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Inside Job, Chinese Style:

Suspicious Use of Public Funds under Fiscal Pressure

by

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Abstract: Governments usually increase taxes or cut spending to tackle deficits. In contrast, local governments in China tend to increase suspicious uses of public funds under fiscal pressure, which is not well understood. Using the reduction of agricultural tax as a revenue shock, we find that greater fiscal pressure leads to higher questionable fund use by county governments. The suspicious activities are triggered by the motivation to reallocate resources, to fields that correlate with officials' own interests like stimulating local economic growth, pursuing personal promotion as well as grabbing resources before retirement.

Keywords: Fiscal pressure; Government audit; Public funds; China

JEL Classification: H83, O23, P37

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1. Introduction

Unlike developed countries that are characterized by modern tax systems with high collection and redistribution capabilities, the fiscal capabilities of developing countries are usually weak due to the huge differences in economic and political parameters (Besley and Persson, 2014). When fiscal pressure increases, strengthening the efforts of tax collection, cost-cutting already insufficient expenditure, or using fiscal revenue more efficiently become difficult for these countries. Under such circumstances, it is hard to fathom how governments will react when normal tools are ineffective to apply.

In this paper, we use China as an example to investigate the impacts of revenue shortage on local governments' behavior. The Chinese central government started to lower agricultural tax in early 2004, and as a result, the agricultural tax revenue was 22.653 billion RMB yuan less than that of 2003, a 44.7% drop,[1] which serves as a good natural experiment. Our research documents an interesting reaction of local governments to this, which has received little attention in the existing literature: increasing suspicious use of public funds. More specifically, local governments and bureaucrats may act as an insider and change the use of public funds, by putting them into places in accordance with their own interests, deviating from originally planned purposes.

Employing a difference-in-difference (DID) estimator that compares the suspicious expenditures before and after the reduction of agricultural tax, and between counties with high and low levels of lost revenue, we find that a one-standard-deviation

[1] Calculated by authors using data from *China Financial Yearbook* (2005), Ministry of Finance.

increase in fiscal shock results in a 90% increase in suspicious expenditures. Further, suspicious expenditures increase when counties obtain more general transfer payments, a type of revenue less supervised by upper governments. However, the amount decreases with a strengthening of supervision intensity, measured by corruption crackdown and by geographical distance from upper-level governments.

The empirical evidence is consistent with a well-documented phenomenon called the flypaper effect, i.e., money sticks where it hits (Inman, 2008). In China, local governments are often responsible for handling local public affairs but cannot fully raise the required revenue to finance all the expenditures. The imbalance between financial power and administrative responsibilities is worsened in the wake of unexpected fiscal shocks like the agricultural tax reform, weakening the local government's capacity to deliver the same amount of public services as before the reform. And the limited funds will be more likely used in areas aligning with officials' own interests, resulting in the increase of questionable public funds.

Previous studies like Flynn and Smith (2022) argue that it is the loose restrictions on the use of public funds that lead local governments to reallocate money to other purposes when they are infra-marginal to the state budget. In the present paper, we find that under large fiscal pressures, the motivation to stick money in certain areas becomes stronger, even when the intensity of oversight does not change. As a result, the flypaper effect under fiscal shocks leads to an increase in suspicious expenditures.

More interestingly, we find that fiscal pressure may also cause indirect *positive*

effects. While suspicious expenditures rise, detected criminal activities fall. The reason may lie in that local governments under fiscal pressure must use limited budgets in a more deliberate way to achieve their goals such as stimulating economic growth to gain career promotion. These results suggest that under fiscal pressure, local officials not only allocate more resources to the areas of their own preferences, but also try to use them more effectively.

The results also echo with the Chinese institutional design of political centralization but economic decentralization. China is one of the largest developing countries with weak institutions in government, corporate governance, law, and finance. Local governments serve as the key stakeholders in the bulk of the economy, having influence or even direct control rights over a substantial number of financial resources (Xu, 2011). Based on commonly applied standards, China is below average on most measurements of the application of the rule of law and government quality (Allen et al., 2005; Xu, 2011), suggesting that it is easier for local officials to misuse public funds. For example, by the end of 2010, 122.3 billion yuan of suspicious expenditures in 2009 were recovered after detection by audit bureaus; simultaneously a total number of 1103 officials were punished by CCP (Chinese communist party) discipline, and ninety-five officials were arrested, charged or sentenced.[2]

Specifically, we find that if the county secretary of the CCP, who is the top leader of the county government, has stronger career incentives, the amount of questionable

[2] Source: *Announcement of audit results* (No. 1 of 2011), National Audit Office.

monies observed becomes larger, to promote projects that may help him/her climb the bureaucratic ladder. More interestingly, we find a *retirement effect*: the effect of fiscal shocks on suspicious expenditures becomes even more significant when he/she is about to retire; that is, secretaries with low career incentives may attempt to grab resources for personal use after retirement. These results could imply an unexpected consequence of increasing government tax capacity and land sales: it may accelerate the redistribution of money to areas with officials' own interests, leading to more suspicious use of public funds.

This paper is closely related to four strands of literature. The first is on how fragile governments can improve fiscal capacity by engaging in tax collection (Chen, 2017), reducing public expenditure (Green and Loualiche, 2021), or increasing the efficiency of tax collection (Khan et al., 2016; Balán et al., 2022).

The second strand is the study of political institutions on the tax capacity of the government (Acemoglu, 2005; Besley and Persson, 2009; Gordon and Li, 2009; Besley and Persson, 2013). We contribute to this literature by finding that due to weak governance, strengthening tax collection during fiscal shocks causes suspicious use of public funds, which albeit might improve the efficiency of government spending. The stricter tax enforcement in our paper is not driven by advanced monitoring techniques (Rubolino, 2023), higher staff-to-taxpayer ratios (Basri et al., 2021), or more third-party information (Jensen, 2021), but by bureaucrats' increased private incentives.

The third strand is the literature on windfall gains such as Brollo et al. (2013),

Caselli and Michaels (2013) and Chen and Kung (2016), which says that the non-tax revenue from natural resources or international aid can be a disease or even a curse that increases corruption and embezzlement, and the diverted funds may be used for self-enrichment and vote buying. Even in a country like Switzerland with high-quality fiscal institutions, the windfall gains can still be directed to interest groups that are closed to local politicians and administrators (Berset and Schelker, 2020). In this paper, we focus on fiscal windfalls from stronger tax enforcement and land sales, and find that their increase might help improve the local economy.

Finally, this paper is related to the study on government audits as the embodiment of state capability, which not only supervise the use of public funds, but also curb corruption in local governments (Olken, 2007; Ferraz and Finan, 2011; Bobonis et al., 2016; Gerardino et al., 2017; Avis et al., 2018; Bo et al., 2020; Chu, et al., 2021). In the present paper, we find that the deterrent functions of the state audit system on local governments are far from being perfect, especially when conflict of interests arises between local bureaucrats and the public.

The rest of the article is structured as follows. Section 2 describes the institutional background of the agricultural tax reform, the government audit system, the situation of fiscal pressure and suspicious use of public funds of China's local governments. Section 3 introduces the data and empirical strategy. Section 4 presents the baseline results and robustness checks. Section 5 explores the mechanisms. And finally, section 6 concludes.

2. Background

2.1 Agricultural tax reform and fiscal pressure on Chinese local governments

The budget system in China is spread out over five levels: central, provincial, prefectural, county, and township. For local governments, tax revenue is the main source of the public budget. After the tax-distribution reform in 1994, the fiscal pressure on local governments increases significantly; even with transfer payments from the central government, the inequality across regions and between different levels of government still results in large variations in revenue shortage (Qiao, et al., 2008; Lü and Landry, 2014).

The agricultural tax reform worsened the financial difficulties for county governments. Before 2000, agricultural tax was levied and exclusively enjoyed by local governments, accounting for nearly 15% of their total revenue (Li et al., 2021). In 2000, the State Council initiated a policy called the Notice on the Pilot Reform of Rural Taxes and Fees, which is a prelude to a later reform of agricultural tax reduction.[3] The new reform was rolled out to the whole country in 2004.[4] By early 2005, 28 provinces had abolished agricultural tax, and other provinces also lowered the tax rates to below 2%. On December 29, 2005, the National People's Congress formally passed the resolution to completely abolish the agricultural tax nationwide. The purpose of repealing the agricultural tax was to alleviate the burden on peasants and reduce inequality between rural and urban areas, which was determined by the Central Government in Beijing.

[3] The policy includes 1) the abolition of administrative and institutional fees levied on farmers, 2) the adjustment of taxes on special agricultural products, and 3) the abolition of slaughterhouse tax. The Pilot Reform of Rural Taxes and Fees was first administered in some counties of Anhui province, and in 2001, it was implemented in Jiangsu province, together with 102 counties of other provinces.

[4] Heilongjiang and Jilin provinces first abolished the agricultural tax in 2004.

Hence this policy is an exogenous shock for county governments, which do not have the necessary bargaining power with upper-level policymakers.

Fig. A1 in the Appendix plots the density distribution of the agricultural tax to total revenue at the county level for 2002-2004. The mean values for each year are 26.2%, 25.1%, and 16.5%, respectively. On average, the agricultural tax share in 2004 is 35.7% lower than those in 2002 and 2003. Agricultural tax accounts for a large proportion of county governments' tax revenue before 2004, and the implementation of tax reduction is a major income shock for them. Hence, this policy can be used as an ideal exogenous measure of county governments' fiscal pressure.

