data

The regional data is drawn from the Department of Comprehensive Statistics (1999), and covers all 31 provinces of Mainland China between 1980 and 1999.¹⁶ Variables include information on revenues and expenditures of each locality, disaggregated by source and type. The dataset also includes information on locality GDP and population, as well as exposure to international forces through locality imports and exports. The dataset gives a complete portrait of economic conditions at the locality level.

Of the 31 localities, 4 were dropped due to incomplete or unreliable data. Tibet and Hainan were dropped because of missing data. Chongqing was a city affiliated with the Sichuan province, and was not directly supervised by the central government until 1997, when it became one of four municipalities. For these reasons, Tibet, Hainan, Chongqing, and Sichuan were dropped from the analysis. This leaves us with 27 localities, 20 years of data, and 540 total observations. Summary statistics of key variables are reported in Table 1.

One particularly noteworthy aspect of the dataset is the amount of heterogeneity observed across these localities and over time. There is significant variation in GDP, population, local expenditures and revenues, openness to international trade, and local expenditure priorities. Figure 1 shows heterogeneity in growth rates over time for each locality, while Figure 2 emphasizes the significant cross-sectional variation over time. Furthermore there is significant variation in locality measures of expenditures of agricultural support programs, expenditure share on education, expenditure share on government administration, and capital construction expenditure shares. Given so much observable heterogeneity, our approach will take care to control for individual locality effects that may influence economic growth.

In our difference-in-difference implementation, we rely on the structure of the timing of reform to identify the effect of the TSS relative to the FRS. To this end, we restrict our dataset to the years 1985-1999, which covers both the FRS and TSS phases of fiscal

¹⁶In Mainland China, there are three different names used for effectively the same administrative level: provinces, municipalities, and autonomous regions. For comparative purposes, these are similar in scope to U.S. states. Presently, there are 23 provinces, 5 autonomous regions, and 4 municipalities in China.

federalism in China. To interpret our estimates as causal, we would ideally want random assignment of treatment and control. While the selection process of treatment was not explicitly a randomized experiment, Table 2 provides comforting evidence about the observable differences between control and treatment groups. When all types of treatment are grouped together, a number of observable variables are significantly different than those in the control group, raising the specter that unobservable variables are also significantly different. Two cities, Qingdao City and Wuhan City, were included in the first phase of the reform in 1992, however, the encompassing Provinces, Shangdong and Hubei respectively, did not reform until the 1994 wave. Since the data is available at the Province level, these two provinces received partial treatment since only a part of the Province was included in the first phase of reform. In the analysis below, we will consider two different measures of treatment. First, if any part of the province received treatment, we will refer to this as "Any Treatment". Second, we will break treatment up into "Full" and "Partial Treatment" since the two partial treatment Provinces are neither complete control nor complete treatment groups. When treatment is broken up into full and partial treatment groups, it becomes clear that the partial treatment group is driving the observed differences. With the exception of population size, there are no statistically significant differences between the 21 control localities and the four full treatment localities, supporting our interpretation of full treatment as random. In our analysis below, we will be careful to consider per capita economic measures to account for potential differences in size across localities. For the two partial treatment localities, there are however significant differences compared to the control group. As such, we will take care to consider separate treatment effects for partial and full treatment, as well as include control variables to account for observable differences across localities.

While there are some statistical differences in observable means, especially for partial treatment localities, Figure 3 shows that pre-treatment trends in $\ln(\text{GDP per capita})$ for control and treatment (any treatment) groups do not differ. This observation motivates our use of locality and year fixed effects in our DD specification, and lends support to our identification assumption of random application of treatment.

3.2 Empirical Implementation

We begin our analysis by exploring the relationship between measures of fiscal federalism and economic growth, following the traditional approaches in the fiscal federalism literature. In the process, the concerns over the interpretation of traditional approaches will be highlighted.

To get a first cut at the data, consider Table 3, which reports regression results for three different proxies of fiscal federalism and their impact on local economic growth rates per capita. Our first proxy considers the ratio of local revenue to total central revenue in China. The idea is that as the share of local revenue increases relative to central revenue, the local government gains more economic freedom over local choices through higher available local revenue. Results in Table 3 imply that a higher ratio of local to central revenue leads to slower economic growth per capita, suggesting that fiscal decentralization actually reduces economic growth.

The second standard measure of fiscal federalism is the ratio of local tax revenue to central tax revenue, an alternative measure of fiscal decentralization based on revenue flexibility. As reported in Table 3, the estimated effect of enhanced fiscal decentralization reduces economic growth per capita, consistent with the measure based on total revenue rather than just tax revenue. In both cases, revenue based proxies for fiscal federalism suggest that decentralization hurts local economic growth.

When we consider expenditure-based proxies of fiscal federalism, however, we find evidence in support of the opposite conclusion. The ratio of local expenditure to central expenditure has a positive effect on growth per capita, and is also statistically significant. This suggests that as localities gain more control over local expenditures relative to the central government, growth rates increase.

One limitation with the results in the first part of Table 3 is that omitted variables may be correlated with the measures of fiscal federalism, and this may be influencing the observed estimates leading to conflicting results. The standard approach to an omitted variables bias is to include sufficient relevant control variables, although specifying which control variables to include is problematic. To attempt to correct for omitted time varying factors at the locality level, the second part of Tables 3 reports estimates for fiscal federalism proxies after controlling for observable locality factors such as spending on social programs (education, health, culture, and science), government administration, capital construction, as well as spending on agriculture support programs.

