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Abstract

A fundamental aspect of China's transition to a market economy is the change of fiscal decentralization marked by the tax reform in 1993. This paper examines the effect of revenue and expenditure decentralization and their divergences on fiscal spending multipliers in China using nationally aggregate and provincial-level data from 1978 to 2017. Our investigations show that expenditure decentralization weakens the efficacy of spending policies, while revenue decentralization enhances the efficacy. Moreover, the divergence of revenue and expenditure decentralization has decreased the aggregate and provincial spending multipliers. The results are robust to the inclusion of off-budgetary expenditure and revenue, using different estimates of multipliers and different measures of fiscal decentralization, considering from a long-run perspective, and addressing the endogeneity issue.

Keywords: Fiscal decentralization, Government spending, Fiscal multiplier, Tax reform, China

JEL Classification: E62, H5, H72, R5

1. Introduction

By the end of 2020, the Coronavirus pandemic lasted for a whole year, during which worldwide governments expanded spending to combat the induced recessions (e.g.: the US, the UK, China, Germany, and other countries)[1]. Against this backdrop, the debate grows over how to improve the efficacy of fiscal spending policies (e.g.: Auerbach et al., 2020; Woodford, 2020; Valla, 2020). Essentially, the effectiveness of fiscal spending policies heavily hinges on whether every penny of fiscal revenue is spent efficiently. As is indicated by Oates (1972), close matches between expenditure and revenue decentralization maximize the efficiency of government policies. In the spirit of Oates (1972), this paper investigates the effect of the divergence between revenue decentralization and expenditure decentralization (Fiscal decentralization (FD) divergence) on fiscal spending multipliers, a measure of the efficacy of spending policies, using data on China.

The rationale of the Oates hypothesis is summarized from three perspectives. First, matches between spending and revenue in provincial governments improve accountability (Kitchen et al., 2019; Oates, 1972; Shah 1994). Second, governments often spend more than their revenue, leading to fiscal deficits. In the long-run, other regions (countries) may be creditors of the region (country) with fiscal deficits, and the income of debtors would inevitably flow to creditors, leading to efficiency losses of the debtors (Ilzetzki et al., 2013; Oates, 1972). Third, mismatches between spending and revenue often involve intergovernmental transfers, which may lead to distortions (Kitchen et al., 2019; Shah, 1994).

Researching China is because the country experienced a series of striking reforms in the fiscal system, which drove its highly centralized fiscal management system to the fiscal contracting systems (1980 to 1993) and the tax sharing system (1994 to present). The fiscal reform significantly impacted the degree of

[1] Policy Responses to Covid-19, International Monetary Fund, Dec. 4th, 2020. Retrieved from: https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19.

fiscal decentralization (FD) from the central to provincial governments. Massive research has been conducted regarding the economic impact of the FD induced by the reforms in China (e.g.: Ding et al., 2019; Lin and Liu, 2000; Qiao et al., 2008; Sun et al., 2017; Yang, 2016; Zhang and Zou, 1998). However, little is informed by these papers regarding the effect of FD on fiscal spending multipliers in China.

The fiscal spending multiplier is defined as the increase in output that results from one unit (percentage) increase in government spending, which is a measure of the efficacy of spending policies, being distinct from the economic growth considering no efficacy of government policies. Massive papers estimate fiscal spending multipliers in China at different levels of government, and investigate factors that drive the magnitude of the multipliers (e.g.: Chen et al., 2018; Guo et al., 2016; Wang and Wen, 2017; Zhang, 2019; Zhang et al., 2019). However, little is informed about the effect of FD or the FD divergence on fiscal spending multipliers from these papers.

Apart from the aforementioned distinctions between the fiscal spending multiplier and economic growth, the literature on the FD – growth nexus in the context of China and other countries shows no consensus. For instance, in the context of China, Zhang and Zou (1998) find negative effects of fiscal decentralization on economic growth, Lin and Liu (2000) and Qiao et al. (2008) find positive effects, and Sun et al. (2017) and Yang (2016) find that an inverted-U-shaped curve describes the relationship well. Internationally, Gemmell et al. (2013) find mixed results using different measures of FD and data from OECD countries, while Canavire-Bacarreza et al. (2020) find positive effects of FD on the growth of GDP per capita using data from 67 developing and developed countries. The inconsistency in literature once again arouses our interest to examine whether this is also the case for the FD – multiplier nexus, and how to reconcile the mixed results if it is.

Indeed, theories on the FD – growth nexus imply little to infer the FD – multiplier nexus or the FD divergence – multiplier nexus. By highlighting the advantages of local governments over the central

government in producing public goods or the opposite, literature could easily conclude that economic growth increases or decreases along with changes of FD, without implying the dynamics of the efficacy of fiscal policies in the two levels of government. Indeed, even if the efficacy of fiscal policies is constant across changes of FD, when FD varies, there would be variations in economic growth merely due to the reallocation of fiscal resources between the two levels of government with different but constant efficiencies. The lack of informativeness in the literature adds to our interest in this research line.

Literature on the FD – growth nexus focuses on expenditure or revenue decentralization (e.g.: Gemmell et al., 2013; Lin and Liu, 2000; Zhang and Zou 1998). Differently, we focus on the FD divergence, while we have also examined the effect of expenditure and revenue decentralization on spending multipliers. A similar work to our paper is Jin and Zou (2005), which concludes that the FD divergence enhances economic growth in China, being different from the canonical wisdom. However, their conclusion is inferred from empirical findings of a negative relationship between expenditure decentralization and growth, a positive relationship between revenue decentralization and growth, and an averagely larger size of revenue decentralization than expenditure decentralization in their sample, rather than directly investigating the nexus between the FD divergence and growth. Moreover, their sub-sample yielding the above results is from 1979 to 1993 when there is averagely larger revenue decentralization than expenditure decentralization, while it is not the case since 1994. Given this, our paper aims to use the mostly recent data to directly examine the relationship between the FD divergence and spending multipliers, to test whether China yields different results from the canonical wisdom.

Adopting data from 1978 to 2017 at both aggregate and provincial levels (27 provinces and 3 metropolitan cities), this paper estimates the fiscal spending multiplier by using the SVAR (structural vector autoregressive approach, hereafter) as well as an instrumental variable approach, and then examine the effect of the expenditure decentralization, revenue decentralization, and the FD divergence on the spending

multipliers

To preview the results, the aggregate spending multiplier estimated using multiple methods consistently declined since the 1993 tax reform due to the increase in the FD divergence. Further, empirical evidence using provincial data shows that expenditure decentralization decreases fiscal spending multipliers, while revenue decentralization increases fiscal spending multipliers, which are consistent with the literature on the FD – growth nexus (e.g.: Gemmell et al., 2013; Jin and Zou, 2005; Lin and Liu, 2000; Zhang and Zou, 1998). Moreover, a greater FD divergence decreases the provincial spending multipliers, as is predicted by the Oates hypothesis. Our results remain robust to using different estimates of spending multipliers and different measures of FD, considering from a long-run perspective, and addressing the endogeneity issue.

The remainder of the paper is organized as follows. Section 2 gives a review of the literature and an overview of the tax policy reforms in China. Section 3 estimates the aggregate spending multiplier in China and compares the difference before and after the tax reform. In Section 4, the FD divergence – multiplier nexus is investigated on a provincial basis. Finally, a conclusion is drawn in Section 5.

2. Related literature

2.1 FD and economic growth

Theoretically, fiscal decentralization could enhance or depress economic growth. The "first-generation" theory indicates that fiscal decentralization could enhance economic growth because local governments know better about the local conditions than the central government (Oates, 1972; 2005). Moreover, Oates (1972; 1999) and Tiebout (1956) argue that FD could lead to more diversified government output, which further enhances social welfare by considering the needs and preferences of residents better. Bruecker (2004) builds a theoretical model to illustrate that FD could indirectly increase incentives to save and hence increases economic growth.

There are also theories supporting a negative relationship between FD and economic growth. The "second-generation" theory on FD developed by Qiao and Weingast (1997) emphasizes the self-interest property of government officials, implying the possible inefficiency of FD. For example, FD may constrain redistribution policies. This is because the poor move into jurisdictions with a large degree of redistributions, while the rich move out from such jurisdictions, leading to less effective redistribution policies. As is argued by Persson and Tabellini (1994), inequality decreases economic growth, and hence FD may depress growth via the inequality channel. Moreover, local governments expect to be bailed out by the central government from their fiscal deficits (Inman, 2003). Such motivation of provincial governments leads to high debt risks, negatively affecting economic growth. Finally, local governments may also be more corrupt since the local officials are more susceptible to the local interest groups (PRud'homme, 1995; Tanzi, 1996), and the corruption may depress the growth.