2.2 Government audit system and suspicious use of public funds

The Chinese government audit system consists of the National Audit Office (NAO) and local audit bureaus. NAO is the constituent department of the State Council and is responsible for the vertical management of local audit departments. The appointment, removal, and transfer of local audit officials are directly approved by NAO, proving its independence in supervising and reporting the allocation, use, and management of public funds by local governments.[5]

Despite the audit supervision, county governments may misuse funds, due to the relatively weak local governance and the heavy burden on maintaining governmental

[5] Based on China's Audit Law and Regulations for the Implementation of the Audit Law promulgated in 1994 and 1997, respectively. The scope of audit supervision on local governments mainly includes revenues and expenditures under budgetary control, administrative institutional fees, state-owned resources and assets, and income from state capital operations. According to the Audit Law enacted in 1994 and revised in 2006, NAO and local auditing organs have the power to independently monitor the financial anomalies and ensure the legality and authenticity of the implementation of fiscal budgeting (revenue & expenditure) by local governments. Auditors check whether the uses of public funds such as tax revenues, transfer payments, international aid, donations and investment by the central government fit the intended purposes, and report wrong doings to NAO (Bo, et al., 2020).

operations. Chinese county-level secretaries have large autonomy on the distribution of local fiscal revenue and are less supervised, as the reach of the State is limited (Chang and Wang, 2021). The weaker audits on county governments might also reflect state intention, as even strong states will have limited capacity, and will strategically retain regions of limited state presence or subcontract state function to non-state actors (such as local top leaders) to enjoy greater political support (Steinberg, 2018). Anecdotal evidence reflects that county secretaries are de facto "local emperors",[6] and they have the absolute decision right on county affairs compared to other county bureaucrats.[7]

Here we cite several news reports. From 2002 to 2003, a special government audit based on the basic education funds of 50 counties in 17 provinces show that 43 county governments embezzled, misappropriated, or detained 445 million RMB yuan of education funds, accounting for 7.4% of the total expenditure in education.[8] In 2003, Yunnan province received 360 million RMB yuan of relief funds from the central government to cope with the damage of a 6.2 Richter scale earthquake, affecting nearly one million people. However, an ex-post audit found that 41.11 million RMB yuan of relief funds were reported 'questionable' or 'suspicious'.[9] In 2007, NAO reported that transportation authorities involved in 26 highway projects nationwide observed suspicious monies, totaling at 2.158 billion RMB yuan.[10] From 2011 to 2012, an audit investigation revealed that, to attract investment, 53 out of 54 counties issued 221

[6] Chinese Reform, 2015 (5): https://cnreform.caixin.com/2015-04-29/100805097.html?p0#page2
[7] Chinese Youth Daily: http://zqb.cyol.com/html/2011-10/26/nw.D110000zgqnb_20111026_1-12.htm
[8] http://www.audit.gov.cn/n5/n25/c63443/content.html
[9] https://magazine.caixin.com/2005-05-16/100080199.html
[10] https://www.chinacourt.org/article/detail/2007/03/id/240572.shtml

documents on tax-breaking that were clearly contrary to national policy, causing a loss of 7.043 billion RMB yuan of government revenue in the form of disguised government expenditures.[11] Similarly, in 2012, an audit of medical and health systems of 45 counties found that 14 counties had reported misuse of 79.89 million RMB yuan of rural medical service construction funds.[12] In 2015, a mining rights audit in 14 provinces found that 10.639 billion RMB yuan of mineral funds were reported misused in six provinces.[13] Moreover, embezzlement appears to be prevalent in many public service domains, and there exists a significant variation in the value of questionable expenditures among different counties, inspiring us to empirically investigate the motivations behind.[14]

3. Data and Variables

3.1 Data sources

The data for this article are collected from various sources. 1) County governments' suspicious expenditures, number of audit projects and audit reports are collected from the China Audit Yearbook from the EPS dataset. 2) County agricultural tax and subsidies, fiscal revenue, and transfer payment revenue are obtained based on National Prefectural and County Finance Statistics (NPCFS). 3) Information about county CCP secretaries is acquired from the regional yearbook and online news coverage. 4) Corruption data are collected from the Procuratorial Daily.[15] 5) Information on SEZs is obtained from the

[11] https://www.audit.gov.cn/n5/n25/c63597/content.html
[12] https://china.huanqiu.com/article/9CaKrnJuRT6
[13] https://www.chinacourt.org/article/detail/2015/02/id/1552379.shtml
[14] Fig. A1 in the Appendix reports the spatial distribution of the average suspicious expenditures for 2000-2007.
[15] The Procuratorial Daily is hosted by the Supreme People's Procuratorate (See Chen and Kung, 2016).

China Development Zone Review bulletin directory. 6) Firm-level data are taken from the Annual Survey of Above-Scale Industrial Firm (ASIF) Database managed by the National Bureau of Statistics. 7) Other county-level information is aggregated from the China Statistical Yearbook for Regional Economy and China City Statistical Yearbook. All monetary variables have been deflated to 1998 prices. Table A1 in the Appendix contains details of the summary statistics from the county-year panel we construct.

3.2 Construction of the fiscal shock

We measure the fiscal pressure on county governments based on the reduction of the agricultural tax in 2004 as an exogenous shock, similar to Chen (2017):

$$Shock_c = \frac{\sum_{t=2002}^{2003}(Agr\_tax_{ct} + Subsidy_{ct})}{\sum_{t=2002}^{2003} Total\_tax\_rev_{ct}} - \frac{\sum_{t=2004}^{2007} Subsidy_{ct}}{\sum_{t=2004}^{2007} Total\_tax\_rev_{ct}} \quad (1)$$

where Agr_tax_{ct} represents the total agricultural tax,[16] $Subsidy_{it}$ denotes the sum of agricultural related subsidies,[17] and $Total\_tax\_rev_{ct}$ is the total tax revenue, all for county c in year t. In Eq. (1), the shock index of fiscal pressure caused by the reduction of agricultural tax contains two parts: the left of the minus sign is the proportion of agriculture tax and subsidies in fiscal revenue in each county before the reform, and the right of the minus sign refers to that proportion after reform.

[16] Total agricultural tax includes agricultural tax, animal husbandry tax, and tax on agricultural specialty products.
[17] Because data on county agricultural tax and subsidies are not reported before 2002 in EPSDATA, we can only measure fiscal shocks based on the values for 2002-2007.

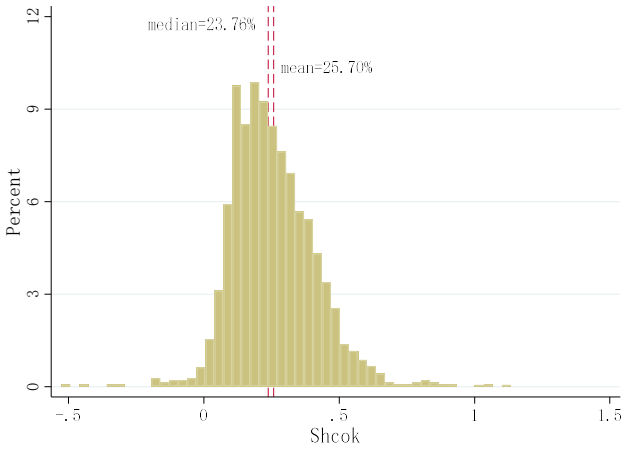


Fig. 1. Distribution of the fiscal shock
Notes: Graph plots the distribution of fiscal shocks by county, using Eq. (1).
Source: Authors' calculation based on National Prefectural and County Finance Statistics (NPCFS).

Fig. 1 illustrates the distribution of the shock index, which shows that numerous counties have suffered from fiscal pressure due to the agricultural tax reduction, with an average loss of county revenue being 26%. Fig. A4 in the Appendix also contains the spatial distribution of the fiscal shocks.

3.3 Empirical strategy

To identify the causal relationship between fiscal pressure and the amount of suspicious expenditures, we take the agricultural tax reduction as an exogenous shock to county revenue, and construct a DID regression model:

$$\log(SuspiciousExpenditures_{ct}) = \beta Shock_c \times Post_t + X_{ct} + \alpha_c + \gamma_t + \varepsilon_{ct} \quad (2)$$

where $\log(SuspiciousExpenditures_{ct})$ is the natural logarithm of the suspicious expenditures in county c in year t. $Post_t$ is a time dummy set to 1 if t is larger than 2004 and 0 otherwise. $Shock_c$ is the fiscal shock as denoted in Eq. (1). The impact of the agricultural tax reform on the suspicious expenditures is captured by β. Given that county governments may experience fiscal pressure that can induce them to use measures such as enhanced tax enforcement or increased transfer payments, β can be

interpreted as a conservative estimate of the effect of fiscal shocks on suspicious expenditures. X_{ct} is a vector of control variables, including log gross domestic product (GDP) per capita, ratio of public budget expenditure to GDP, log population and area, and log value added tax (VAT) revenue. α_c and γ_t are county and year fixed effects, respectively, and ε_{ct} is an error term.

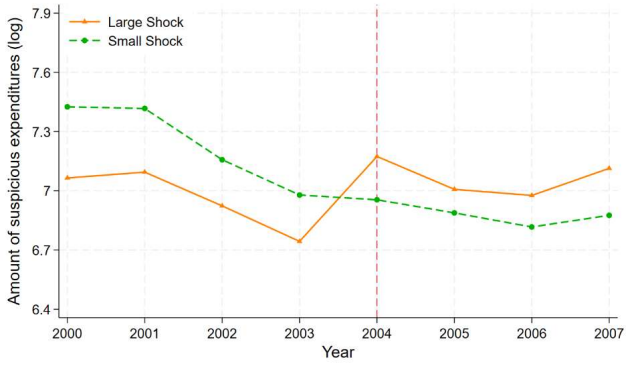


Fig. 2. Trends of suspicious expenditures
Notes: Figure plots average amount of suspicious expenditures of counties with large and small fiscal shocks, respectively. Counties are designated as suffering from large (small) revenue shortage if their fiscal shock values are above (below) the median value.