Consider first a revenue-based proxy of fiscal federalism, the ratio of local to central revenues. Our raw point estimate is negative and statistically significant (column (1)). A series of regression results are reported in columns (4) through (8), as we systematically include relevant locality specific factors such as spending on government administration, capital construction, and social services such as health and education, and agricultural programs. In all cases, the coefficient on the total revenue proxy of fiscal federalism is negative and statistically significant. In fact, when all relevant controls are included

(column (8)), the point estimate increases nearly 50% relative to the raw coefficient reported in column (1), with even stronger statistical significance. We estimate that an increase in the ratio of local revenue to central revenue by one unit leads to a 1.1 percentage point decrease in the growth rate per capita, a non-trivial effect.

We next conduct the same basic exercise, except we look at only local tax revenue, which strips out any central government transfers that are often earmarked for specific spending projects. Once again, the inclusion of controls has no effect on the sign or significance of the key variable of interest, but interestingly the point estimate is nearly identical in the preferred specification with all relevant controls (Column (9)). The impact of a one-unit increase in the ratio of local tax revenue to central tax revenue results in a 1.7 percentage point decrease in economic growth with high statistical significance. At least for revenue-based proxies for fiscal federalism, the result is quite robust: greater fiscal decentralization leads to lower economic growth.

Lastly, we conduct the same exercise, but focus on an expenditure-based measure of fiscal federalism. And once again, the results originally found in Column (3) stand up to the inclusion of locality specific time varying controls. In all cases, the point estimate is positive and statistically significance (results not reported, but available on request). When all relevant controls are included (Column (10)), the point estimate is nearly 4 times as large as that found in the simple bivariate case, and highly statistically significant. A one-unit increase in the ratio of local expenditure to central expenditure is associated with a 4.5 percentage point increase in economic growth per capita.

These conflicting results, robust to a battery of controls, suggest that endogenous proxies for fiscal federalism are unsuitable for estimating the effect of fiscal federalism on economic outcomes such as economic growth. Traditional approaches for measuring and estimating the effect of fiscal federalism are likely to be conflicting, confusing, and unreliable because they don't directly measure fiscal federalism, but rather rely on endogenous proxies for fiscal federalism.

To reinforce this concern, Table 4 considers these three proxies before and after the policy experiment. Not only do revenue and expenditure based measures tell different stories, each measure is not robust to sample period selection, losing significance or even switching sign before and after the policy experiment under consideration. This should not be surprising since these are endogenous proxies, and the policy experiment under consideration had differential impacts on revenues and expenditures.

We move beyond approaches in the traditional literature by leveraging a unique policy experience, exploiting a quasi-experimental environment and using a difference-

in-difference estimation approach. As outlined above, localities differed in the timing of policy, and we consider the first localities to adjust as a treatment group compared to a control group of localities that adjusted later.

We start our analysis by considering a locality as treated if the locality received at least some treatment. This includes localities where some cities received treatment even though the entire locality did not receive treatment initially. Table 5 estimates the treatment effect to be 0.6 percentage points in Column 1, but not statistically significant. As discussed above, however, there is significant heterogeneity in localities, and over time, which should not be attributed to treatment directly. Columns (2) through (6) include time-varying controls, with no effect on statistical significance, although the point effect more than doubles when all controls are included. However, once year and province fixed effects are included, the point estimate of treatment on locality growth rates per capita is positive and statistically significant. The most preferred specification (Column (8)) estimates the impact of treatment to be 1.7 percentage points and is statistically significant. For comparative purposes, average per capita growth rates during the FRS period were 11.9%, suggesting that TSS treatment increased per capita growth rates by around 15%. Localities that experienced the TSS treatment first grew faster than localities that received treatment later, and the estimated effect was economically significant.

While the results in Table 5 are intriguing, one concern is that treatment heterogeneity might be confounding the estimated effects. To address this concern we restrict treatment to only those localities that fully received treatment and consider partially treated localities as part of the control group. The same basic patterns emerge for full treatment only (unreported results available upon request). The preferred specification, reported in Column (9) of Table 5, suggests that full treatment localities saw their growth rate increase by 2.1 percentage points compared to localities that adopted TSS later. Compared to FRS average per capita growth rates, full TSS treatment increased per capita growth rates by over 17%.

To consider the effect of partial treatment, we break treatment up into three distinct groups: full treatment, partial treatment, and no treatment (control). Again, unreported patterns are nearly identical to the previous results. The most preferred specification (Column (10)), confirms the estimated full treatment effect of 2.2 percentage points and is statistically significant. The partial treatment effect is estimated at 1.0 percentage points, but is not statistically significant. Given the heterogeneity within localities, the result suggestively reinforces the view that TSS treatment positively affected per capita growth, even when only partially applied.

Summing up the results on per capita economic growth rates, we find that while traditional approaches to estimating the impact of fiscal federalism depend upon unreliable endogenous proxies, when the institutional structure of TSS reform is exploited with a difference-in-difference estimator, the causal effect of TSS on per capita growth rates is large and statistically significant, representing a 17% increase compared to per capita growth rates during the FRS period.

While the literature has focused on the impact of fiscal federalism on growth rates, we explore the impact using quasi-experimental methods on not just growth rates, but also GDP levels, providing a richer portrait of the economic consequences of the TSS reform.