Empirically, the FD – growth nexus shows mixed results with using different measures. In the context of China, Zhang and Zou (1998) find that expenditure decentralization decreases growth, Lin and Liu (2000) find that revenue decentralization increases growth, and Sun et al. (2017) and Yang (2016) find an inverted-U-shaped relationship between FD and growth. Internationally, Gemmell et al. (2013) use data from OECD countries and find positive effects of revenue decentralization but negative effects of expenditure decentralization on economic growth. Nguyen and Anwar (2011) have the same findings as Gemmell et al. (2013) using data from Vietnam, while Canavire-Bacarreza et al. (2020) have consistent findings that FD increases GDP per capita growth using different measures of FD and data from 67 countries.

2.2 Fiscal multipliers in China

In recent years, fiscal multipliers at different levels of government in China are widely examined, for instance, the provincial level multiplier in Chen et al. (2018) and Zhang (2019), the county level multiplier in Guo et al. (2016), and the national level multiplier in Wang and Wen (2017) and Zhang et al. (2019).

Massive factors affecting fiscal multipliers are examined in literature, for instance, the degree of development, the exchange rate, and the government debt (Ilzetzki et al., 2013); whether a country is in recessions or expansions (Auerbach and Gorodnichenko, 2012; Ramey and Zubairy, 2018); whether the interest rate is near to the zero-lower bound (Ramey and Zubairy, 2018). In the context of China, additional factors such as the political incentives of provincial leaders are examined (Wang, 2019).

2.3 Fiscal decentralization in China

To handle and adapt to its market-oriented strategies, the Chinese government adopted policies of decentralizing many government activities, among which was its fiscal system. Since then, the economy of China has seen two fiscal system reforms: the fiscal contract system (FCS) from 1980-1993, and the tax-sharing system (TSS) since 1994 which is still in operation. Under the FCS, local governments oversaw the collection of virtually all state revenues and remitted part to the central government to finance its operations at the national levels. This led to a drop in the size of budgetary revenue (as a share of GDP) (He et al., 2016; Zhang, 2018), and limited the ability of the central government to assist economically weaker provinces (Lai et al., 2014).

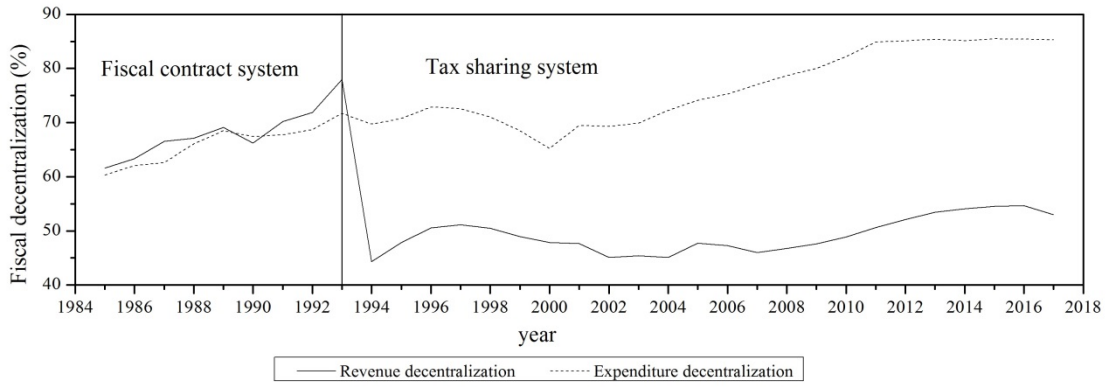
The reform in 1994 revolutionized how revenues were allocated between the central and provincial governments. TSS divided taxes into three different groups (Wang, 1997): central, local, and shared taxes. For example, 75% of the income generated from the value-added tax goes to the central government and the remainder stays with the provincial government (Wang, 1997).

TSS was introduced to ensure uniformity of tax laws across the country, administration of fair taxation, and simplification of the tax system. It provides a justifiable basis for tax sharing, revenue centralization, and expenditure decentralization (Loo and Chow, 2006; Lai et al., 2014; Zhu and Peyrache, 2017; Zhang, 2018). The TSS system has paved the way for more resources at the disposal of the government, which it could use at its own discretion to maintain horizontal balance in the economy (Lai et al., 2014). Under this

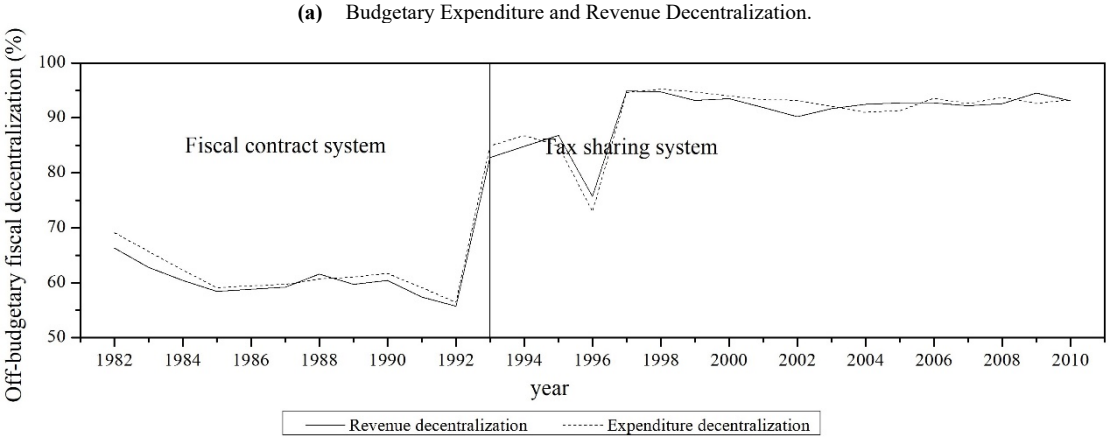
system, the central government determines the transfer to provincial governments according to their fiscal position. And hence this system is deemed as rewarding low tax effort and high spending by provincial governments (Shah, 1994).

One major distinction between the FCS and TSS tax systems is the degree of revenue and expenditure decentralization. Figure 1 below describes the revenue decentralization and expenditure decentralization in the two tax systems, where they are defined as the provincial share of total national budgetary/off-budgetary/consolidated revenue (expenditure).

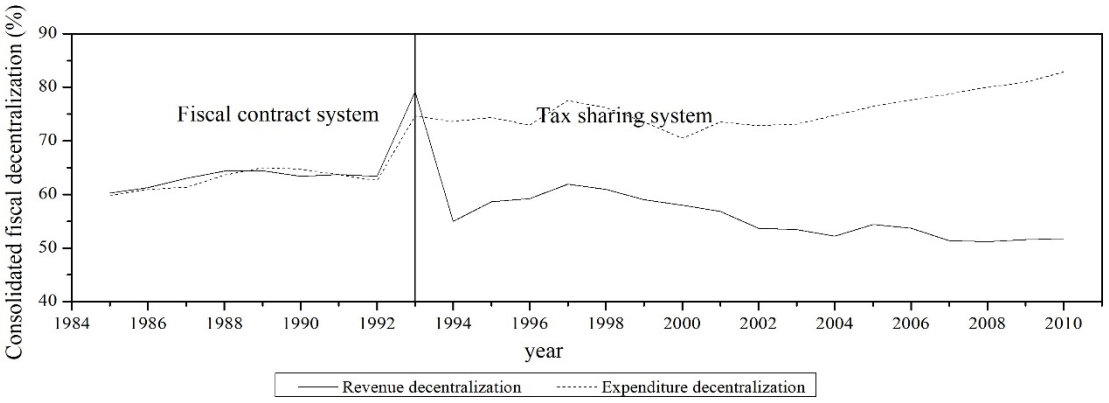
Figure 1(a) shows that the degree of budgetary revenue decentralization drastically declined with the launch of the TSS, while the budgetary expenditure decentralization continued to rise as a general trend. Moreover, there is a clear distinction between the FCS and the TSS in the degree of FD divergence. The FCS system shows a low level of budgetary FD divergence, while the TSS shows a high level of budgetary FD divergence.



(a) Budgetary Expenditure and Revenue Decentralization.



(b) Off-budgetary Expenditure and Revenue Decentralization.



(c) Consolidated Expenditure and Revenue Decentralization

Figure 1 Convergence vs. Divergence of Expenditure and Revenue Decentralization

Note: Budgetary/Off-budgetary/Consolidated revenue (expenditure) decentralization is defined as the provincial share of total national budgetary/off-budgetary/consolidated revenue (expenditure).