We divide counties into high (low) fiscal pressure groups if their fiscal pressure is above (below) the median value of the total sample (i.e., 23. 76%) to intuitively show the relationship between fiscal pressure and the amount of suspicious expenditures. Fig. 2 indicates that the average suspicious expenditure (in log) in both the high and low groups presents an almost parallel trend. However, 2004 is a critical year: counties with smaller fiscal pressure have a larger amount of suspicious expenditures before 2004, but after 2004, the opposite is true. The break-in-trend in 2004 reveals the positive relationship between fiscal pressure and questionable monies.

4. Results

4.1 Basic results

The baseline results based on Eq. (2) are reported in Table 1. In Column (1), the estimation without control variables shows that suspicious expenditures rise significantly after the reduction of the agricultural tax.[18] In Column (2), the coefficient of the interactive term when controlling for per capita GDP, fiscal expenditure, population, region size and VAT revenue is 0.642, significant at the 1% level, implying that the fiscal shock is associated with 90% more questionable monies. On average, the fiscal shock increases the amount of suspicious expenditures by 26 million RMB yuan. Another way to gauge the magnitude is to compare with the sample mean: the fiscal shock increases suspicious expenditures by 9% relative to the sample mean. In Column (3), samples with fiscal shocks of less than zero are deleted; still, the coefficient of the interactive term is positive.

We then run various robustness checks of the baseline model in Table 2. In these alternative estimations, we follow Eq. (2) in controlling for county and year fixed effects, and county-level controls are as in Column (2) of Table 1.

Table 1 Baseline results: fiscal shock and suspicious expenditures

Outcome variable: Ln (Suspicious expenditures)			
	(1)	(2)	(3)
Mean of outcome variable	6.997	6.997	7.001
Shock × Post	0.706***	0.642***	0.810***
	(0.163)	(0.165)	(0.176)
GDP per capita (log)		0.163	0.179
		(0.109)	(0.110)
Expenditure/GDP		0.758*	0.729*
		(0.431)	(0.432)
Population (log)		0.257	0.240
		(0.220)	(0.219)
Area (log)		0.028	0.028
		(0.038)	(0.039)
VAT revenue (log)		0.076**	0.092**
		(0.038)	(0.038)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	10,690	10,690	10,483
R-squared	0.565	0.566	0.568

[18] All standard errors in this regression are clustered at the county level, as in Bertrand et al. (2004).

Notes: Robust standard errors clustered at the county level. ***, **, * indicate significance at 1%, 5% and 10% levels.

First, we cluster the standard errors at the prefectural level to attenuate possible bias caused by serial correlation in the standard errors of counties. In Column (1) of Table 2, the coefficients with standard error clustered at the city-level are much the same with those in Column (2).

Second, we control for county-specific linear time trend and provincial-year fixed effects to mitigate concerns that trending factors and provincial-year confounding effects may drive the estimates. The interaction term in Columns (2)-(3) barely changes.

Third, to rest the concerns that some county-level characteristics may have impacts on both counties' fiscal pressure and the amount of suspicious expenditures, we control for the interactions between the reform time dummy (*Post*) and a series of time-invariant county variables, including if a county is a county-level city, national poor county, major food-suffering county or provincial bound county, based on the definition of Li et al., (2016). In Column (4), the key coefficients based on these interactive terms remain almost the same, alleviating the worry that it is these factors, not fiscal pressure, that drive the differential responses to suspicious expenditures.

Fourth, Chen (2017) shows that the strengthening of VAT enforcement can offset the government's total revenue loss. To account for this effect, we control for the effective VAT based on the ASIF dataset following the definition of Li et al. (2021), and the results in Column (5) also remain the same.

Table 2 Robustness checks: fiscal shocks and suspicious expenditures

Outcome variable: Ln (Suspicious expenditures)					
	(1)	(2)	(3)	(4)	(5)

Mean of outcome variable	6.997	6.997	6.997	6.997	7.037
Shock × Post	0.638***	0.651**	0.645**	0.712**	0.673**
	(0.221)	(0.314)	(0.292)	(0.313)	(0.335)
County city × Post				-0.025	-0.034
				(0.147)	(0.151)
Poor county × Post				-0.143	-0.108
				(0.122)	(0.131)
Food county × Post				0.054	0.039
				(0.133)	(0.141)
Provincial bound county × Post				-0.005	-0.010
				(0.102)	(0.114)
Effective VAT					0.007
					(0.173)
County controls	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
County × Time trends	No	Yes	Yes	Yes	Yes
Province × Year FE	No	No	Yes	Yes	Yes
Observations	10,676	10,676	10,676	10,676	9,701
R-squared	0.566	0.693	0.706	0.706	0.714
Cluster	City	City	City	City	City

Notes: Robust standard errors clustered at city level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Finally, we estimate the dynamic treatment effects of fiscal shocks on suspicious expenditures, by taking the year before the agricultural tax cut as a benchmark, and plotting the interactive coefficients between the dummy year and the fiscal shock in Fig. 3. The results verify that before 2004, fiscal pressure has no significant effects on the suspicious expenditures. However, after 2004, there is a positive jump in the coefficients, satisfying the parallel trend hypothesis. We also use staggered DID methods as a robustness check. Specifically, we divide counties into two groups that started the reform in 2004 or 2005, by considering whether county governments receive agricultural subsidies or agricultural tax revenue is zero. The base year is set to the year before the tax reform year. The dynamic effects in Fig. A5 also show that suspicious expenditure increases significantly after the abolition of the agricultural tax.

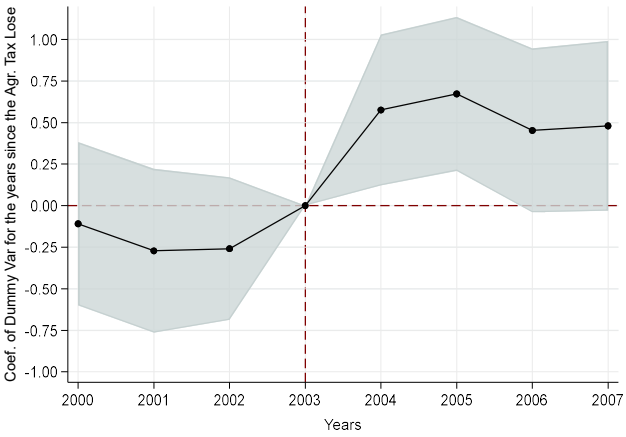


Fig. 3. Dynamic effects

Notes: Figure depicts dynamic effects of fiscal shocks on amount of suspicious expenditures by county governments (in logarithm). Robust standard errors clustered at county level. Points connected by the solid line indicate estimated coefficients of fiscal shock interacted with year dummies. Dashed lines indicate 95% confidence intervals. Year 2003 is omitted as the reference year.

4.2 Cosidering audit effort and local government discretion

Audit effort. In this subsection we further consider the effects of local audit effort, to precisely identify the causal effect of fiscal pressure on real public fund misuse. Specifically, we measure local audit effort by the number of auditors per capita, representing audit intensity at city level, to address the concern of city size (data on the number of auditors at the county level are not available after 2004). We follow four steps as below.

First, we obtain the predicted value of "suspicious expenditure" by regressing the reported suspicious expenditure (ln) on the number of auditors per capita (ln). Column (1) of Table 3 shows that the increase of audit effort has a significant negative effect on suspicious expenditure, implying stronger audit effort can decrease the total questionable monies.

Second and more importantly, we measure the suspicious expenditure free from audit effort, which is obtained by the difference of the log value of total suspicious

expenditure and the log value of the predicted audit-effort related suspicious expenditure obtained from the first step. If fiscal shock still has significant positive effects on the part of suspicious expenditure unrelated to audit effort, we can have more confidence that the increase of suspicious expenditure is not caused by increasing audit effort. In Column (2) of Table 3, the effect of the agricultural tax reform on the part of suspicious expenditures that are unrelated to audit effort are still positively significant. Also, the coefficients in Column (2) are about the same with that of the coefficients based on total suspicious expenditure in Column (4). Further, as a robustness check, we consider the effect of fiscal shock on predicted suspicious expenditures in Column (3), and find that the coefficients of the interactive terms are insignificant. These results imply that questionable monies related to audit effort are not affected by the fiscal shock.

Third, we directly use the audit effort as an additional control variable. In Column (5) of Table 3, even when controlling for the logarithm of the number of auditors per capita, the effects of the fiscal shock on suspicious expenditure remain unchanged.

Table 3 Influence of audit effort

	Total Suspicious expenditure	Suspicious expenditure unrelated to audit effort	Suspicious expenditure related to audit effort	Total Suspicious expenditure	Total Suspicious expenditure
	(1)	(2)	(3)	(4)	(5)
Shock × Post		0.671***	0.004	0.675***	0.674***
		(0.173)	(0.006)	(0.173)	(0.173)
Log(auditors)	-0.233***				-0.050
	(0.021)				(0.092)
County Controls	No	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Observations	12,645	10,303	10,303	10,303	10,303
R-squared	0.009	0.561	0.958	0.568	0.568

Notes: Robust standard errors clustered at county level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Fourth, we switch to using the amount of public funds withheld by county

governments or with changed purpose of use as alternative outcome variables, which can be used to represent the real public fund misuse in a more accurate way. Table 4 shows that there are still significant positive effects of the reform on suspicious expenditures, which is consistent with the baseline conclusions.

Table 4 Audit effort and public funds withheld or with changed purposes of use

Outcome variable	Public funds withheld by county governments		Public funds with the changed purposes of use	
	(1)	(2)	(3)	(4)
Shock × Post	0.829***	0.832***	0.859**	0.726*
	(0.228)	(0.232)	(0.416)	(0.420)
Log(auditors)		-0.106		-0.127
		(0.122)		(0.203)
County Controls	NO	YES	NO	YES
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	10,566	10,566	7,810	7,810
R-squared	0.517	0.518	0.436	0.437

Notes: Robust standard errors clustered at county level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Finally, we consider earnings manipulation by state-owned enterprises (SOEs) through real activity manipulation (RAM). RAM is in a gray area in China - not explicitly illicit, but not clearly legal (Chu et al., 2021). Since SOEs are under the purview of the audit system, if audit efforts are increased along with fiscal pressure, management via RAM, while not strictly illegal, captures more expenditures that are in a legal gray area, which would naturally raise the concerns of auditors. Therefore, we expect the RAM of SOEs to decrease in counties with a larger fiscal shock after the reform when auditing efforts become stronger.