We follow the same empirical approach for levels as with the analysis of growth rates. In Table 6, we start with simple relationships between \ln (GDP per capita) and proxies for fiscal federalism using revenue and expenditure measures. As with growth rates, revenue-based measures of fiscal decentralization are correlated with lower levels of GDP per capita, while our export-based measure of fiscal decentralization is associated with higher GDP levels per capita. In all cases, measures are highly statistically significant.

Focusing more specifically on each proxy of fiscal federalism, Columns (4) through (8) demonstrates that local to central total revenue is robust to additional controls. The patterns are very similar to those found for growth rates above. While controls reduce the estimated effect by about half, and explain nearly 80% of observed variation in \log of GDP per capita, the general conclusion holds – fiscal decentralization decreased GDP per capita levels. Column (9) reports the preferred specification focusing on tax revenue instead of total revenue. The estimated coefficient on this revenue-based measure of fiscal federalism is negative and highly statistically significant, and while controls reduce the point estimate by about two-thirds (and explain about 80% of the variation), the negative relationship between revenue-based proxies of fiscal federalism and GDP per capita levels is confirmed.

Expenditure-based proxy results, however, tell the opposite story. As with the growth rate analysis, revenue and expenditure proxies differ in the estimated effects. The point estimate for local to central expenditure is always positive and highly statistically significant, robust to the inclusion of control variables, and accounts for nearly 80% of observed variation in \log GDP per capita (results not reported). In the most preferred specifications (Column 10), the absolute value of the estimated effect based on expenditures is nearly identical to the absolute value of the estimated effect based on tax revenues – but with the opposite sign. Once again, endogenous proxy measures of fiscal federalism tell

conflicting and unreliable stories about the economic impact of reform since the reform under consideration had differential effects on revenue and expenditures.

To reinforce these concerns, Table 7 reproduces the before and after approach utilized above for growth rates. Again, proxies for fiscal federalism are not robust to sample period selection. In some cases, estimated coefficients lose significance, while in other cases, estimated coefficients switch signs. Overall, the conflicting evidence strongly pushes against trying to use endogenous proxy variables to measure the impact of fiscal federalism. Instead, we use our preferred quasi-experimental approach.

Table 8 considers all localities that received at least some treatment as treated, and we find that fiscal federalism treatment increases GDP per capita levels. While the same general tendency was identified with growth rates, the levels analysis has the added benefit that in the most preferred specification (Column (9)), TSS treatment is significant at the 0.1% level. The DD estimates implies that TSS treatment lead to a 8% increase in per capita GDP, or 139 Yuan per person compared to median per capita GDP levels in 1991.

Columns (9) and (10) break treatment up into full and partial treatment, and confirm the growth findings. The full treatment effect is larger at 11.5% and highly statistically significant. The partial treatment effect is positive (2.6%), but not statically significant, mirroring the growth results. Overall, the model explains nearly all of the observed variation in locality GDP per capita levels. The implied causal TSS full treatment effect equates to 203 yuan per person (compared to 1991 per capita GDP levels).

4 Conclusion

Between 1949 and 1979, the Chinese fiscal system was highly centralized with only occasional minor allowances for local discretionary spending. Following a period of experimentation in the 1979-1983 period, the fiscal system was substantially decentralized in 1984. The fiscal federalism that this decentralization gave rise to has been widely credited for the unprecedented growth rates the Chinese economy experienced in the three decades that followed. However, this fiscal system also resulted in a significant decline of the fiscal revenues of the central government, with the share of total tax revenue transferred to it falling from 39 percent in 1985 to 22 percent in 1993. The policy response to the fiscal decline was the staggered introduction of the so-called Tax Sharing System (TSS) system that started in 1992 and was fully implemented by 1994. The economic and political consequences of the TSS have been debated extensively given

the interest on fiscal decentralization and its interaction with political institutions and economic outcomes. The question that is central in this debate has been whether the TSS constitutes a significant departure from decentralization with adverse effects on fiscal federalism or whether the recentralization under the TSS corrects for the overshooting in decentralization with beneficial economic outcomes. Traditional approaches that try to assess the impact of the TSS reform typically focus on endogenous proxies of fiscal centralization and find conflicting and fragile results. In contrast, our quasi-experimental approach, utilizing the large-scale TSS policy experiment in China with staggered timing to implementation, provides consistent and robust estimates. Following the traditional literature's focus on growth rates, we find that treatment increased growth rates by economically meaningful amounts, and estimates were robust to alternative specifications and controls. If we expand our view beyond the traditional focus solely on growth rates, and we find that the TSS has significant implications for levels of economic activity. While methods based on endogenous proxies for fiscal federalism are again unstable and unreliable, our preferred approach using difference-in-difference estimation tells a consistent and compelling story. The TSS reform increased levels of economic activity, estimates are highly significant, and robust to alternative controls and inferential assumptions.