We depict the off-budgetary revenue and expenditure decentralization in Figure 1(b). The figure shows that the off-budgetary revenue and expenditure decentralization move in tandem with each other before and after the tax reform, despite the dramatic rise in both kinds when the TSS was launched. Figure 1(c) depicts the consolidated revenue and expenditure decentralization. Consolidated revenue (expenditure) indicates the sum of budgetary and off-budgetary revenue (expenditure). The gap between consolidated revenue and expenditure decentralization in Figure 1(c) is roughly unchanged compared to Figure 1(a). In other words, there is a larger level of consolidated FD divergence under the TSS compared to the FCS.

3. Aggregate fiscal spending multipliers

3.1 Model settings and the data description

In the estimation of the aggregate fiscal spending multipliers, we adopt the framework of Blanchard and Perotti (2002):

$$\boldsymbol{Y_t} = \boldsymbol{A}(L)\boldsymbol{Y_{t-1}} + \boldsymbol{U_t} \tag{1}$$

where $\boldsymbol{Y_t} \equiv [T_t, G_T, X_t]'$ is a three-dimensional vector that contains the logarithms of net taxes, fiscal spending, and GDP in real terms. $\boldsymbol{U_t} \equiv [t_t, g_t, x_t]'$ is the corresponding vector of reduced-form residuals,

which in general has nonzero cross-correlations, and $\boldsymbol{A}(L)$ is the polynomial in the lag operator. As in Blanchard and Perotti (2002), the equations of the reduced-form residuals are specified as follows:

$$t_t = a_1 x_t + a_2 e_t^g + e_t^t \tag{2}$$

$$g_t = b_1 x_t + b_2 e_t^t + e_t^g \tag{3}$$

$$x_t = c_1 t_t + c_2 g_t + e_t^x \tag{4}$$

where e_t^t, e_t^g and e_t^x are the mutually uncorrelated structural shocks that we need to recover.

The intuition of the settings is as follows. First, each of the three variables responds to its own structure shock (e_t^t, e_t^g and e_t^x). Second, policy variables (net taxes and government spending) also respond to each other's structure shocks ($a_2 e_t^g$ and $b_2 e_t^t$), while the economic-outcome variable (output) does not directly respond to structure shocks of policy variables, but has *automatic* responses to them ($c_1 t_t$ and $c_2 g_t$) (Perotti, 2004). This is because the structure shocks of policy variables are observable to the policy-enacting authorities, while they are not able to be disentangled in the production stage. Instead, the economic-outcome variable automatically responds to the real enacted values of policy variables via economic mechanisms just like observing them. Third, net taxes and government spending may *automatically* and *discretionarily* respond to output ($a_1 x_t$ and $b_1 x_t$) via the tax-collection mechanism and the discretional spending process, respectively, but no response to structure shocks of output, since the latter is not able to be disentangled in the tax-collection or the discretional spending process. Two additional assumptions are made to identify the shocks:

(a) $b_1 = 0$, implying no contemporaneous feedback from economic output to government purchases of goods and services, which is standard in literature (Blanchard and Perotti, 2002; Ilzetzki et al., 2013; Ramey, 2011).

(b) One of a_2 and b_2 is 0, while the other one is not 0. The assumption $a_2 = 0$ but $b_2 \neq 0$ indicates that the equation of net taxes (equation (2)) comes first in the ordering, while $b_2 = 0$ but $a_2 \neq 0$ indicates

that the equation of government spending (equation (3)) comes first in the ordering. Economically, the former indicates tax decisions come first and they are exogenous to orthogonal spending shocks, while the latter indicates spending decisions come first and they are exogenous to orthogonal shocks of net taxes. As is indicated by Perotti (2004), while "it is hard to think of plausible reasons for selecting one ordering over the other one", assumption (b) has considered complete cases in identifying the shocks.

We cannot estimate a_1 directly by regressing t_t on x_t, since x_t is correlated with e_t^t and e_t^g. Instead, we estimate a_1 separately. To this end, we set $a_1 = \sum_i \eta_{T_i,B_i}\eta_{B_i,X}\frac{\tilde{T}_i}{\tilde{T}}$ as in Blanchard and Perotti (2002), in which $\tilde{T}_i$ is the type of taxes or transfers forming net taxes (positive to be taxes and negative to be transfers). η_{T_i,B_i} is the elasticity of taxes or transfers of type i to its tax or transfer base, and $\eta_{B_i,X}$ is the elasticity of the tax or transfer base to GDP. When estimating a_1, we have indirect taxes, individual taxes, corporate income taxes, and transfers as components of net taxes.

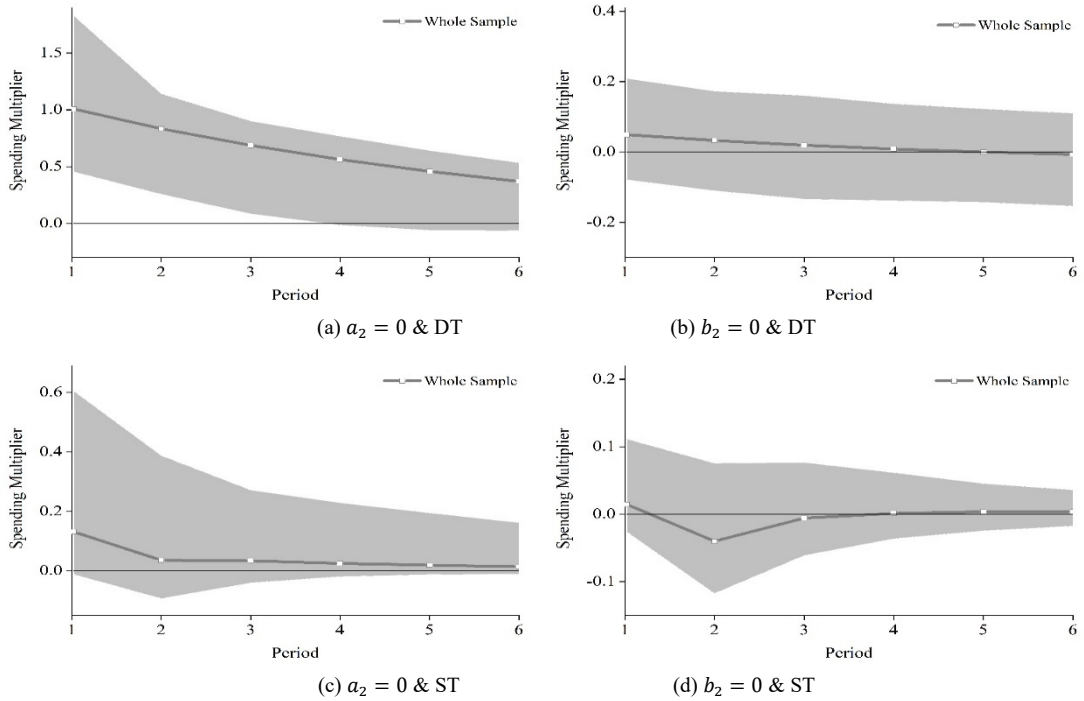
By using assumption (a) and the separately estimated a_1, we could estimate c_1 and c_2 by conducting instrumental variable regression using equation (4), in which t_t is instrumented by $t_t - a_1x_t$, while g_t is instrumented by $g_t - b_1x_t = g_t$ (as $b_1 = 0$). By using assumption (b), we could estimate a_2 and b_2. Under the assumption $a_2 = 0$ but $b_2 \neq 0$, b_2 could be estimated by regressing $g_t - b_1x_t$ on $t_t - a_1x_t$. Under the assumption $b_2 = 0$ but $a_2 \neq 0$, a_2 could be estimated by regressing $t_t - a_1x_t$ on $g_t - b_1x_t$. These are all consistent with Blanchard and Perotti (2002).

Data on output, government spending, taxes, and employment are from the Chinese Statistical Yearbook. Government spending, taxes, and GDP are deflated, seasonally adjusted, and used in log terms of per capita values. Following Blanchard and Perotti (2002), we have adopted settings of both the deterministic trend (DT) and the stochastic trend (ST) in the empirical part for robustness.

3.2 The aggregate fiscal spending multiplier

The elasticity of tax on GDP (a_1) is estimated at 0.903, which is comparable to literature with estimates

around unity for most countries (Price et al., 2015). The impulse response functions of the spending multipliers are shown in **Figure 2 and Figure 3**. In each figure, we have four cases regarding whether it is under settings of DT or ST, and whether a_2 or b_2 is 0 as in assumption (b). **Figure 2** shows the spending multiplier for the whole sample period (1978 to 2017). The aggregate impact multiplier ranges from -0.078 to 1.827, indicating that a 1 percentage increase in government spending leads to about -0.078% to 1.827% increase in output, being comparable to the Blanchard-Perotti estimates in Zhang et al. (2019) which have aggregate spending multipliers ranging from 0.550 to 2.102. Moreover, our results are also comparable to estimates using data on the United States which range from larger to smaller than unity (Ramey, 2011; Blanchard and Perotti, 2002).