There are two advantages in considering the influence of audit efforts from the perspective of SOE's RAM. One is that it is closely related to auditor effort and has nothing to do with suspicious expenditures. Hence, if we observe a decrease of SOE's

RAM after tax reform, most likely it is due to increases of audit effort rather than fiscal shock. The other advantage is related to data: the Annual Survey of Above-Scale Industrial Firm (ASIF) datasets contain a complete list of all the SOE information we need (Huang et al. 2017), which is helpful for accurately measuring RAM.

Following Kothari et al. (2005), we use the absolute values to measure RAM. The larger the values, the more serious the RAM problem. Specifically, RAM is the residuals from the annual cross-sectional industry regression model:

$$TA_{i,t} = \alpha + \beta\left(1/Assets_{i,t-1}\right) + \gamma\Delta Sales_{i,t} + PPE_{i,t} + \delta Roa_{i,t} + \varepsilon_{i,t} \quad (5)$$

where *i* indicates firm, $Assets_{i,t-1}$ is the total assets of firm i in $t-1$, $\Delta Sales_{i,t}$ is the difference of sales revenue between year t and year $t-1$, $PPE_{i,t}$ is the value of fixed assets in year t. $Roa_{i,t}$ is the return on assets in year t. All variables are standardized by the total assets for the previous years. Based on Kothari et al. (2005), the definition of $TA_{i,t}$ is as follows:

$$TA_{i,t} = \frac{\Delta\left(Inv_{i,t} - Rec_{i,t}\right) - \Delta CL_{i,t} - Del_{i,t}}{Assets_{i,t-1}} \quad (6)$$

where $\Delta\left(Inv_{i,t} - Rec_{i,t}\right)$ is the change in the value of inventory and accounts receivable. $\Delta CL_{i,t}$ is the change in current liabilities. $Del_{i,t}$ is the depreciation of the year. All of the above variables are based on the ASIF dataset.

In Table 5, the firm-level estimates in Columns (1)-(3) show that when fiscal shocks increase, the RAM of SOEs does not significantly decrease, implying that audit effort does not intensify in counties with larger fiscal shocks. In Columns (4) and (5), we also consider the estimation based on county level results, and SOE's average RAM

remains almost the same, suggesting that it may not be the strengthening of auditing efforts that lead to the increase in suspicious expenditures.

Table 5 Real activity manipulation by SOEs

Outcome variable: Ln (RAM)					
	(1)	(2)	(3)	(4)	(5)
		Firm level		County level	
Mean of outcome variable	-0.082	-0.082	-0.082	-0.158	-0.158
Shock × Post	0.068	0.081	0.145	0.016	0.014
	(0.116)	(0.114)	(0.133)	(0.057)	(0.058)
County Controls	No	No	Yes	No	Yes
Firm Controls	No	Yes	Yes	No	No
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	18,167	18,119	18,119	4,842	4,842
R-squared	0.334	0.336	0.336	0.310	0.310

Notes: Robust standard errors clustered at city level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). Firm-level controls include assets size, age, number of employs and ROA. ***, **, * indicate significance at 1%, 5% and 10% levels.

Government discretion. To address the concern that the increase in suspicious expenditure is due to increased local government discretion, we consider several alternative tests.

The first is city type. Cities of various levels may have different discretionary power and audit efforts. There are four types of cities in China: prefecture-level, sub-provincial, provincial, and municipalities with independent planning status. We define the city types from 0 to 3 and control the interaction term of city type with time trends.

The second is government structure. The county power expansion (CPE) reform and the province-management-county (PMC) reform, which started in 2003, flatten the hierarchy of governments, leading to the increase of misused public funds (Bo, et al., 2020). As the flattening of the government structure may change the audit effort and discretionary power, we set the CPE and PMC dummies to 1 if a county is a CPE or PMC city.

The third is local officials' preference. Chu, et al. (2020) find that Chinese provincial chief auditors show significant favoritism when auditing their hometown cities. Since the potential influences of senior officials' personal connections may have strong effects on audit effort and discretionary power, we include two dummy variables equal to one if provincial chief auditors or supervisors have strong connections with counties. We define that a county has connection with superior officials if provincial chief auditors or chief supervisors were born, worked or studied in prefectural cities that are responsible for auditing the interested county. We gradually add the control variables of city type, CEP (PMC) reform and official connections in Columns (2) to (4), and find the coefficients change only slightly from Column (1) of Table 6, implying that the increase in suspicious expenditures after the agricultural tax reform may not be caused by regional discretionary power.

Table 6 Influence of discretionary power

Outcome variable: Ln (Suspicious expenditures)				
	(1)	(2)	(3)	(4)
Shock × Post	0.616***	0.612***	0.637***	0.626***
	(0.221)	(0.222)	(0.222)	(0.219)
Log(auditors)	-0.054	-0.053	-0.029	-0.021
	(0.102)	(0.102)	(0.102)	(0.101)
Citytype × Year		-0.007	-0.009	-0.021
		(0.016)	(0.016)	(0.016)
PMC			0.150*	0.157*
			(0.087)	(0.087)
CPE			0.182**	0.185**
			(0.088)	(0.088)
Chief supervisor connection				0.117
				(0.074)
Chief auditor connection				0.147*
				(0.085)
County Controls	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	10,566	10,566	10,566	10,566
R-squared	0.567	0.567	0.568	0.568
Cluster	City	City	City	City

Notes: Robust standard errors clustered at city level. City-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Finally, we consider the geographical distance to prefectural and provincial governments as another way of measuring discretionary power. Distance is an important influence on the effectiveness of discretionary power and audit monitoring system in China (Li et al., 2019). The greater the distance between county governments and their corresponding higher-level governments, the lower the discretionary power. Thus, one would expect the influence to be stronger in counties with longer distances. Based on the normalized distance from the county to the corresponding upper-level prefecture or province city,[19] the coefficients of triple differences in Table A5 show that counties with longer distances to their prefectural or provincial cities do not have more suspicious expenditures, suggesting that discretionary power may not be the main reason for the increase in public funds misappropriation.

4.3 Addressing additional concerns

We further conduct a series of robustness checks for our main findings. First, we permute the dummy time for the beginning of agricultural tax reduction and the value of each county's fiscal shock randomly for one thousand times, respectively. Subsequently, counterfactual variables are used to perform the regression based on Eq. (2). The distribution of coefficients for the interactive terms is demonstrated in Fig. A6(a) of the Appendix, which implies that more than 99% of the counterfactual coefficients are less than the true value. Fig. A6(b) of the Appendix outlines the

[19] The normalized distance defined as a ratio, where the numerator is the real distance between the targeted county and the prefecture-level city, and the denominator is the maximum distance between the prefecture-level city and a county that is within the same prefecture-level administrative boundary as the targeted county.

corresponding p values, which also have a random distribution.

To accommodate the possibility of latent differences between the treated and controlled groups, we use the changes-in-changes (CIC) method (Athey and Imbens, 2006) to estimate the quantile treatment effects on the entire distribution. By dividing the counties into treated and controlled groups according to if their fiscal shocks are above or below the mean value, we estimate the quantile treatment effects on the distribution following the two-step procedures in Cao and Chen (2022). Fig. A7 in the Appendix shows that the fiscal shock has a positive effect on suspicious expenditures on the entire distribution. Also, the increase of suspicious expenditures is larger in both the left and right tails of the conditional distribution, implying that the changes of public funds between the treatment and control groups mainly come from counties that have the least or the most serious suspicious expenditure before the reform. This pattern lays to rest the concern that certain counties with larger fiscal pressure might be prone to misusing public funds before and after the agricultural tax reform, in which case we would have smaller increases in counties with smaller fiscal pressures at the left tail of the distribution.

Also, we replace the amount of suspicious expenditures with the number of audit reports submitted by local auditors and the amount of suspicious expenditures per project as potential proxies. The results in Fig. A8 in the Appendix imply that the coefficients become significantly positive after 2004, which further proves that fiscal shortage increases suspicious expenditure.

To rest concerns that the results may be sensitive to the specific definition of the

fiscal shock, we use alternative ways to define fiscal pressure, as shown in Table A3 in the Appendix. The results imply that regardless of the ways the fiscal shock is measured, the positive impacts of fiscal pressure on suspicious activities still exist.

Another limitation of Eq. (1) could be that it captures only the revenue reduction resulting from the removal of agricultural taxes, and not the full range of actions that county governments may take to compensate for this loss. As such, our estimation based on Eq. (1) may underestimate the true impact of fiscal pressure on suspicious expenditures, as it only reflects the potential for county governments to misbehave. To mitigate the above concern, we remeasure the average reduction in tax revenue before and after the agricultural tax reform as follows:

$$Shock\_rev_c = \frac{\frac{1}{2}\sum_{t=2002}^{2003}(Total\_tax\_rev_{ct}) - \frac{1}{4}\sum_{t=2004}^{2007}(Total\_tax\_rev_{ct})}{\frac{1}{2}\sum_{t=2002}^{2003} Total\_tax\_rev_{ct}} \tag{3}$$

Next, we construct an instrumental variable (IV) for before and after the reform:

$$Shock\_agr_c = Ln[\frac{1}{2}\sum_{t=2002}^{2003}(Agr\_tax_{ct} + Subsidy_{ct}) - \frac{1}{4}\sum_{t=2004}^{2007} Subsidy_{ct}] \tag{4}$$

Table 7 presents the first-stage results, which demonstrate significant decreases in government revenue following the abolition of the tax. The IV estimates in Columns (1)-(3) confirm the reduction in government revenue significantly increases the total amount of suspicious expenditures, the number of audit reports, and the suspicious expenditures per project. Additionally, Fig. A9 in the Appendix displays the corresponding dynamic effects based on the IV estimation, showing spikes in the variable of interest. These findings provide further evidence that the reform reduces

government revenue, ultimately leading to suspicious use of public funds.