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Figures

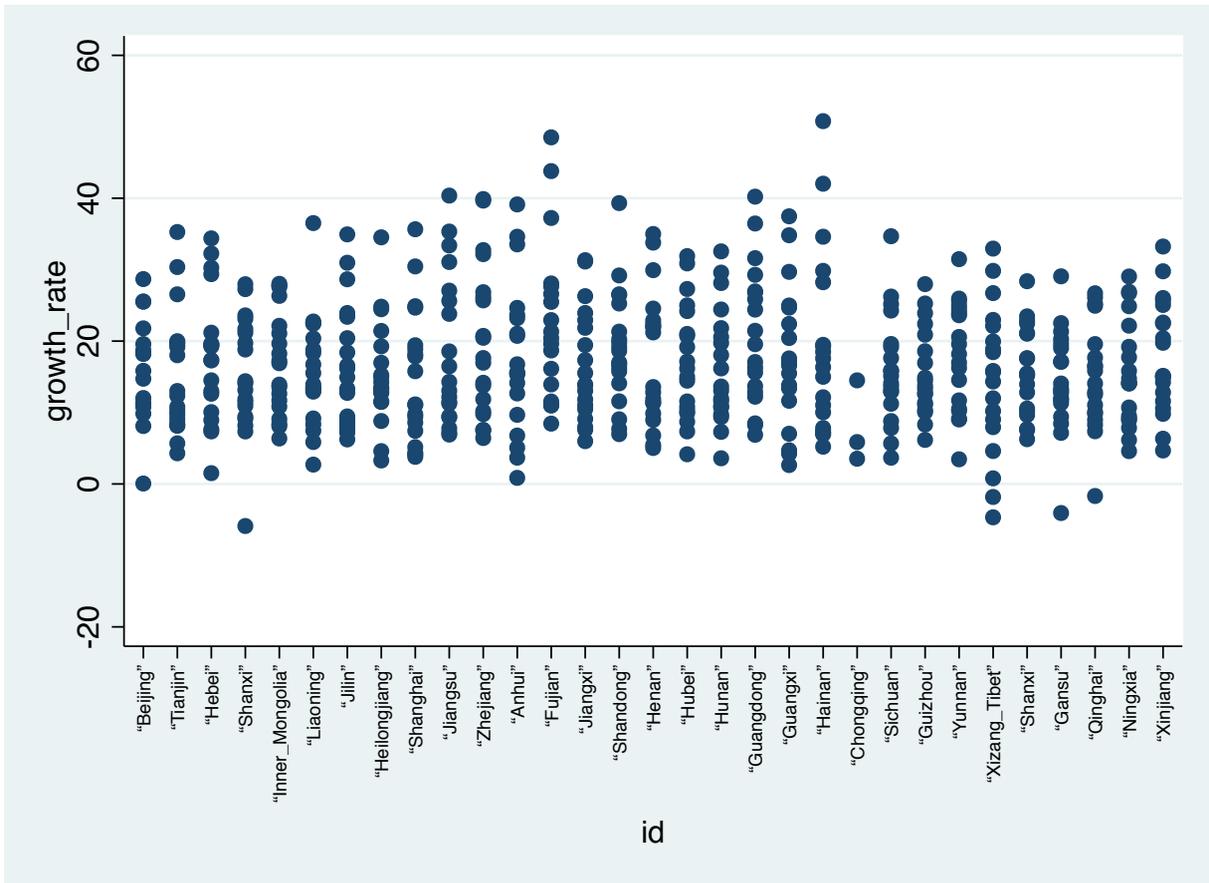


Figure 1: Locality Growth Heterogeneity (Across Localities)