(a) $a_2 = 0$ & DT (b) $b_2 = 0$ & DT

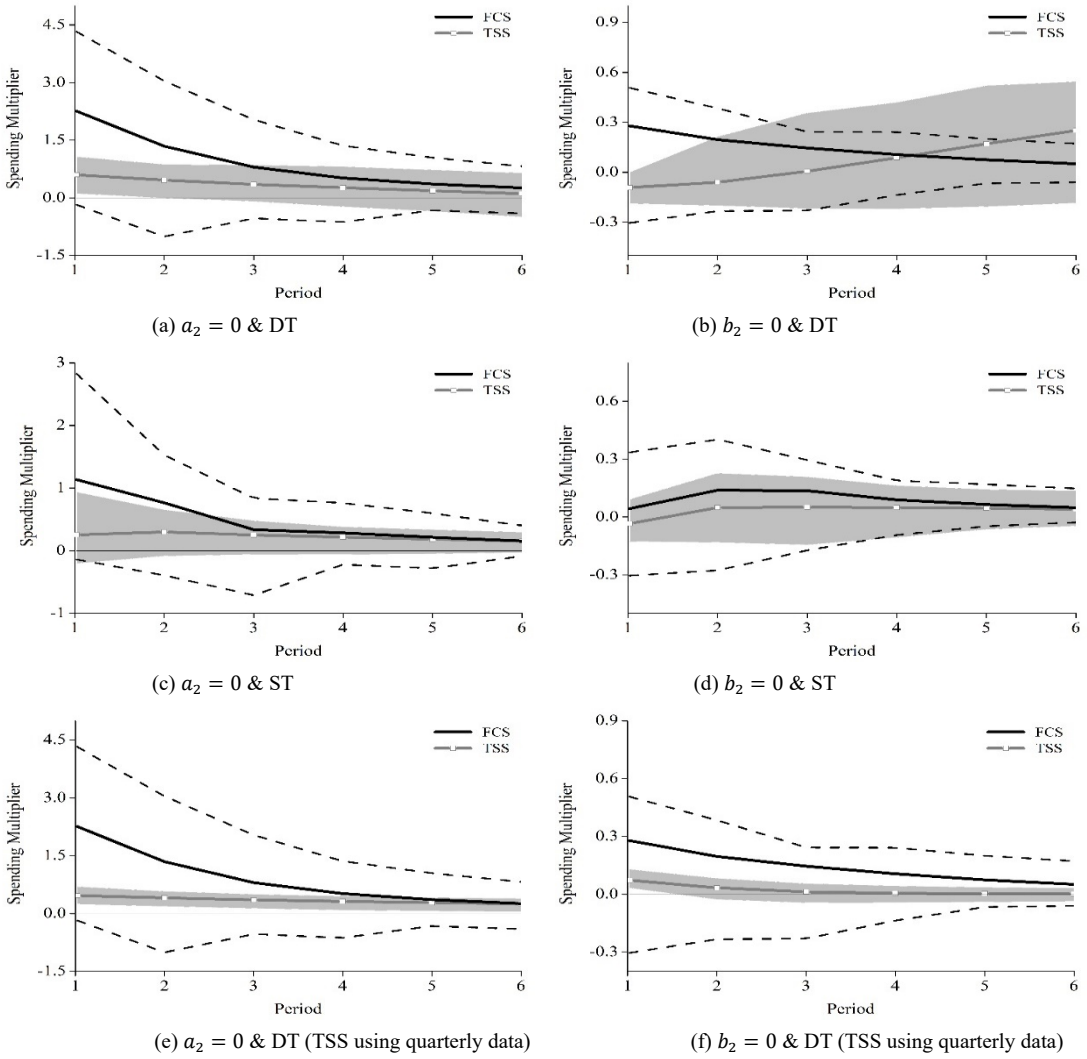
(c) $a_2 = 0$ & ST (d) $b_2 = 0$ & ST

Figure 2 The Aggregate Spending Multiplier for the Whole Sample Period

To examine the effect of the tax reform in 1993 on the fiscal spending multiplier, we split the sample into the FCS sub-period (the pre-tax-reform period) and the TSS sub-period (the post-tax reform period). The associated impulse response functions and 90% confidence intervals are shown in **Figure 4 (a, b, c, and d)**. During the FCS sub-period, the impact multipliers under the four settings range from 0.278 to 2.256;

while during the TSS, the impact multipliers under the four settings range from -0.034 to 0.599. The spending multiplier is substantially larger under the FCS than the TSS.[2]

A reason for the above finding is that, as in **Figure 1**, the FCS shows a convergence of expenditure and revenue decentralization while the TSS shows a divergence of the two kinds of decentralization. This is consistent with the Oates hypothesis that close matches between expenditure and revenue decentralization could increase economic efficiency. Specifically, for the central government, the convergence of expenditure and revenue decentralization could improve its accountability and reduce the distorting effect induced by transfers from central to provincial governments.

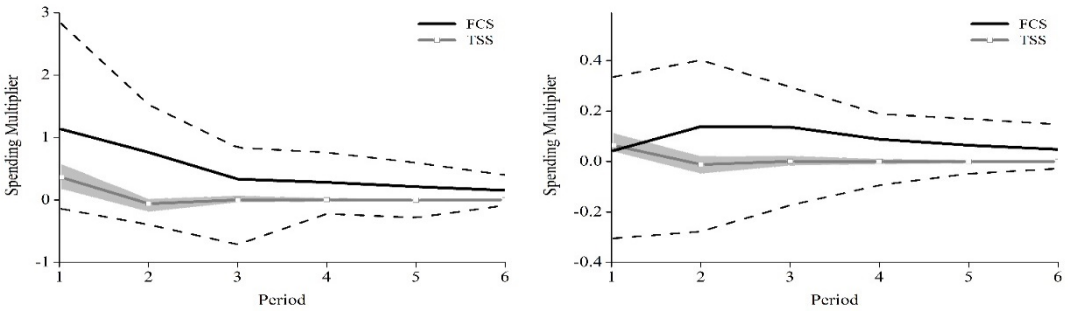


(a) $a_2 = 0$ & DT (b) $b_2 = 0$ & DT

(c) $a_2 = 0$ & ST (d) $b_2 = 0$ & ST

(e) $a_2 = 0$ & DT (TSS using quarterly data) (f) $b_2 = 0$ & DT (TSS using quarterly data)

[2] The confidence intervals of the responses under FCS are relatively large in Figure 3 (a, b, c, and d), leading to less significant differences between the responses under FCS and TSS. Nevertheless, in the first three periods, the responses under FCS are consistently greater than those under TSS in Figure 3 (a, b, c, d).



(g) $a_2 = 0$ & ST (TSS using quarterly data) (h) $b_2 = 0$ & ST (TSS using quarterly data)

Figure 3 The Aggregate Spending Multiplier under the FCS and TSS

To reinforce the robustness of the above findings, we replicate the SVARs by using quarterly data (only available since 1995), and the results are shown in **Figure 3 (e, f, g, and h)**. Quarterly data yields a similar-sized fiscal spending multiplier ranging from 0.064 to 0.467 (averagely 0.242) with higher statistical significance, buttressing the results using annual data (averagely 0.182). With no surprise, **Figure 3 (e, f, g, and h)** shows that the black line always lies above and out of the confidence interval of the grey line, indicating significantly larger spending multipliers in FCS than in TSS.

4. The provincial fiscal spending multipliers and FD

4.1 Estimating the provincial fiscal multipliers

This section investigates the nexus between FD divergence and spending multipliers at the provincial level, as a comparison to that at the aggegate level. Nakamura and Steinsson (2014) use military procurement as an instrument to estimate state spending multipliers in the United States. In the context of China, the central government carries out most parts of the military spending, and hence the provincial military procurement is very weakly associated with the provincial government spending and may not be valid instruments for the latter. As such, Chinese provincial spending multipliers are estimated by exploring new instruments in literature. Chen et al. (2018) use the tenure of provincial party secretary, interacted with the fiscal expenditure in all other provinces, as an instrument for provincial expenditure growth. The justification is that provincial leaders have political incentives to increase government spending when it gets close to the

end of their tenure. Specifically, economic growth is usually the most important standard to assess the performance of provincial leaders, which is crucial to their future promotion. As such, provincial leaders have the incentive to stimulate economic growth when approaching the end of their tenure, usually by expanding government expenditures. This has been borne out by Guo (2009) that provincial government spending tends to rise in the third and fourth years during the five-year tenure of provincial leaders. Here, we keep consistent with Guo (2009) and Chen et al. (2018).