Table 7 IV results: revenue reduction and suspicious expenditures

2nd stage outcome variable:	(1) Ln (Suspicious expenditures)	(2) Ln (Report)	(3) Ln (Suspicious expenditures per project)
Mean of outcome variable	7.000	3.288	3.408
Shock_rev × Post	0.486**	0.646***	0.552**
	(0.243)	(0.237)	(0.245)
1st stage outcome variable:	Shock_rev × Post	Shock_rev × Post	Shock_rev × Post
Mean of outcome variable	-0.233	-0.233	-0.233
Shock_agr × Post	0.114***	0.113***	0.114***
	(0.020)	(0.023)	(0.020)
County Controls	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
1st stage Cragg-Donald Wald F	509.53	417.50	509.53
1st stage Kleibergen-Paap Wald rk F	33.31	23.85	33.31
Observations	10,130	8,973	10,130

Notes: Table reports IV estimation ofimpact of revenue reduction on suspicious expenditures, number of audit reports and suspicious expenditures for each project in Columns (1) – (3), respectively. Regressor is the interaction of the reduction of revenue (measured by Eq. (3)) and agricultural time dummy. First stage IV is measured by Eq. (4). Robust standard errors clustered at county level. Dependent variable is amount of public funds. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

In Table A4 in the Appendix, we also utilize the OLS model to estimate the relationship between suspicious expenditures and revenue shocks measured by Eq. (3). We observe a negative correlation between the total amount of suspicious expenditures and the number of audit reports, and a positive correlation between suspicious expenditures for each project. However, these results are not statistically significant, suggesting that the suspicious uses are influenced by both the amount of revenue the local government can use and their motivation to change the way funds are utilized.

4.4 Further exclusion of irrelevant information in suspicious expenditures

Another concern is that the variable of total suspicious expenditures might contain irrelevant information about real public fund misbehaviors. Unobserved factors may exert effects on the outcome variables in counties with different degrees of fiscal shocks, which may bias the estimation of our true potential misbehaviors. To further alleviate

such concerns, we construct three types of shift-share instruments. The basic idea is that the tax shock is closely related to the average price of agricultural products and the regional characteristics of the county. The higher the agricultural income shock, the stronger the positive incentive for agricultural production, and thus the higher the cost of eliminating the agricultural tax.

First, we construct a shift-share instrument (IV1), w_f, for the effects of the agricultural tax of county i in prefecture f:

$$w_{if} = \sum_{f \in \Omega} s_{if} \pi_{if} \tag{7}$$

where s_{if} is the exogenous shock to agricultural income in prefecture f to which county i belongs (i.e., the "shift" part). π_{if} is the ratio of the prefectural agricultural tax to total tax revenue of all the prefectures in the set Ω (i.e., the "share" part).

Following the procedures in Imbert et al. (2022), the agricultural income shock s_{if} can be written as a combination of specific cropping patterns and commodity price innovation. The cropping pattern in each prefecture, q_{cif}, is the interaction between the total harvest area for a given crop c in prefecture f, h_{cif}, and the potential yield per hectare for crop c in prefecture f, y_{cif} ($q_{cf} = h_{cif} \times y_{cif}$). The data on harvested areas and potential yield per hectare in each prefecture are taken from the 2000 World Census of Agriculture and 2000 Global Agro-Ecological Zones Agricultural Suitability and Potential Yields.

The measurement of commodity price innovation also follows Imbert et al. (2022), by first constructing the international price of each crop as the average price across

countries (excluding China) weighted by their baseline share of global exports, p_{ct}, and then by measuring year- and crop-specific innovation in the logarithm of prices following an autoregressive process of order 1 (AR (1)) specification based on p_{ct}. The annual USD prices of 21 major commodities/crops are extracted from the Agricultural Producer Prices provided by the Food and Agriculture Organization of the United Nations (FAO). Finally, we obtain the agricultural income shock in each year as follows:

$$s_{cift} = \frac{\sum_c \bar{p}_c q_{cif} \hat{\varepsilon}_{ct}}{\sum_c p_c q_{cif}} \tag{8}$$

where $\bar{p}_c$ is the baseline international price for each crop in 2000, $\hat{\varepsilon}_{ct}$ is the residuals of AR (1). By averaging s_{cift} over 2000-2005, we have the "shift" part of our first shift-share instrument w_{if}, and combing the previous "share" part we obtain the IV w_{if} at the prefecture level.

Column (1) of Table 8 shows that the first coefficient of the shift-share instrument is significantly positive and passes the weak instrumental tests. The second stage coefficient indicates that the increase of fiscal shocks after the agricultural tax reform leads to more suspicious expenditures. The results based on the 2SLS model are similar to those based on OLS, further confirming the robustness of the basic results.

For the second type of the shift-share instrument (IV2), we use the number of emigrants in the prefectures to which the county belongs in 2000 as the "share" part. Since 2000, China has experienced a great process of structural change, with more than 45 million rural workers migrating to cities in only five years (Imbert et al., 2022). Prefectures with higher agricultural income shock will experience higher opportunity

cost of emigration, and the incentives to engage in agricultural production will be stronger. Therefore, the fiscal shock will be higher in prefectures with higher emigration shift share variable. Based on the 1 percent samples extracted from the 2000 census, we calculate the emigration share for the prefecture to which the county belongs by dividing the number of emigrant workers in the prefecture by the total number of emigrants before 2000. The results of the 2SLS model in Column (2) of Table 8 remain largely the same as those in Column (1).

The third shift-share instrument (IV3) is based on the county-level agricultural tax ratio and the provincial agricultural tax growth rate. Specifically, the "share" part is the ratio of county level to provincial agricultural tax in 2000, the "shift" part is the average growth rate of agricultural tax in the province to which the county belongs since 1999. Column (3) shows that in the first stage, a county with a higher tax ratio and a higher provincial growth rate suffers a larger fiscal shock. The second stage estimation further proves robustness, implying that it is the fiscal shock after the tax reduction, rather than other omitted variables such as audit efforts, that leads to the increase in suspicious expenditures. Moreover, the results based on the 2SLS model capture the changes in the total suspicious expenditures that are related to the fiscal shock, alleviating the concern that the basic OLS results are driven by unobserved factors that affect the part of the questionable monies irrelevant to the potential real misuse.

Table 8 Fiscal shock and suspicious expenditures based on 2SLS model

	(1) IV1: based on agricultural price shock	(2) IV2: based on emigration shock	(3) IV3: based on province tax growth rate
2nd stage outcome variable:	Ln (Suspicious expenditures)	Ln (Suspicious expenditures)	Ln (Suspicious expenditures)

Mean of outcome variable	7.034	7.034	7.034
Shock × Post	1.157*	2.572**	4.258***
	(0.670)	(1.015)	(1.098)
1st stage outcome variable:	Shock × Post	Shock × Post	Shock × Post
Mean of outcome variable	0.132	0.132	0.132
W_{if} × Post	608.122***	386.069***	0.002***
	(34.015)	(34.410)	(0.000)
County Controls	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
1st stage Cragg-Donald Wald F	359.93	139.88	120.77
1st stage Kleibergen-Paap Wald rk F	319.61	125.88	126.69
Observations	10,625	7,957	8,724

Notes: Robust standard errors clustered at city level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

4.5 Changes of revenue and expenditures

Since the core premise of our paper rests on the assumption that the removal of agricultural taxes could lead to reduced revenue for local governments and, in turn, increased potential for fund misappropriation, it is crucial to examine whether the tax reform is indeed associated with a decrease in total revenue for counties. Column (1) of Table 9 reveals that the tax reform had a negative impact on the budget revenue of county governments. Since the freedom to use STPs is restricted, here we exclude them from the budget revenue. Then the result in Column (2) shows a significant negative correlation between county revenue and fiscal shocks. In Fig. A10 of the Appendix, we present the trends and dynamic effects of fiscal shocks, both with and without STPs. The findings indicate that prior to 2006, fiscal shocks resulted in a reduction of county revenue; however, the impact started to subside in 2007. The satisfaction of the parallel trends assumption prior to 2004 provides reassurance that counties experiencing different levels of fiscal shocks did not undergo divergent changes in total revenue before the implementation of the tax reform, mitigating concerns regarding potential confounding factors. This reduction in budget revenue is similar to that in Chen (2017),

but with larger effects, perhaps because the definition of fiscal shocks in our paper captures longer periods, from the decrease in agricultural tax to its complete elimination.

Table 9 Government revenue and suspicious expenditures

	(1) Ln (Budget revenue)	(2) Ln (Budget revenue – STPs)
Mean of outcome variable	8.939	8.598
Shock × Post	-0.169**	-0.893***
	(0.071)	(0.184)
County Controls	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Observations	7,400	7,400
R-squared	0.961	0.843

Notes: STPs refer to special transfer payment of county governments. Robust standard errors clustered at county level. ***, **, * indicate significance at 1%, 5% and 10% levels.

Column (1) of Table 10 demonstrates a counterintuitive result: following the agricultural tax reform, counties with greater fiscal pressure had larger budget expenditure. It may arise from the enforcement of other taxes and land sales by local governments (Chen, 2017). Further evidence in Columns (2) and (3) indicates that expenditures on capital construction and administration significantly increased after the reform. In contrast, Columns (4) – (6) show that expenditures on education, social security subsidies, and on public-security organizations, procuratorial organizations and people's courts (PPC) were not significantly impacted. These findings suggest that counties with greater fiscal pressure may have a higher likelihood of misusing public funds, evidenced by the increase in total budget expenditure and items on local construction and government issues.