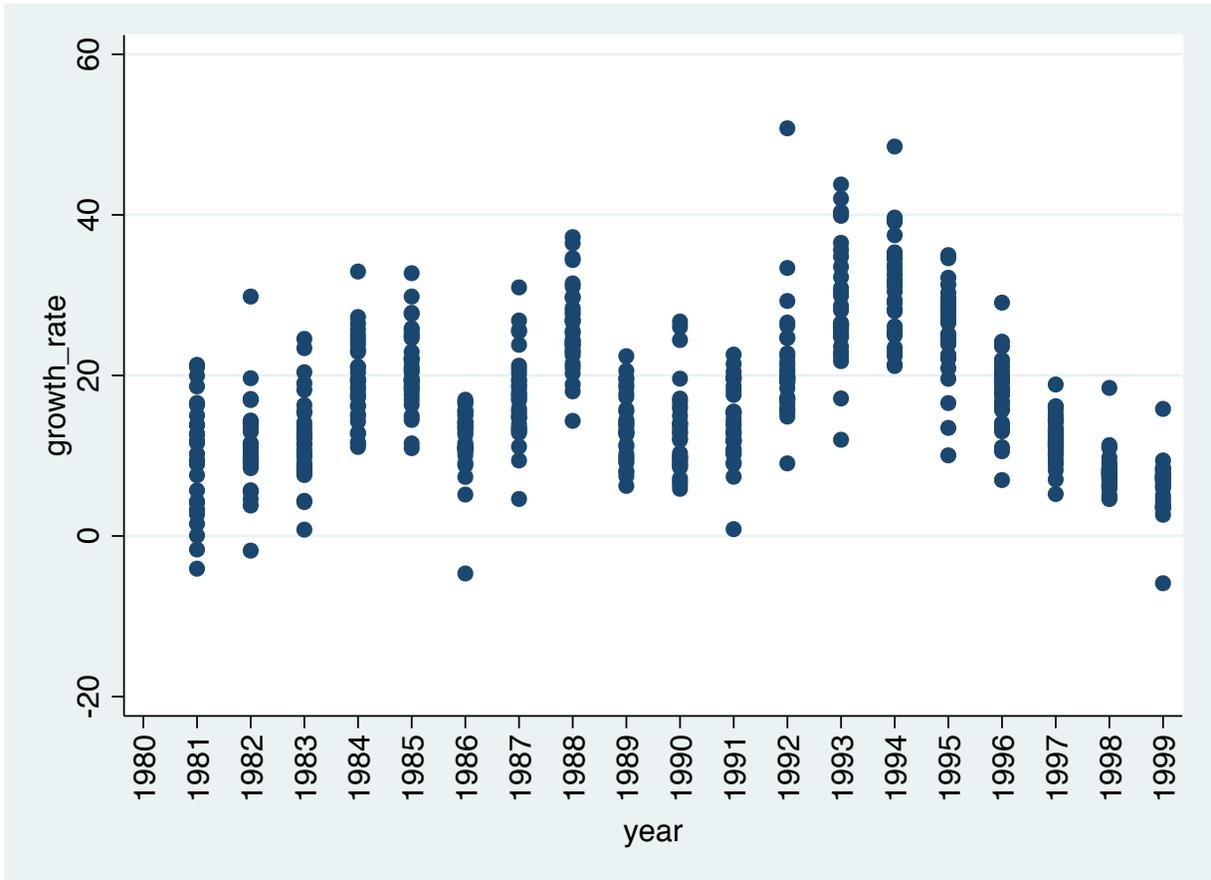


Figure 2: Locality Growth Heterogeneity (Over Time)