The empirical specification is given as:

$$\frac{Y_{it}-Y_{it-2}}{Y_{it-2}} = \alpha_i + \gamma_t + \beta \frac{G_{it}-G_{it-2}}{Y_{it-2}} + \varepsilon_{it}, \quad (5)$$

Y_{it} is the real per capita output in province i in year t while G_{it} is the real per capita government spending, α_i and γ_t are the individual and year fixed effects, respectively. We employ two-year changes of output and two-year changes of government spending to identify the provincial level fiscal multipliers, as in Nakamura and Steinsson (2014) and Chen et al. (2018). As is introduced, the tenure of the provincial party secretary (the leader of a province) interacted with the fiscal expenditure of all other provinces is used as the instrument for provincial government spending. In the first stage regression, the two first-order items are controlled.

As is mentioned, Guo (2009) and Chen et al. (2018) offer justifications for using the tenure of provincial leaders as an instrument. Interacting with government spending in all other provinces is because the government spending in a certain province takes that in other provinces as a policy benchmark. Also, government spending in other provinces is less likely correlated with the economic performance of the researched province, ensuring the exogeneity of the instrument variable.

The fiscal spending multipliers estimated using the instrumental variable approach (IV multipliers) are summarized in Table 1. Note that in most of the previous literature, provincial or state multipliers are estimated on an average basis, and all provinces/states share one estimate (e.g.: Nakamura and Steinsson,

2014; Chen et al., 2018). Differently, we here estimate provincial fiscal multipliers for each of the individual provinces to investigate factors affecting their heterogeneities. The mean of our IV estimates for the individual provinces is 1.320, which is comparable in magnitude to the provincial spending multiplier in China estimated using similar instruments, for example, 0.75 and 1.2 in different sample periods in Chen et al. (2018), and 1.2 to 2.5 in Zhang (2019) under different settings. The mean (1.320) and the standard deviation (1.579) of the IV estimates are both in normal magnitudes, and the middle 90% of the multipliers are in the range of [-0.563, 3.099], being comparable to estimates in the literature.

To reinforce the robustness, we have also estimated the multipliers using the SVAR approach introduced in Section 3.1. Following Zhang (2019), we use annual provincial-level data of GDP, tax revenue, and government spending taken from China's National Bureau of Statistics and the Chinese Statistical Yearbook. The summary statistics of the SVAR multipliers are also reported in Table 1. FM_SVAR_1 and FM_SVAR_2 are the SVAR estimates under settings of $a_2 = 0$ and $b_2 = 0$.

4.2 Measures of FD

FD is generally measured by the provincial share of government expenditure (revenue) over the national overall government expenditure (revenue). To control for the scale effect, in empirical work, scholars often use per capita expenditure (revenue) or that scaled by income in deriving FD (e.g.: Akai and Sakata, 2002; Qiao et al., 2008; Zhang and Zou, 1998). Following Zhang and Zou (1998), we define four measures of expenditure decentralization, four measures of revenue decentralization, and four measures of the FD divergence. The measures are defined as follows:

FD expenditure 1: the ratio of provincial budgetary spending to overall national budgetary spending, expressed relative to income;

FD expenditure 2: the ratio of provincial consolidated spending to overall national consolidated spending, expressed relative to

income;

FD expenditure 3: the ratio of provincial budgetary spending to overall national budgetary spending, expressed in per capita terms;

FD expenditure 4: the ratio of provincial consolidated spending to overall national consolidated spending, expressed in per capita terms;

FD revenue 1: the ratio of provincial budgetary revenue to overall national budgetary revenue, expressed relative to income;

FD revenue 2: the ratio of provincial consolidated revenue to overall national consolidated revenue, expressed relative to income;

FD revenue 3: the ratio of provincial budgetary revenue to overall national budgetary revenue, expressed in per capita terms;

FD revenue 4: the ratio of provincial consolidated revenue to overall national consolidated revenue, expressed in per capita terms;

FD divergence 1: the absolute value of the difference between **FD expenditure 1** and **FD revenue 1;**

FD divergence 2, FD divergence 3, and **FD divergence 4** are defined similarly to **FD divergence 1**, but use revenue and expenditure decentralization that has a serial number consistent with that of the defined FD divergence.

Data on provincial budgetary and off-budgetary government expenditure and revenue, and data on the provincial population are from China National Bureau of Statistics. Data of provincial CPI, which are used to deflate nominal terms, are from the CEIC dataset. The descriptive statistics of expenditure decentralization, revenue decentralization, and FD divergences are shown in Table 1. It shows that the means of different measures of expenditure decentralization range from 0.892 to 0.919, being close to unity, while that of revenue decentralization range from 0.617 to 0.823, and that of FD divergences range from 0.250 to 0.438.

The time averages of FD divergence under the two tax systems in different provinces are shown in Table 2. The provinces are classified into four categories according to their geographic distribution and

political properties, which are metropolitan cities, coastal provinces, inland provinces, and minority provinces. Such classifications follow Zhang and Zou (1998). The category averages of FD divergences under the two tax systems are also reported. Table 2 shows that, after the tax reform, the metropolitan cities are much smaller in average FD divergence than before, while the inland provinces and the minority provinces are higher in average FD divergence after the reform than before. As a result, the coastal provinces have higher average FD divergences than the inland provinces before the reform, while their relative magnitudes invert to the opposite after the reform. Overall, we do not see a trend of increase or decrease in FD divergence due to the tax reform. However, if we take away the three metropolitan cities, we can observe an increase in the FD decentralization on average due to the tax reform. The time average of revenue and expenditure decentralization under the two tax systems shows that, across different measures, it becomes more expenditure decentralized but less revenue decentralized after the reform than before.[3] This is consistent with the results on a provincial-aggregation basis in Figure 1.

Table 1. Descriptive statistics

Variable	Obs.	Mean	S.D.	Min	Max
FM_IV	50	1.320	1.579	-2.044	5.546
FM_SVAR_1	56	0.501	0.350	0.070	1.805
FM_SVAR_2	56	0.342	0.190	0.038	0.818
FD expenditure 1	56	0.910	0.606	0.390	4.689
FD expenditure 2	56	0.913	0.454	0.512	3.726
FD expenditure 3	56	0.892	0.548	0.352	2.755
FD expenditure 4	56	0.919	0.593	0.359	2.944
FD revenue 1	56	0.617	0.248	0.346	1.789
FD revenue 2	56	0.666	0.185	0.386	1.216
FD revenue 3	56	0.823	1.226	0.237	8.376
FD revenue 4	56	0.775	0.756	0.212	4.342
FD divergence 1	56	0.438	0.611	0.056	4.254
FD divergence 2	56	0.291	0.473	0.017	3.340
FD divergence 3	56	0.479	0.917	0.037	6.461
FD divergence 4	56	0.250	0.336	0.012	1.889
GDP per capita	56	3.159	2.677	0.336	9.152
Exchange rate regime	56	7.586	3.093	4.833	11.000
Region	56	0.446	0.502	0.000	1.000
Initial FD divergence 1	56	0.434	0.625	0.003	4.326
Initial FD divergence 2	56	0.269	0.460	0.000	3.338
Initial FD divergence 3	56	0.592	1.538	0.003	11.010
Initial FD divergence 4	56	0.247	0.394	0.000	2.545

Notes: (i) FM_IV indicates the IV estimates of fiscal spending multipliers; FM_SVAR_1 indicates the SVAR estimates under the setting of $a_2 = 0$; FM_SVAR_2 indicates the SVAR estimates under the setting of $b_2 = 0$. (ii) The observation number of **FM_IV** is slightly smaller than that of other variables due to data availability in the SVAR estimation.

[3] The results are not reported due to space.