Table 10 Government total expenditure and suspicious expenditures

	(1) Ln(Total budget expenditure)	(2) Ln(Capital construction expenditure)	(3) Ln(Administrative expenditure)	(4) Ln(Education expenditure)	(5) Ln(Social security subsidies expenditure)	(6) Ln(PPC expenditure)
Mean of outcome variable	10.077	6.450	7.998	8.638	6.031	7.066
Shock × Post	0.101***	0.801***	0.069**	0.003	-0.155	-0.031
	(0.023)	(0.190)	(0.035)	(0.030)	(0.110)	(0.038)

County Controls	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,205	6,572	8,748	11,205	8,748	8,748
R-squared	0.964	0.676	0.915	0.946	0.824	0.939

Notes: PPC refers to expenditures on public-security organizations, procuratorial organizations and people's courts. Robust standard errors clustered at county level. ***, **, * indicate significance at 1%, 5% and 10% level.

5. Discussion of Mechanisms and Economic Consequences

5.1 Motivation for suspicious use of public funds

Construction of SEZ projects. As mentioned in the introduction, because the abolition of the agricultural tax deteriorates the vertical fiscal imbalance of county governments, public funds are likely to be sticked to where they hit before the reform in accordance with local officials' preferences. We consider the construction of special economic zones (SEZs), which is one of the driving forces of economic growth in China (Alder et al., 2016), as an indicator of the area that county governments are motivated to invest considerable resources in.[20] We define the dummy variable *Zone* to be 1 if counties had established SEZs before 2003, and conduct triple estimations by considering whether the county has SEZs established before the repealing of agricultural tax. Table 11 shows that the increase in suspicious expenditures after the tax reform is significantly higher in counties with greater fiscal shocks, suggesting counties with SEZs are more willing to distribute funds to promote local economic development, which may lead to more suspicious behavior.

Table 11 Suspicious expenditures and special economic zones

Outcome variable: Ln (Suspicious expenditures)		
	(1)	(2)
Mean of outcome variable	6.997	6.997
Zone × Shock × Post	1.569***	1.647***
	(0.517)	(0.518)

[20] Firms in SEZs benefit from many favorable policies related to taxation, land, loans, and infrastructure.

Zone × Post	-0.278*	-0.296*
	(0.154)	(0.154)
Shock × Post	0.570***	0.503***
	(0.169)	(0.171)
County Controls	No	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Observations	10,714	10,684
R-squared	0.566	0.566

Notes: Robust standard errors clustered at city level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

To address the concern that there may be other unobserved differences between counties with and without SEZs prior to the tax reform, we consider the dynamic effects of triple differences. Figure 4 shows the parallel trends hypothesis is satisfied, implying that counties with a stronger motivation for the local economy may increase the suspicious expenditures.

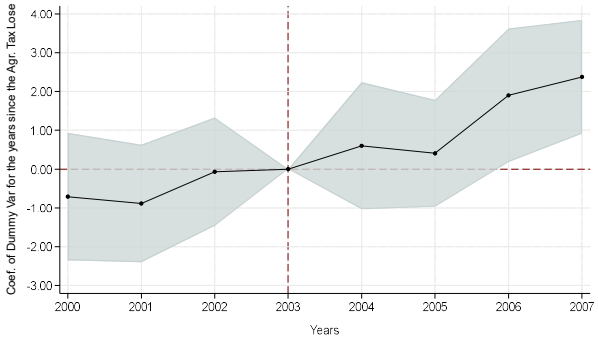


Fig. 4. Dynamic effects of suspicious expenditures via SEZs

Notes: Figure depicts the dynamic effects of fiscal shocks and the construction of SEZs before 2003 on the amount of suspicious expenditures by county governments (in log). Robust standard errors clustered at the county level. Points connected by the solid line indicate the estimated coefficients of the fiscal shock interacted with the Zone and year dummies. Dashed lines indicate 95% confidence intervals. Year 2003 is omitted as the reference year.

Burden of public services. Under the guideline of the "Scientific Outlook of Development" (the central government, 2002), local governments gradually increased expenditure on public services, which aggravated the burden of county governments, especially after the decrease in the corporate income tax sharing ratio from the central government. Accordingly, the reduction of the agricultural tax may constrain the financial resources required by county governments to develop the local economy. Here

we use the number of students in school and the number of beds in health institutions as representatives of potential demand for public services. Columns (1) and (2) of Panel A in Table 12 indicate that suspicious expenditures become larger if the demand for public education or medical services increases.

Table 12 Burden of public services and suspicious expenditures

	Education burden	Medical burden
	Outcome variable: Ln (Suspicious expenditures)	
	(1)	(2)
Mean of outcome variable	6.997	6.997
Public service (log) × Shock × Post	0.388**	0.682***
	(0.181)	(0.236)
Shock × Post	-3.536*	-3.541**
	(1.931)	(1.463)
Shock × Public service (log)	-0.478	-0.852**
	(0.897)	(0.404)
Post × Public service (log)	-0.055	-0.132*
	(0.059)	(0.073)
Public service (log)	0.243	0.301**
	(0.265)	(0.127)
County Controls	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Observations	10,673	10,673
R-squared	0.567	0.567

Notes: In Columns (1) – (2) of Panel A, *Public service* is log number of school students and number of beds in health institutions, respectively. In Panel B, outcome variables are logarithm of household savings per capita (second stage result) and suspicious expenditures (first stage result) in counties based on the 2SLS model, respectively. Robust standard errors clustered at county level. Dependent variable is amount of public funds. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

5.2 Substitution effects

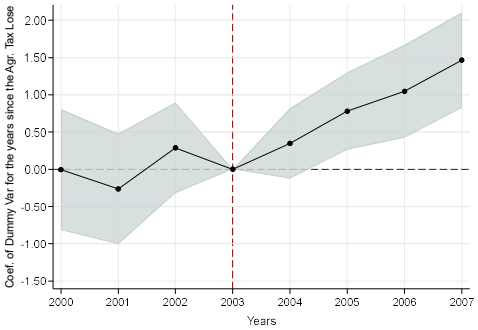
We decompose suspicious expenditures into three types, to check if suspicious use is the result of a change in the way county governments spend money, and find an interesting substitution: fiscal pressure increases public funds illegally withheld or changed purposes, while decreasing criminal activities, as county governments must consider how to use money more efficiently.

Firstly, under fiscal pressure, county governments may illegally withhold revenue that should be turned in to upper governments according to the tax law. Thus, we use

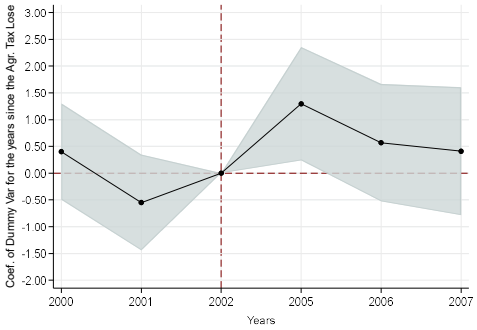
the illegally kept amount (in log) as the outcome variable. Fig. 5 (a) shows this amount significantly increases after the agricultural tax reform.

Secondly, we consider funds with illegally changed purpose of use. For example, county governments may i) divert project funds for other purposes, ii) appropriate or crowd out special public funds, iii) transfer state-owned assets, iv) transfer funds from budgetary accounts to extra-budgetary accounts. Fig. 5 (b) reveals this type of suspicious expenditure also significantly increases after the agricultural reform.[21]

Thirdly, we create a dummy for county governments committing criminal activities, such as corruption, abuse of power, dereliction of duty and other illegal issues that are transferred to judicial organs for prosecution by audit departments, as the outcome variable.[22] Fig. 5 (c) shows that fiscal pressure has a significant negative effect on criminal activities related to suspicious public funds.[23]

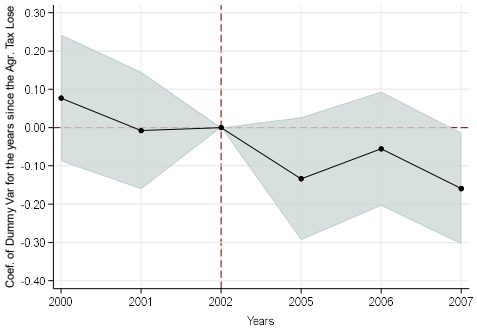


(a) Public funds withheld by county governments



(b) Public funds with changed purpose of use

[21] Public-funds data that county governments should return to the original channel of use is not available in audit year 2003-2004. We thus drop these two years.
[22] The number of cases transferred from audit departments to judicial organs in each county is unavailable for 2003-2004. We thus drop these two years.
[23] Table A5 in the Appendix reports the coefficients based on these three outcome variables, which are all consistent with the pattern shown in Fig 6.



(c) Criminal activities detected by auditors

Fig. 5. Substitution effects

Notes: Sub-figures (a) and (b) depict dynamic effects of fiscal shocks on public funds withheld by county governments or with changed purpose of use, respectively. Sub-figure (c) depicts the dynamic effects of fiscal shocks on the number of criminal activities detected by auditors (all in logarithm). In sub-figure (a), year 2003 is omitted as the reference year. In sub-figures (b) and (c), year 2002 is omitted as the reference year because of the data unavailability for 2003-2004. Robust standard errors clustered at the county level. Points connected by the solid line indicate the estimated coefficients of the fiscal shock interacted with the year dummies. Dashed lines indicate 95% confidence intervals.