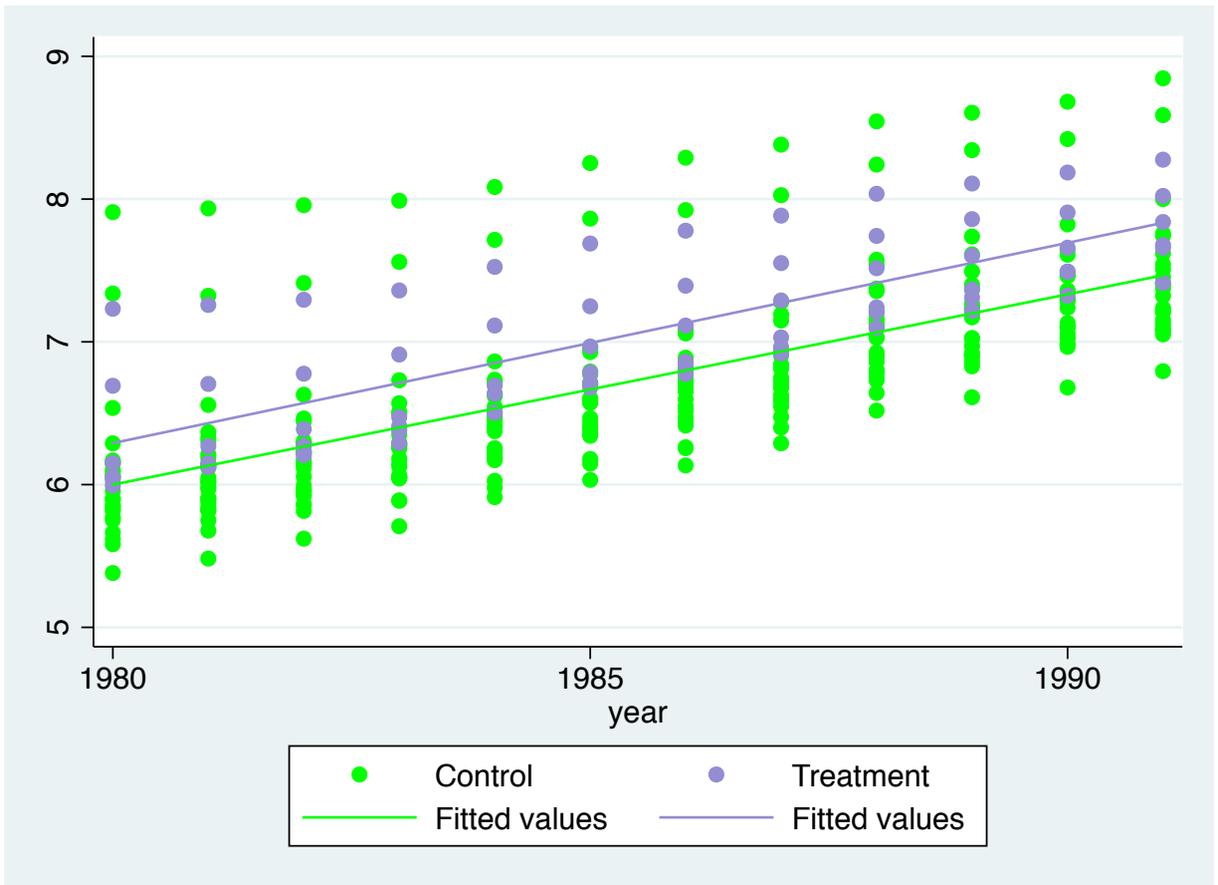


Figure 3: Ln GDP per capita Pre-Treatment Trends - Control and Treatment

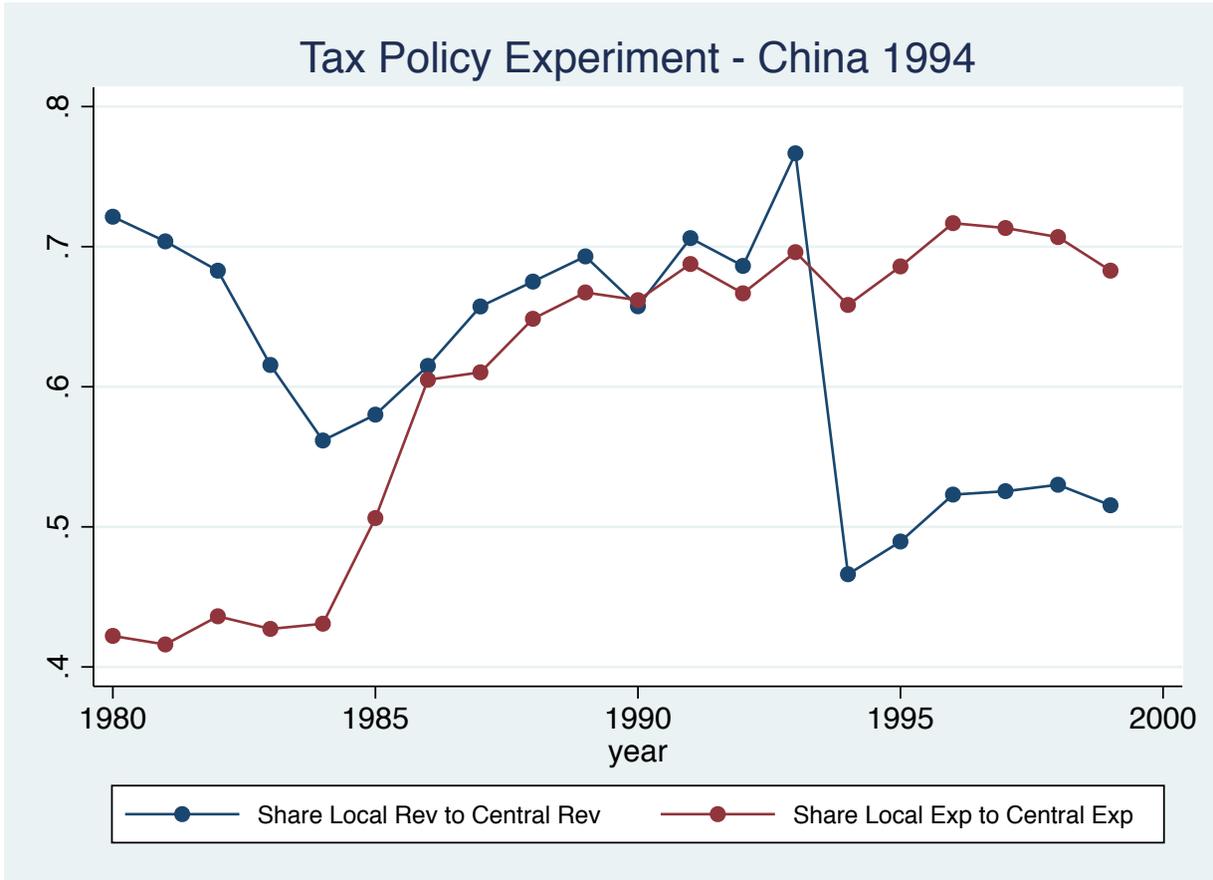


Figure 4: Share of Local Revenues and Expenditures to Central Revenues and Expenditures - 1994 Policy Experiment

Tables

	Obs	Mean	Std. Dev.	Min	Max
GDP	538	1040	1404.0	16.0	8464.31
Local Revenue	540	82.0	87.1	1.1	766.19
Local Taxes	529	69.3	70.4	1.3	507.13
Industrial and Commercial Taxes	456	61.8	68.4	1.2	497.54
Local Expenditure	540	99.6	116.7	1.9	965.9
Capital Construction	539	10.0	14.9	0.5	143.86
Innovation Funds	498	7.0	10.6	0.2	77.14
Agriculture Support Programs	536	6.9	6.5	0.6	40.27
Culture, Education, Science, and Health	536	26.2	30.8	1.0	244.18
Government Administration	517	10.9	11.3	0.5	74.05
Population	539	3706	2216	373.7	9387
Total Exports and Imports	520	439354	1429717	5.5	14036742
Total Exports	525	268652	785672	1.8	7770458
Total Imports	520	168165	648022	0.0	6266284

Notes: Summary statistics for 27 localities from 1980 to 1999. All monetary values measured in 100 Million Yuan, except for trade variables (imports and exports) which are measured in \$10,000s. Population measured in 10,000s.

Table 1: Summary Statistics

Pre-Treatment Group Means	Control	All Treatment	Full Treatment	Partial Treatment
GDP	452.6 (28.98)*****	185.4 (61.48)***	58.45 -70.49	439.3 (95.61)*****
Local Total Revenue	54.51 (3.319)*****	17.13 (7.041)**	13.09 -8.302	25.21 (11.26)**
Local Tax Revenue	50.73 (2.897)*****	14.41 (6.146)**	10.23 -7.24	22.79 (9.820)**
Local Expenditure	56.29 (2.517)*****	5.288 (5.338)	-5.094 -6.142	26.05 (8.331)***
Population	3551.6 (178.1)*****	374.3 (377.8)	-986 (404.7)**	3094.9 (548.9)*****
Culture, Edu, Science	14.27 (0.659)*****	1.848 (1.397)	-1.106 -1.599	7.754 (2.169)*****
Government Admin	5.890 (0.241)*****	0.445 (0.550)	-0.959 -0.66	2.552 (0.792)***
Agriculture Support	4.505 (0.222)*****	0.948 (0.470)**	0.984 (0.555)*	0.876 -0.753
Capital Construction	5.928 (0.303)*****	-0.260 (0.642)	-0.364 -0.758	-0.0523 -1.028
Innovation Funds	3.959 (0.404)*****	-1.771 (0.823)**	-1.11 -0.964	-3.093 (1.302)**
Total Imports	93441.0 (24573.7)*****	-55294.9 (52128.7)	-56336.3 -61599.1	-53212.3 -83557
Total Exports	141981.3 (26584.8)*****	58222.2 (56394.9)	59422.4 -66640.2	55821.8 -90395.1

Notes: Column (1) reports control group means for relevant characteristic and outcome variables during pre-treatment period, 1985-1991. Differences in group means for Any Treatment, Full Treatment, and Partial Treatment groups are reported in Columns (2), (3), and (4) respectively. Stars indicate statistical differences with Control Group mean. *(p<0.10), **(p<0.05), ***(p<0.01), ****(p<0.001). All monetary values measured in 100 Million Yuan, except for trade variables (imports and exports) which are measured in \$10,000s. Population measured in 10,000s.