Table 2. FD Divergence in Different Provinces (before and after the Fiscal Reform)

Region	FCS				TSS			
	FD divergence 1 Average (1978-1993)	FD divergence 2 Average (1987-1993)	FD divergence 3 Average (1978-1993)	FD divergence 4 Average (1987-1993)	FD divergence 1 Average (1994-2017)	FD divergence 2 Average (1994-2010)	FD divergence 3 Average (1994-2017)	FD divergence 4 Average (1994-2010)
Metropolitan cities	0.796	0.258	3.160	0.804	0.090	0.080	0.223	0.206
Beijing	0.471	0.125	1.471	0.353	0.076	0.058	0.188	0.154
shanghai	1.331	0.465	6.461	1.670	0.060	0.057	0.186	0.186
Tianjin	0.586	0.183	1.548	0.388	0.135	0.126	0.295	0.277
Coastal provinces	0.222	0.083	0.243	0.095	0.182	0.133	0.203	0.150
Fujian	0.082	0.026	0.069	0.025	0.128	0.089	0.171	0.118
Guangdong	0.086	0.024	0.098	0.036	0.075	0.057	0.117	0.091
Hainan	0.441	0.267	0.279	0.250	0.480	0.350	0.386	0.279
Hebei	0.071	0.020	0.062	0.017	0.247	0.180	0.225	0.170
Jiangsu	0.295	0.104	0.359	0.132	0.069	0.052	0.109	0.081
Liaoning	0.404	0.072	0.656	0.113	0.264	0.206	0.343	0.276
Shandong	0.146	0.019	0.133	0.018	0.113	0.083	0.143	0.105
Zhejiang	0.254	0.133	0.290	0.171	0.076	0.049	0.126	0.082
Inland provinces	0.112	0.061	0.099	0.050	0.395	0.303	0.313	0.233
Anhui	0.094	0.061	0.059	0.037	0.372	0.281	0.245	0.175
Chongqing	-	-	-	-	0.361	0.294	0.302	0.232
Heilongjiang	0.176	0.074	0.233	0.081	0.482	0.347	0.442	0.340
Henan	0.056	0.018	0.037	0.012	0.300	0.219	0.224	0.160
Hubei	0.092	0.017	0.085	0.015	0.308	0.237	0.273	0.197
Hunan	0.067	0.017	0.052	0.012	0.357	0.272	0.271	0.195
Jiangxi	0.145	0.089	0.099	0.057	0.372	0.268	0.252	0.173
Jilin	0.219	0.155	0.210	0.149	0.523	0.429	0.499	0.397
Shaanxi	0.144	0.102	0.100	0.068	0.476	0.394	0.362	0.272
Shanxi	0.068	0.022	0.061	0.018	0.371	0.269	0.286	0.213
Sichuan	0.063	0.059	0.055	0.050	0.426	0.326	0.292	0.213
Minority provinces	0.530	0.272	0.432	0.210	0.850	0.652	0.585	0.429
Gansu	0.235	0.154	0.165	0.094	0.934	0.697	0.483	0.356
Guangxi	0.225	0.158	0.128	0.087	0.448	0.322	0.285	0.195
Guizhou	0.321	0.123	0.154	0.057	0.831	0.657	0.355	0.244
Inner Mongolia	0.678	0.328	0.543	0.258	0.549	0.467	0.596	0.461
Ningxia	0.922	0.483	0.751	0.369	0.939	0.756	0.716	0.539
Qinghai	0.904	0.485	0.896	0.419	1.543	1.135	1.142	0.793
Xinjiang	0.722	0.339	0.679	0.338	0.769	0.558	0.658	0.491
Yunnan	0.236	0.104	0.136	0.060	0.785	0.627	0.446	0.355
Total average	0.329	0.146	0.547	0.185	0.429	0.329	0.347	0.261
Average without metropolitan cities	0.275	0.133	0.246	0.113	0.467	0.356	0.361	0.267

Notes: The classification follows Zhang and Zou (1998).

4.3 Fiscal decentralization and the provincial spending multipliers

To examine whether the divergence of revenue and expenditure decentralization reduces the fiscal spending multipliers, we estimate the following model:

$$M_{it} = \beta_0 + \beta_1 Divergence_{it} + \beta_2 Development_{it} + \beta_3 Exchange_t + \beta_4 Region_i + \varepsilon_{it}. \quad (6)$$

M is the spending multiplier, *i* indicates province *i*, and *t* indicates the two periods before and after the tax reform. ε_{it} is the random error term. *Divergence* is the FD divergence.

Several variables are controlled. *Development* indicates the degree of development of provinces. Ilzetzki et al. (2013) use GDP per capita as a benchmark and find that developed countries have higher multipliers than developing countries. The exchange rate regime also affects fiscal spending multipliers as is researched in Ilzetzki et al. (2013). Specifically, a more flexible exchange regime leads to decreases in the multiplier. *Region* is a dummy that takes the value 1 for eastern provinces and 0 for western provinces. The classification of eastern and western provinces follows Chinese Statistical Yearbook.

Data on the exchange rate regime is taken from Ilzetzki et al. (2017), which gives scores to the exchange rate regime to construct an exchange rate flexibility index. A higher score means a more flexible exchange regime. Data to construct the decentralization are from the China National Bureau of Statistics and the CEIC dataset. Data of other variables are taken from the Chinese Statistical Yearbook.

We first examine the effect of the expenditure and revenue decentralization on fiscal multipliers following equation (6). It means that we use FD measured by revenue decentralization and expenditure decentralization as the main independent variable, rather than using the FD divergence. The results are shown in Table 3. The OLS results in Panel A of Table 3 show that, despite some insignificant values, expenditure decentralization tends to negatively affect spending multipliers, while revenue decentralization tends to positively affect spending multipliers. These results are consistent with Zhang and Zou (1998), Lin

and Liu (2000), and Jin and Zou (2005) in the context of China, and Gemmell et al. (2013) in the context of OECD countries, researching the FD – growth nexus.

It is argued in literature that there may be reverse causality issues between FD and economic performance. To deal with the possibly similar endogeneity issue in our case, we follow Akai and Sakata (2002) by using the initial values of FD as instruments of FD and conduct 2SLS regressions, results of which are reported in panel B of Table 3. The results in panel B are less significant than those in panel A, while they still show consistently negative coefficients of expenditure decentralization and positive coefficients of revenue decentralization on the spending multipliers. To summarize, the results in Table 3 once again bear out the conclusion in literature that, there are inconsistent results from using revenue and expenditure decentralization, even regarding their effects on fiscal spending multipliers.

Table 3. The Effect of FD on Fiscal Spending Multipliers (IV estimates; FD is Measured by Expenditure and Revenue Decentralization)

Measures of FD	Expenditure Decentralization				Revenue Decentralization			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FD expenditure1	FD expenditure 2	FD expenditure 3	FD expenditure 4	FD revenue 1	FD revenue 2	FD revenue 3	FD revenue 4
Panel A: OLS regressions								
FD	**-0.687*** **	**-0.790*** **	-0.236	0.067	**3.949*** **	**3.528*** **	**1.326*** **	**1.391** **
	[0.187]	**[0.263]**	[0.479]	[0.585]	**[0.723]**	**[1.279]**	**[0.317]**	**[0.619]**
GDP per capita	-0.070	-0.070	0.010	-0.027	-0.040	-0.071	-0.182	-0.223
	[0.190]	[0.193]	[0.209]	[0.219]	[0.182]	[0.199]	[0.190]	[0.222]
Exchange regime	-0.214*	-0.210	-0.151	-0.171	-0.297**	-0.311**	-0.314**	-0.334**
	[0.126]	[0.131]	[0.133]	[0.142]	[0.127]	[0.147]	[0.133]	[0.155]
Region	-0.976*	-0.906	-0.734	-0.691	-0.978*	-0.624	-1.084*	-0.987*
	[0.566]	[0.570]	[0.578]	[0.571]	[0.527]	[0.560]	[0.555]	[0.570]
Cons	4.227***	4.240***	2.929**	2.910**	1.822	1.867	3.885***	4.027***
	[1.369]	[1.465]	[1.352]	[1.366]	[1.286]	[1.283]	[1.356]	[1.488]
Obs.	50	50	50	50	50	50	50	50
R-squared	0.234	0.208	0.161	0.156	0.327	0.251	0.300	0.244
Panel B: 2SLS regressions using the initial values of FD as instruments								
FD	**-0.561*** **	**-0.718*** **	-0.408	-0.010	1.788	**3.415***	**1.088*** **	**1.271** **
	[0.112]	**[0.194]**	[0.448]	[0.606]	[2.268]	**[1.928]**	**[0.291]**	**[0.594]**
GDP per capita	-0.035	-0.058	0.037	-0.012	-0.002	-0.066	-0.153	-0.202
	[0.185]	[0.186]	[0.209]	[0.217]	[0.182]	[0.191]	[0.183]	[0.219]
Exchange regime	-0.178	-0.204	-0.138	-0.164	-0.196	-0.305**	-0.287**	-0.319**
	[0.124]	[0.125]	[0.129]	[0.137]	[0.162]	[0.152]	[0.130]	[0.152]
Region	-1.053*	-0.920*	-0.795	-0.713	-0.955*	-0.645	-1.014*	-0.976*
	[0.547]	[0.553]	[0.578]	[0.559]	[0.522]	[0.547]	[0.518]	[0.547]
Cons	3.799***	4.106***	2.937**	2.895**	2.215*	1.894	3.709***	3.925***
	[1.318]	[1.372]	[1.290]	[1.300]	[1.250]	[1.304]	[1.305]	[1.440]
Obs.	48	49	49	49	48	49	50	49
R-squared	0.198	0.210	0.159	0.156	0.248	0.251	0.296	0.243

Notes: (i) Heteroscedasticity robust standard errors are in square brackets; *** *p<0.01, ** p<0.05, * p<0.1*

We then examine the effect of the FD divergence on fiscal spending multipliers following equation (6), the results of which are shown in Table 4. Panel A in Table 4 shows the effect of the FD divergence on the spending multipliers by using OLS regressions. Column (1) to column (4) show the results of regressions using the whole sample. Among the four measures of the FD divergence, three show negative and significant effects on the spending multipliers, while one shows insignificant results.