5.3 The political economy of misusing public funds

Career prospects. The empirical results in the previous sections show that it is the motivation of officials to shift public resources and direct money to areas of their own private interests that leads to suspicious use of public funds. If this is the case, we would expect that career concerns, which are at the root of such motivation, would have a strong influence on the amount of suspicious expenditures. As the average age and tenure of county secretaries are 46 and 4 years, respectively, the promotion incentives of county secretaries tend to decrease in the second term (Chen et al., 2021). We set a dummy variable 1 (age≤50) (1 (age>50)) as 1 if the county secretary is younger (older) than 50 years, and 0 otherwise.[24] Also, we control for a series of secretary characteristics, such as years spent on education, number of years of service and work, and birth connections. In Table 13, Columns (1) to (2) of panel A imply that when county secretaries have stronger promotion incentives, questionable monies

[24] While the age distribution of prefectural secretaries is 51 years old (Xi et al., 2018), the distribution age for county secretaries is much earlier, which can be seen in Fig. A12 in the Appendix.

significantly increase.

Retirement effect. Although career concerns lead to more reported suspicious expenditures, bureaucrats with *low* promotion incentives (such as near retirement) may also be more willing to build personal connections and grabbing resources for after-retirement. To disentangle this effect, we first measure the *ex-ante* career incentives of county secretaries following Wang et al. (2020) and Fang et al. (2022), by constructing a forecasting model to predict the promotion probability of each county secretary based on its *ex-ante* personal characteristics such as age, education background and previous work experience.[25] Then we set the dummy variable *Low promotion probability* (*High promotion probability*) as 1 if the secretary's predicted probability of promotion is below (above) the median value of the total sample, otherwise 0. Next, we divide the samples into two groups according to if the age of the secretary is above or below the median value (46 years old). In Table 13, Column (1) of Panel B reports that for older secretaries, the amount of suspicious expenditures under fiscal pressure increases only when their predicted promotion probabilities are relatively low, suggesting that the retirement effect indeed contributes to the increase of suspicious expenditures. In contrast, Column (2) shows that suspicious expenditures increase under fiscal pressure, for young secretaries with *both* high or low promotion incentives. These imply that for secretaries with low incentives to climb the ladder, the motivation of misusing public funds to build connections for after-retirement becomes stronger when their time of

[25] The Appendix (Table A7) reports the coefficients of historical relationship between the secretary's promotion probability and personal characteristics.

retirement is approaching.

Table 13 Career concerns and retirement effect

Outcome variable: Ln (Suspicious expenditures)		
Panel A	(1)	(2)
Mean of outcome variable	6.982	6.982
Shock × Post ×1 (age≤50)	0.778***	0.683***
	(0.226)	(0.230)
Shock × Post × 1 (age>50)	0.487	0.384
	(0.411)	(0.410)
Shock × 1(age≤50)	-0.531	-0.514
	(0.450)	(0.455)
Post × 1(age≤50)	-0.187	-0.180
	(0.159)	(0.158)
1(age≤50)	0.086	0.079
	(0.140)	(0.141)
County Controls	No	Yes
Secretary Controls	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Observations	6,831	6,831
R-squared	0.598	0.599
Panel B	(1) Age>46	(2) Age⩽46
Mean of outcome variable	7.245	7.003
Shock × Post × Low promotion prob	0.945**	1.401***
	(0.454)	(0.525)
Shock × Post × High promotion prob	-0.090	1.075*
	(0.687)	(0.635)
Shock × Low promotion prob	-0.358	-0.781
	(0.709)	(0.652)
Post × Low promotion prob	-0.335	0.106
	(0.264)	(0.249)
Low promotion prob	0.165	0.119
	(0.226)	(0.213)
County Controls	Yes	Yes
Secretary Controls	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Observations	1,273	2,031
R-squared	0.620	0.641

Notes: In Panels A and B, results are based on merged data of county variables and county secretaries' information. Columns (1) – (2) of Panel B are based on counties with secretaries' age above or below the median values, respectively. Secretary-level controls include logged years spent in education, logged total number of years of service and work and birth connection dummies. Robust standard errors clustered at county level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Corruption crackdown. Since suspicious activities is based on the strong motivation of county officials to redistribute money to specific areas of their own interests, the incentives to stick money where it hits will be depressed when the cost of suspicious activity increases. We consider the crackdown on corruption to be one such constraint: the stronger the crackdown, the higher the cost of misbehavior, making it

less worthwhile to increase suspicious expenditures.[26] We define that if the provincial or prefectural governor, secretary of the provincial committee of the CPC, or other similar level officials are charged with corruption one year before, the crackdown intensity of the county is set to 1, and 0 otherwise. Columns (1) and (2) of Table 14 imply that with the increase of corruption crackdown, the effects of fiscal pressure on suspicious use of funds decrease significantly.

Table 14 Corruption crackdown

Outcome variable: Ln (Suspicious expenditures)		
	(1)	(2)
Mean of outcome variable	6.982	6.982
Crackdown × Shock × Post	-0.626**	-0.681**
	(0.303)	(0.305)
Crackdown × Shock	0.377	0.420*
	(0.230)	(0.232)
Crackdown × Post	0.135	0.150
	(0.096)	(0.097)
Shock × Post	1.196***	1.155***
	(0.251)	(0.253)
Crackdown	-0.040	-0.046
	(0.072)	(0.072)
County Controls	No	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Observations	9,562	9,562
R-squared	0.577	0.577

Notes: *Crackdown* equals 1 if the total number of corrupted prefectural and provincial level officials one year before is larger than zero, otherwise 0. Robust standard errors clustered at county level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

6. Concluding Remarks

We have studied the impact of fiscal pressure on the suspicious use of public funds by county governments in China. Using the agricultural tax reduction in 2004 as an exogenous shock, we find that county governments impacted by greater fiscal pressure tend to misbehave more, for career concerns by young bureaucrats and for local economic growth. Further analysis reveals a substitution effect between the increase of

[26] Following Chen and Kung (2016), we assess the threat of localized corruption crackdown by collecting the number of corruption cases at the provincial and the prefectural level, reported in the Procuratorial Daily.

public funds with changed use and the decrease of criminal activities related to fund using. In addition, while county secretaries with strong promotion incentives may change the use of public funds, secretaries with lower promotion incentives may prefer to grab resources before retirement.

Fundamentally, the paper sheds light on an undiscovered channel of how local governments in developing countries cope with revenue shortages: changing the ways of using public funds in accordance with their own interest. More interestingly, our results imply that the increase of misusing public funds could improve expenditure efficiency by stimulating the local economy, perhaps supplementing the weak institutions, as is the case in many developing countries.

Acknowledgements

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Appendix

Table A1 Summary statistics

Variable	Definition	Obs.	Mean	S.D.
Ln (Suspicious expenditures)	Logarithm of suspicious use of public funds uncovered by county audit bureau (unit: 10,000 RMB)	13,047	6.997	1.411
Number of projects	Logarithm of the number of audited projects in each county	13,867	3.433	0.968
Audit report	Logarithm of the number of audited reports in each county	11,466	3.288	1.273
Ln(auditor)	logarithm of the number of auditors per capita in each prefecture-level city	13,709	3.910	0.451
Shock	The agricultural tax losses	11,389	0.257	0.156
County level				
GDP Per Capita	Logarithm of the GDP per capita (unit: 10,000 RMB)	13,894	8.641	0.701
Expenditure	Logarithm of public finance expenditures (unit: 10,000 RMB)	13,881	0.151	0.126
Population	Logarithm of registered population at year-end (unit: 10,000)	13,894	3.581	0.793
Area	Logarithm of county area (unit: square kilometers)	13,891	-1.540	0.900
VAT revenue	Logarithm of the gross of VAT revenue (unit: 10,000 RMB)	13,868	6.858	1.408
Effective VAT rate	Ratio of firm's payable VAT to their total sales	12,699	0.042	0.075
Special transfer	Logarithm of one plus real special transfer payment (unit: 10,000 RMB)	12,905	8.225	0.816
General transfer	Logarithm of one plus real general transfer payment (unit: 10,000 RMB)	12,507	8.888	0.942
Distance/max	Normalized ratio of the distance between a county and its prefecture and the longest distance within the prefecture	13,873	0.661	0.263
Education	Logarithm of primary and secondary school students	13,890	10.917	0.835
Medical	Logarithm of number of beds in health institutions	13,869	6.436	0.715
PMC	=1 if a county adopted PMC reform in year t and afterwards; =0 otherwise	13,894	0.115	0.320
CPE	=1 if a county adopted CPE reform in year t and afterwards; =0 otherwise	13,894	0.083	0.276
County city	=1 if a county is a county-level city; =0 otherwise	13,894	0.190	0.392
Poor county	=1 if a county is a national poverty county; =0 otherwise	13,894	0.294	0.456
Food county	=1 if a county is a national food or cotton production county; =0 otherwise	13,894	0.264	0.441
Province boundary county	=1 if a county's boundary (at least part of it) is overlapped with its provincial boundary; =0 otherwise	13,894	0.367	0.482
Supervision Connection	=1 if the head of provincial supervisor was born, worked or study in cities that have jurisdiction over the interested county; =0 otherwise	13,894	0.069	0.254
Auditor connection	=1 if provincial auditor was born, worked or study in cities that is responsible for auditing the interested county; =0 otherwise	13,894	0.123	0.329
SEZ	=1 if county established special economic zones in year t and afterwards; =0 otherwise	13,894	0.197	0.398
Corruption crackdown	=1 if the provincial or prefectural official (governor, mayor or their equivalents) have been apprehended for corruption in the previous year; =0 otherwise	12,706	0.529	0.499
Firm-level				
Subsidy (SOE)	Logarithm of average Subsidy revenue of SOEs in the county (unit: 10,000 RMB)	10,001	2.651	3.479
Subsidy_(non-SOE)	Logarithm of average Subsidy revenue of non-SOEs in the county (unit: 10,000 RMB)	12,230	4.710	3.952
TFP (SOE)	Average TFP of SOE enterprises in the county	9,994	1.944	1.049
TFP (non-SOE)	Average TFP of non-SOE enterprises in the county	12,226	2.530	0.646
Management expense ratio	Ratio of management expense of products	12,694	0.108	0.441
Number of new enterprises	Logarithm of new enterprises	12,701	0.661	0.885
Individual characteristics of officials				
Age	County party secretary's age	8,765	45.662	3.977
Education	County party secretary's years of schooling	8,767	17.080	1.862
Cyl party secretary	=1 if county secretary has previously served as party secretary in the Communist Youth League; =0 otherwise	8,767	0.152	0.359
Workplace connection	=1 if county secretary has previously work in a prefectural government; =0 otherwise	8,767	0.407	0.491
Birthplace connection	=1 if county secretary was born in the same prefecture with prefectural CCP secretary or mayor	8,767	0.194	0.396