Table 2: Mean Differences Across Groups

Growth Rate (per capita)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Local Revenue to Central Revenue	-0.00821 (0.00366)**			-0.00912 (0.00370)**	-0.00976 (0.00370)***	-0.0111 (0.00367)***	-0.00918 (0.00367)**	-0.0113 (0.00368)***		
Local Tax Revenue to Central Tax Revenue		-0.0127 (0.00401)***							-0.0174 (0.00448)****	
Local Expenditure to Central Expenditure			0.0121 (0.00561)**							0.0446 (0.00806)****
Government Administration Expenditure				-0.000342 (0.000326)				-0.000106 (0.00135)	-0.000180 (0.00134)	0.00151 (0.00136)
Spending on Education, Health, Culture, and Science					-0.000247 (0.000121)**			0.000767 (0.000611)	0.000668 (0.000613)	-0.000433 (0.000641)
Capital Construction Expenditure						-0.000991 (0.000256)****		-0.00205 (0.000601)****	-0.00193 (0.000597)***	-0.00194 (0.000586)***
Agricultural Production Support Expenditure							-0.000981 (0.000586)*	-0.000801 (0.00125)	-0.00103 (0.00126)	-0.00108 (0.00123)
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	511	502	511	489	508	510	507	487	481	487
R ²	0.010	0.021	0.009	0.014	0.019	0.040	0.017	0.052	0.065	0.093
F	5.039	10.06	4.621	3.287	4.742	10.12	4.060	4.982	6.257	9.364

Notes: Dependent variable is per capita growth rate. Standard errors in parentheses. *(p<0.10), **(p<0.05), ***(p<0.01), ****(p<0.001) All measures of Fiscal Federalism are measured as ratios. All expenditure variables measured in 100 Million Yuan.

Table 3: Endogenous Measures of Fiscal Federalism and Economic Growth

Growth rate (per capita)	1	2	3	4	5	6
	Before 1992	After 1994	Before 1992	After 1994	Before 1992	After 1994
Local Revenue to Central Revenue	-0.009 (0.004)*	-0.134 (0.059)*				
Local Tax Revenue to Central Tax Revenue			-0.029 (0.004)***	0.0245 (0.0977)		
Local Expenditure to Central Expenditure					0.0134 (0.0059)*	0.0163 (0.0762)
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes
N	297	133	297	124	297	133
R ²	0.014	0.065	0.054	0.002	0.011	0.001
F Statistic	7.154	5.198	31.26	0.0631	5.231	0.0457

Notes: Dependent variable is per capita growth rate. Robust standard errors in parentheses. *(p<0.10), **(p<0.05), ***(p<0.01), ****(p<0.001) All measures of Fiscal Federalism are measured as ratios.

Table 4: Measures of Fiscal Federalism - Before and After Policy Experiment

Growth Rate (per capita)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any Treatment	0.00627 (0.0170)	0.00648 (0.0180)	0.0103 (0.0152)	0.00609 (0.0172)	0.00491 (0.0170)	0.0144 (0.0161)	0.0165 (0.00926)*	0.0172 (0.00889)*		
Full Treatment									0.0209 (0.0116)*	0.0218 (0.0117)*
Partial Treatment										0.0102 (0.0113)
Government Administration Growth PC		0.280 (0.0439)****				0.212 (0.0459)****	0.101 (0.0219)****	0.0898 (0.0203)****	0.0917 (0.0203)****	0.0905 (0.0204)****
Culture, Education, Science, and Health Expenditure Growth PC			0.365 (0.0684)****			0.303 (0.0723)****	0.0902 (0.0334)***	0.0595 (0.0289)**	0.0599 (0.0290)**	0.0601 (0.0291)**
Agricultural Support Growth PC				0.0139 (0.0232)		-0.0553 (0.0233)**	-0.0184 (0.0122)	-0.0235 (0.0123)*	-0.0220 (0.0122)*	-0.0230 (0.0124)*
Capital Construction Growth PC					-0.0666 (0.0157)****	-0.0712 (0.0133)****	0.0204 (0.00982)**	0.0133 (0.00920)	0.0125 (0.00914)	0.0128 (0.00917)
Locality FE	No	No	No	No	No	No	No	Yes	Yes	Yes
Year FE	No	No	No	No	No	No	Yes	Yes	Yes	Yes
N	376	359	373	372	375	357	357	357	357	357
R ²	0.038	0.195	0.210	0.046	0.075	0.322	0.775	0.812	0.812	0.813
F	5.398	14.12	11.58	4.791	9.248	26.04	65.01	37.79	37.90	37.14

Notes: Dependent variable is per capita growth rate. Robust Standard errors in parentheses. *(p<0.10), **(p<0.05), ***(p<0.01), ****(p<0.001) Treatment variables are interaction terms composed of group receiving treatment and post-treatment indicator. Dummies for post-treatment and treatment group are included in regression but not reported in table. Any treatment includes all localities that received at least some treatment. Full treatment considers only localities that were completely treated. Partial treatment are those localities where only part of the localities was treated. Control variables are measured in per capita growth rates. The FRS and TSS periods cover 1985-1999.