It is notable that, in Table 2, the three metropolitan cities (Beijing, Tianjin, and Shanghai) have extraordinarily large FD divergences when using measures in per capita terms (FD divergence 3 and FD divergence 4). We suspect that these unrealistic large values are overestimated, and the insignificant coefficient of the FD divergence in column (3) is possibly biased accordingly. The reason may be that the population in the three metropolitan cities is underestimated.

In China, individuals who stay in a city or province for more than 6 months are counted as resident population (*chang zhu ren kou*). However, if some individuals stay in a city for more than 6 months, but their incomes are mainly spent by their families who are not the resident population in that city, the former would not be counted as the resident population of that city either. In China, a group of people is called rural migrant workers (*nong min gong*), who work in cities all the year round except for holidays but deliver their incomes back to their family members in rural places. Nevertheless, they are not counted as residents of the city where they work according to the above rule. The share of such a population is large in metropolitan cities, while the data does not account for such a group of people. This strongly underestimates the population in these cities and hence overestimates the FD divergence defined in per capita terms, leading to biases of the estimations. To deal with such an issue, we replicate the regressions in column (1) to column (4) using a sample that removes the three metropolitan cities. The results are reported in Panel A of Table 4, in column (5) to column (8). The coefficients of all of the four measures of FD divergences are significantly negative now.

Table 4. The Effect of the FD Divergence on Fiscal Spending Multipliers (the IV Estimates)

	Whole Sample				without three Metropolitan Cities			
Measure of FD divergence	(1) FD divergence 1	(2) FD divergence 2	(3) FD divergence 3	(4) FD divergence 4	(5) FD divergence 1	(6) FD divergence 2	(7) FD divergence 3	(8) FD divergence 4
Panel A: OLS regressions								
FD Divergence	**-0.604***** **[0.174]**	**-0.858***** **[0.261]**	-0.334 [0.558]	**-0.957*** **[0.567]**	**-0.689***** **[0.146]**	**-0.945***** **[0.248]**	**-0.804**** **[0.300]**	**-1.314***** **[0.443]**
GDP per capita	-0.083 [0.191]	-0.093 [0.195]	-0.032 [0.194]	-0.048 [0.197]	-0.220 [0.232]	-0.232 [0.237]	-0.176 [0.239]	-0.193 [0.245]
Exchange regime	-0.222* [0.127]	-0.247* [0.132]	-0.175 [0.132]	-0.207 [0.136]	-0.323** [0.143]	-0.349** [0.149]	-0.283* [0.146]	-0.319** [0.154]
Region	-0.859 (0.573)	-0.855 (0.568)	-0.734 (0.584)	-0.793 (0.575)	-0.961 [0.592]	-0.941 [0.590]	-0.911 [0.603]	-0.911 [0.594]
Cons	3.904*** [1.363]	4.107*** [1.418]	3.171** [1.451]	3.591** [1.465]	5.028*** [1.556]	5.223*** [1.628]	4.543*** [1.607]	4.873*** [1.702]
Obs.	50	50	50	50	47	47	47	47
R-squared	0.222	0.223	0.166	0.187	0.312	0.308	0.277	0.282
Panel B: 2SLS regressions using initial FD divergences as instruments of FD divergences								
FD Divergence	**-0.487**** **[0.196]**	**-0.783***** **[0.224]**	0.071 [0.726]	-0.870 [0.714]	**-0.607***** **[0.148]**	**-0.887***** **[0.212]**	**-0.696*** **[0.421]**	**-1.487***** **[0.402]**
GDP per capita	-0.070 [0.183]	-0.087 [0.186]	-0.016 [0.185]	-0.045 [0.188]	-0.210 [0.222]	-0.226 [0.225]	-0.170 [0.225]	-0.201 [0.231]
Exchange regime	-0.212* [0.124]	-0.240* [0.127]	-0.165 [0.131]	-0.203 [0.133]	-0.314** [0.138]	-0.343** [0.142]	-0.279** [0.140]	-0.328** [0.144]
Region	-0.827 [0.539]	-0.841 [0.537]	-0.681 [0.550]	-0.783 [0.555]	-0.937* [0.553]	-0.930* [0.554]	-0.891 [0.574]	-0.930 [0.569]
Cons	3.711*** [1.346]	4.001*** [1.364]	2.847* [1.476]	3.529** [1.459]	4.883*** [1.512]	5.136*** [1.553]	4.445*** [1.549]	5.013*** [1.590]
Obs.	50	50	50	50	47	47	47	47
R-squared	0.220	0.223	0.150	0.187	0.310	0.307	0.276	0.281

Notes: (i) Heteroscedasticity robust standard errors are in square brackets; *** *p<0.01,* ** *p<0.05,* * *p<0.1*

The results in Panel A of Table 4 bear out that the FD divergence depresses the efficacy of government spending in China, and the Oates hypothesis is authentic when examining the efficacy of spending policies. Our finding is different from Jin and Zou (2005). Their paper concludes that FD divergence enhances economic growth in China, being different from canonical wisdom. However, they do not directly investigate the nexus between the FD divergence and growth, but arrival at the conclusion by inferring from empirical results of a negative expenditure decentralization – growth nexus, a positive revenue decentralization – growth nexus, and an averagely larger revenue decentralization than expenditure decentralization in one of their sub-samples (1979 to 1993). If the relative magnitude of revenue and expenditure decentralization is inverted, their conclusion would change accordingly. Indeed, since 1994, government expenditure was more decentralized in China than government revenue. Moreover, their findings of a negative expenditure decentralization – growth nexus and a positive revenue decentralization

– growth nexus are consistent with us. Given this, our results have no much substantial conflicts with literature, and the conclusion that the FD divergence depresses spending multipliers of provincial governments is authentic, being consistent with canonical wisdom.

We have also adopted fiscal spending multipliers estimated using SVAR as dependent variables in regressions. The results are shown in Table 5. Compared to Panel A in Table 4, the counterparts in Panel A of Table 5 show more consistently significant and negative effects of the FD divergence on fiscal multipliers. The magnitude of the coefficients in Panel A of Table 5 is smaller than those in Panel A of Table 4. This may be because the magnitude of fiscal multipliers estimated using SVAR is smaller than those estimated using the IV approach. Anyhow, this does not alter our conclusion that the FD divergence decreases spending multipliers in provinces of China.

Table 5. The Effect of the FD Divergence on Fiscal Spending Multipliers (SVAR Estimates)