Table 5: Difference in Difference

Ln (GDP Per Capita)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Local Revenue to Central Revenue	-0.191 (0.107)*			-0.0853 (0.0217)****	-0.0524 (0.0254)**	-0.0839 (0.0355)**	-0.0937 (0.0255)****	-0.0835 (0.0208)****		
Local Tax Revenue to Central Tax Revenue		-0.552 (0.0855)****							-0.173 (0.0253)****	
Local Expenditure to Central Expenditure			0.880 (0.177)****							0.178 (0.0495)****
Government Administration Expenditure				0.0743 (0.00206)****				0.0286 (0.00830)****	0.0281 (0.00804)****	0.0337 (0.00856)****
Spending on Culture, Education, Science, and Health					0.0266 (0.000897)****			0.0169 (0.00373)****	0.0144 (0.00367)****	0.0124 (0.00402)****
Capital Construction Expenditure						0.0394 (0.00269)****		-0.0201 (0.00366)****	-0.0182 (0.00357)****	-0.0193 (0.00367)****
Agricultural Production Support Expenditure							0.127 (0.00439)****	0.0491 (0.00761)****	0.0471 (0.00752)****	0.0489 (0.00764)****
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	538	529	538	515	535	537	534	513	507	513
R-sq	0.040	0.272	0.331	0.739	0.650	0.325	0.640	0.769	0.780	0.768
F	3.195	41.75	24.65	689.5	469.4	122.2	448.9	321.0	338.2	318.4

Notes: Dependent variable is ln (GDP per capita). Standard errors in parentheses. *(p<0.10), **(p<0.05), ***(p<0.01), ****(p<0.001) All measures of Fiscal Federalism are measured as ratios. All expenditure variables measured in 100 Million Yuan.

Table 6: Endogenous Measures of Fiscal Federalism and Economic Activity

ln (GDP per capita)	1	2	3	4	5	6
	Before 1992	After 1994	Before 1992	After 1994	Before 1992	After 1994
Local Revenue to Central Revenue	0.0269 (0.100)	0.287 (0.127)*				
Local Tax Revenue to Central Tax Revenue			-0.277 (0.0558)***	-0.105 (0.203)		
Local Expenditure to Central Expenditure					0.840 (0.103)***	-0.0117 (0.158)
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes
N	324	133	324	124	324	133
R ²	0.002	0.073	0.166	0.007	0.601	0.000
F Statistic	0.0724	5.155	24.69	0.266	66.21	0.00553

Notes: Dependent variable is ln (GDP per capita). Robust standard errors in parentheses. *(p<0.10), **(p<0.05), ***(p<0.01), ****(p<0.001) All measures of Fiscal Federalism are measured as ratios.

Table 7: Measures of Fiscal Federalism - Before and After Policy Experiment

Ln (GDP Per Capita)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Any Treatment	0.0764 (0.120)	0.166 (0.108)	0.0972 (0.0813)	0.0558 (0.125)	0.104 (0.0970)	0.0743 (0.116)	0.0603 (0.0835)	0.0355 (0.0686)	0.0800 (0.0206)****		
Full Treatment										0.115 (0.0291)****	0.117 (0.0292)****
Partial Treatment											0.0257 (0.0233)
Government Administration PC Expenditure		77.88 (14.19)****					-12.31 (13.70)	-2.117 (9.878)	-3.577 (2.317)	-2.909 (2.269)	-2.967 (2.284)
Spending on Culture, Education, Science, and Health PC Expenditure			44.49 (4.417)****				84.02 (12.71)****	53.92 (10.75)****	5.365 (2.060)***	5.299 (1.987)***	5.240 (1.996)***
Agricultural Production Support PC Expenditure				42.18 (13.35)***			-12.10 (15.27)	-65.72 (14.34)****	2.762 (7.615)	-0.343 (7.709)	0.933 (7.923)
Capital Construction PC Expenditure					43.12 (6.196)****		-42.08 (13.61)***	-13.79 (12.51)	0.172 (1.896)	0.249 (1.831)	0.276 (1.838)
Population (in Millions)						-0.00432 (0.00131)***	0.000880 (0.00111)	-0.00231 (0.00109)**	0.0335 (0.00332)****	0.0364 (0.00357)****	0.0360 (0.00362)****
Locality FE	No	No	No	No	No	No	No	No	Yes	Yes	Yes
Year FE	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
N	403	385	400	399	402	403	383	383	383	383	383
R ²	0.544	0.641	0.780	0.556	0.709	0.557	0.798	0.843	0.992	0.992	0.992
F	176.0	173.7	305.9	125.1	211.5	142.6	181.0	121.8	1687.4	1891.7	1908.2

Notes: Dependent variable is ln (GDP per capita). Robust Standard errors in parentheses. *(p<0.10), **(p<0.05), ***(p<0.01), ****(p<0.001) Treatment variables are interaction terms composed of group receiving treatment and post-treatment indicator. Dummies for post-treatment and treatment group are included in regression but not reported in table. Any treatment includes all localities that received at least some treatment. Full treatment considers only localities that were completely treated. Partial treatment are those localities where only part of the localities was treated. Control variables are in per capita terms, and measured in 100 Million Yuan, except for population which is measured in millions. The FRS and TSS periods cover 1985-1999.

Table 8: Difference in Difference - Economic Activity