Dependent Variable	Spending Multiplier Using SVAR ($a_2 = 0$)				Spending Multiplier Using SVAR ($b_2 = 0$)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Measure of FD divergence	FD divergence 1	FD divergence 2	FD divergence 3	FD divergence 4	FD divergence 1	FD divergence 2	FD divergence 3	FD divergence 4
Panel A: OLS regressions								
FD divergence	**-0.126****	**-0.147****	**-0.067*****	**-0.191*****	**-0.080*****	**-0.091*****	**-0.046*****	**-0.128*****
	[0.048]	**[0.066]**	**[0.025]**	**[0.064]**	**[0.025]**	**[0.030]**	**[0.014]**	**[0.047]**
GDP per capita	0.007	0.008	0.023	0.018	-0.016	-0.015	-0.005	-0.009
	[0.034]	[0.035]	[0.031]	[0.032]	[0.021]	[0.021]	[0.020]	[0.020]
Exchange regime	-0.041	-0.042	-0.023	-0.033	-0.021	-0.021	-0.009	-0.016
	[0.031]	[0.033]	[0.028]	[0.029]	[0.015]	[0.016]	[0.014]	[0.014]
Region	0.075	0.070	0.089	0.081	0.032	0.029	0.041	0.036
	[0.098]	[0.099]	[0.097]	[0.098]	[0.077]	[0.077]	[0.077]	[0.078]
Cons	0.816**	0.807**	0.595*	0.704**	0.573***	0.564***	0.434***	0.507***
	[0.354]	[0.373]	[0.301]	[0.322]	[0.161]	[0.168]	[0.136]	[0.147]
Obs.	56	56	56	56	56	56	56	56
R-squared	0.204	0.194	0.195	0.196	0.069	0.053	0.064	0.063
Panel B: 2SLS regressions using initial FD divergences as instruments of FD divergences								
FD Divergence	**-0.151****	**-0.169****	**-0.068*****	**-0.215*****	**-0.071****	**-0.089*****	**-0.043*****	**-0.146*****
	[0.061]	**[0.077]**	**[0.024]**	**[0.060]**	**[0.028]**	**[0.031]**	**[0.014]**	**[0.038]**
GDP per capita	0.003	0.006	0.023	0.017	-0.015	-0.014	-0.005	-0.010
	[0.033]	[0.034]	[0.030]	[0.031]	[0.021]	[0.021]	[0.019]	[0.019]
Exchange regime	-0.045	-0.045	-0.023	-0.034	-0.020	-0.021	-0.010	-0.017
	[0.031]	[0.032]	[0.027]	[0.028]	[0.015]	[0.016]	[0.013]	[0.014]
Region	0.076	0.069	0.089	0.082	0.032	0.029	0.041	0.037
	[0.094]	[0.095]	[0.093]	[0.094]	[0.073]	[0.074]	[0.074]	[0.075]
Cons	0.865**	0.841**	0.595**	0.721**	0.555***	0.561***	0.433***	0.519***
	[0.350]	[0.367]	[0.287]	[0.306]	[0.161]	[0.164]	[0.130]	[0.137]
Obs.	56	56	56	56	56	56	56	56
R-squared	0.203	0.193	0.195	0.196	0.068	0.053	0.064	0.062

Notes: (i) Heteroscedasticity robust standard errors are in square brackets; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

It is argued that (e.g.: Martinez-Vazquez et al., 2017) simultaneous effects in certain conditions may cause endogeneity problems. As an example, governments may resort to decentralization reforms to stimulate economic growth in cases of bad economic conditions. Multiple instruments are used in literature to deal with the endogeneity issue, for example, lag terms (Gemmell et al., 2013) and initial values of FD (Akai and Sakata, 2002). Cross-country research also uses lagged democracy (Perez-Sebastian and Raveh, 2013), legal origin (La Porta et al., 1999), land area (Enikolopov and Zhuravskaya, 2007), and Geographic Fragmentation Index (Canavire-Bacarreza et al., 2020).

In our case, we find that most of the regressions in Panel A of Table 4 and Panel A of Table 5 do not have endogeneity problems by using the Hausman test. Nevertheless, we still follow Akai and Sakata (2002) by using the initial values of FD divergences as instruments of FD divergences and replicate regressions in Panel A of Table 4 and Panel A of Table 5 using 2SLS. The results are shown in Panel B of the two tables.

Panel B of Table 4 shows that, without removing the three metropolitan cities, two measures of four of the FD divergences have significantly negative effects on spending multipliers, while the other two have insignificant effects. However, taking away the three metropolitan cities yields significantly negative effects of FD divergences on spending multipliers for all of the four measures of FD divergence. Panel B of Table 5 shows that the coefficients of FD divergence in all of the eight regressions are significant and negative, being consistent with the results in Panel A of Table 5. Overall, the 2SLS results show more consistently negative effects of the FD divergence on spending multipliers than the OLS results. This further reinforces the robustness of our results that the FD divergence depresses fiscal spending multipliers at the provincial level.

4.4 The long-run measure of FD divergence

In real cases, provincial governments may not target the matches of spending and revenue in each period. When there is a need for emergency and necessary spending, governments may spend more than the revenue

in the same period. Nevertheless, efficient spending should target the matches in the long-run. According to previous analyses, targeting long-run matches of revenue and spending could also reduce the distorting effects of intergovernmental transfers, decrease deficits, and increase accountability of provincial governments. To examine this, we construct a long-run measure of FD divergence by using revenue decentralization defined as the time average of the provincial share of overall national revenue (expressed relative to income), and expenditure decentralization being the same as before. We replicate the regressions in Table 4 and Table 5 using the long-run FD divergence, the results of which are shown in Table 6.

Table 6. The Effect of the Long-Run FD Divergence on Fiscal Spending Multipliers

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variables and settings	IV estimate		SVAR multiplier ($a_2 = 0$)		SVAR multiplier ($b_2 = 0$)	
	No Off-Budgetary	With Off-Budgetary	No Off-Budgetary	With Off-Budgetary	No Off-Budgetary	With Off-Budgetary
Panel A: OLS regressions						
FD Divergence	**-1.549****	**-2.236****	**-0.140***	-0.185	**-0.112*****	**-0.157*****
	(0.612)	**(0.958)**	**(0.083)**	(0.126)	**(0.040)**	**(0.052)**
GDP per capita	0.071	0.059	0.022	0.022	-0.005	-0.005
	(0.291)	(0.291)	(0.044)	(0.044)	(0.026)	(0.026)
Exchange regime	-0.024	-0.036	-0.026	-0.025	-0.013	-0.012
	(0.266)	(0.266)	(0.036)	(0.036)	(0.017)	(0.017)
Region	-1.855*	-1.825*	0.087	0.086	0.010	0.008
	(1.095)	(1.083)	(0.103)	(0.104)	(0.081)	(0.081)
Cons	2.876	3.083	0.647	0.643	0.480**	0.484**
	(2.060)	(2.081)	(0.414)	(0.422)	(0.182)	(0.181)
Obs.	49	49	50	50	50	50
R-squared	0.137	0.129	0.165	0.163	0.057	0.058
Panel B: 2SLS regressions using initial FD divergences as instruments of FD divergences						
FD Divergence	**-0.831*****	**-1.447*****	**-0.143****	-0.140	**-0.117*****	**-0.127****
	(0.272)	**(0.388)**	**(0.073)**	(0.115)	**(0.039)**	**(0.061)**
GDP per capita	-0.138	-0.161	0.022	0.025	-0.004	-0.002
	(0.235)	(0.229)	(0.042)	(0.042)	(0.026)	(0.026)
Exchange regime	-0.246	-0.273*	-0.026	-0.023	-0.012	-0.010
	(0.150)	(0.140)	(0.034)	(0.034)	(0.016)	(0.017)
Region	-1.057*	-1.023*	0.085	0.088	0.004	0.005
	(0.596)	(0.566)	(0.100)	(0.100)	(0.079)	(0.078)
Cons	4.226***	4.582***	0.649	0.608	0.481***	0.457**
	(1.590)	(1.524)	(0.395)	(0.394)	(0.175)	(0.180)
Obs.	44	46	49	49	49	49
R-squared	0.272	0.307	0.165	0.162	0.059	0.058

Notes: Heteroscedasticity robust standard errors are in square brackets; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

The results in Table 6 indicate that the FD divergence significantly decreases fiscal spending multipliers in 10 of the 12 regressions, which further reinforces the robustness of our findings.

5. Conclusion

The effect of FD on economic growth is widely examined in literature, while little is known about the effect of FD on fiscal spending multipliers. Moreover, literature researching the FD – growth nexus often shows mixed results when using revenue and expenditure decentralization as measures of FD, calling for further research to reconcile the inconsistency.

Indeed, Oates (1972) argues that close matches between revenue and expenditure decentralization could increase the efficiency of the economy, and the inconsistent results of revenue and expenditure decentralization on economic growth to some extent suggests the authenticity of the Oates hypothesis (Gemmell et al., 2013). The rationale of the Oates hypothesis is as follows. First, matches between spending and revenue in provincial governments improve accountability (Kitchen et al., 2019; Oates, 1972). Second, Fiscal deficits could lead to efficiency losses by delivering profits to creditors in the long-run (Ilzetzki et al., 2013; Oates, 1972). Third, mismatches between spending and revenue often involve intergovernmental transfers and hence distortions (Kitchen et al., 2019; Shah, 1994).

Building on such a context, our paper examines the effect of FD and the divergence of revenue and expenditure decentralization on fiscal spending multipliers. To this end, we first estimate the aggregate and provincial spending multipliers in China using the SVAR method as well as the IV approach and data from 1978 to 2017. Then we examine the effect of FD and the FD divergence constructed in multiple ways on the spending multipliers at the two levels of government.

We find that expenditure decentralization weakens the efficacy of spending policies, while revenue decentralization enhances the efficacy, being consistent with the literature on the FD – growth nexus. Moreover, the spending multipliers become smaller as the wedge between the fiscal expenditure and revenue decentralization widened. Such a result is robust to the use of aggregate and provincial-level data, the estimation methods of the multipliers, different ways to construct FD, the inclusion of the off-budgetary

expenditure and revenue items, dealing with possible reverse causality issue, and considering from a long-run perspective.

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