Table A2 Number of audit reports and suspicious expenditures per project

Outcome variable:	Audit report		Suspicious expenditures per project	
	(1)	(2)	(3)	(4)
Mean of outcome variable	3.288	3.288	3.408	3.408
Shock × post	0.335**	0.316**	0.540***	0.504***
	(0.143)	(0.144)	(0.190)	(0.192)
County Controls	No	Yes	No	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	9,325	9,325	10,737	10,737
R-squared	0.564	0.565	0.500	0.500

Notes: In Columns (1) – (2) and (3) – (4), outcome variables are total number of audit reports and audit projects in counties, respectively (all in logarithm). Robust standard errors are clustered at the county level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

The estimation results based on Eq. (2) are reported in Table A3. In Column (1), the impacts on governments' fiscal pressure are based on the agricultural tax reduction for 2000-2004, and $Shock_i^a$ is defined as:

$$Shock_i^a = \frac{\sum_{t=2002}^{2003} Agr\_tax_{it}}{\sum_{t=2002}^{2003} Total\_tax\_rev_{it}} - \frac{Agr\_tax_{i2004}}{Total\_tax\_rev_{i2004}} \tag{9}$$

In Column (2), we further include agricultural subsidies and define $Shock_i^b$ as:

$$Shock_i^b = \frac{\sum_{t=2002}^{2003} (Agr\_tax_{it} + Subsidy_{it})}{\sum_{t=2002}^{2003} Total\_tax\_rev_{it}} - \frac{(Agr\_tax_{i2004} + Subsidy_{i2004})}{Total\_tax\_rev_{i2004}} \tag{10}$$

In Column (3), the agricultural tax revenue of 2001 is included in Eq. (1), defining $Shock_i^c$ as:

$$Shock_i^c = \frac{\sum_{t=2002}^{2003} (Agr\_tax_{it} + Subsidy_{it}) + Agr\_tax_{i2001}}{\sum_{t=2001}^{2003} Total\_tax\_rev_{it}} - \frac{\sum_{t=2004}^{2007} Subsidy_{it}}{\sum_{t=2004}^{2007} Total\_tax\_rev_{it}} \tag{11}$$

In column (4), we consider the share of agricultural tax to total tax revenue before the abolition of the agricultural tax in 2005 and the related agricultural subsidies. The definition of $Shock_i^d$ is:

$$Shock_i^d = \frac{\sum_{t=2002}^{2004} (Agr\_tax_{it} + Subsidy_{it})}{\sum_{t=2002}^{2004} Total\_tax\_rev_{it}} - \frac{\sum_{t=2005}^{2007} Subsidy_{it}}{\sum_{t=2005}^{2007} Total\_tax\_rev_{it}} \tag{12}$$

Table A3 Different ways of measuring fiscal shocks

Outcome variable: Ln (Suspicious expenditures)				
	(1) Shock[a]	(2) Shock[b]	(3) Shock[c]	(4) Shock[d]
Mean of outcome variable	6.997	6.997	6.997	6.997
Shock × Post	0.569**	0.887***	0.603***	0.415**
	(0.234)	(0.210)	(0.179)	(0.167)
County Controls	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	13,012	10,698	10,690	10,690
R-squared	0.555	0.567	0.566	0.565

Notes: In Columns (1) – (4), definition of *Shock* is based on Eqs. (3) – (6), respectively. Robust standard errors clustered at the county level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Table A4 Revenue reduction and suspicious expenditures (OLS)

	(1) Ln (Suspicious expenditures)	(2) Ln (report)	(3) Ln (Suspicious expenditures per project)
Mean of outcome variable	7.00	3.288	3.408
Shock_rev × Post	-0.011	-0.017	0.006
	(0.034)	(0.031)	(0.036)
County Controls	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	12,781	10,857	12,781
R-squared	0.556	0.559	0.489

Notes: Columns (1) – (2) based on samples with normalized county-prefectural distances above or below the median value, respectively. Robust standard errors clustered at the county level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Table A5 Suspicious expenditure & geographic distance from upper governments

Outcome variable: Ln (Suspicious expenditures)		
	Prefectural-county distance	Provincial-county distance
	(1)	(2)
Mean of outcome variable	6.997	6.997
Distance × Shock × Post	-0.106	0.651
	(0.627)	(0.671)
Shock × Post	0.707	0.321
	(0.444)	(0.347)
Distance × Post	0.046	0.049
	(0.184)	(0.197)
County Controls	Yes	Yes
County FE	Yes	Yes
Year FE	Yes	Yes
Observations	10,679	10,679
R-squared	0.566	0.567

Notes: Columns (1) – (2) based on normalized county-prefectural or provincial-county distances, respectively. Robust standard errors clustered at city level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Table A6 Fiscal shock and substitution effects

Outcome variable:	Public funds withheld by county governments		Public funds with the changed purposes of use		Criminal activities detected by auditors	
	(1)	(2)	(3)	(4)	(5)	(6)
Mean of outcome variable	3.288	3.288	2.192	2.192	0.197	0.197
Shock × Post	0.859***	0.886***	0.938**	0.817**	-0.134**	-0.139**
	(0.235)	(0.240)	(0.408)	(0.413)	(0.054)	(0.055)
County Controls	No	Yes	No	Yes	No	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,352	11,352	8,476	8,476	8,502	8,502
R-squared	0.515	0.517	0.423	0.424	0.330	0.330

Notes: In Columns (1)–(2), outcome variable is logarithm of amount of public funds withheld by county governments. In Columns (3)–(4), outcome variable is logarithm of amount of public funds with changed purposes of use by county governments. In Columns (5)–(6), outcome variable is logarithm of number of criminal activities detected by auditors in counties. Robust standard errors clustered at county level. County-level controls include per capita GDP, fiscal expenditure, population, value of area, and VAT revenue (all in logarithm). ***, **, * indicate significance at 1%, 5% and 10% levels.

Table A7 Promotion probability for county secretaries including age as predictor

Variable	Explanation	Probit
Age	County party secretary's age	0.090***
		(0.013)
Education	County party secretary's years of schooling	0.049***
		(0.024)
CYL	Communist Youth League party secretary	0.442***
		(0.118)
PREFEXP	Experience in prefectural government	0.400***
		(0.089)
BC	From same hometown as prefecture's party secretary or mayor	0.466***
		(0.096)
Observation		4,127
Pseudo R-squared		0.084

Notes: Results show the relationship between secretaries' characteristics and whether they are promoted. Outcome dummy equals 1 if county secretary is promoted to higher level, otherwise 0. Robust standard errors clustered at county level. ***, **, * indicate significance at 1%, 5% and 10% levels.

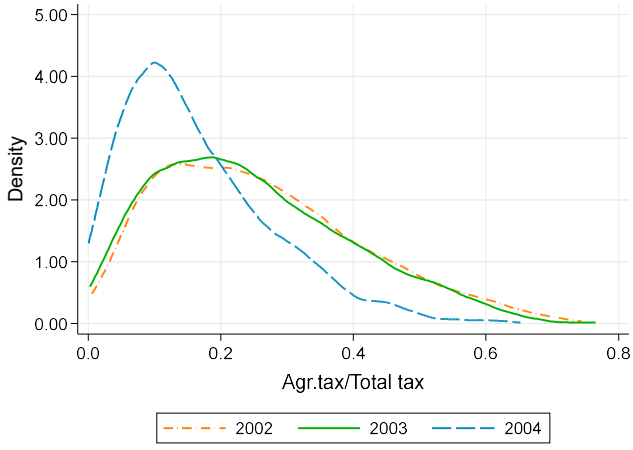


Fig. A1. Share of agriculture tax for county governments

Notes: Graph plots densities of the ratio of agricultural tax revenue to total tax revenue by county for 2002-2004.
Source: Authors' calculation based on National Prefectural and County Finance Statistics (NPCFS).

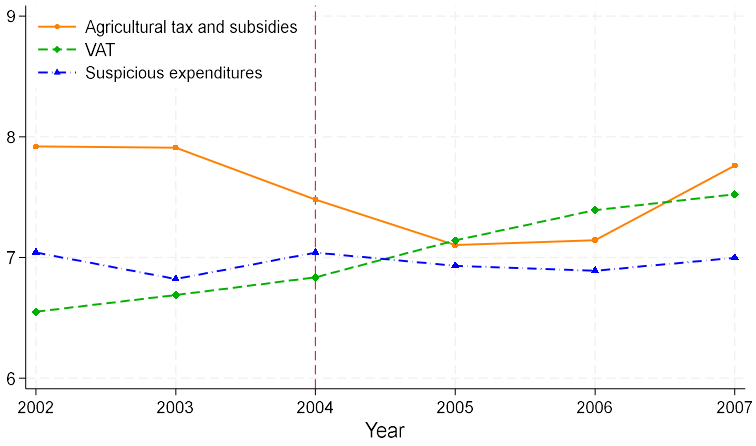


Fig. A2. Trends in agricultural tax revenue and subsidies, VAT revenue, suspicious expenditures

Notes: Graph plots trends of agricultural tax revenue and subsidies, VAT revenue, suspicious expenditures by county for 2002-2007.

Source: Authors' calculation based on National Prefectural and County Finance Statistics (NPCFS).

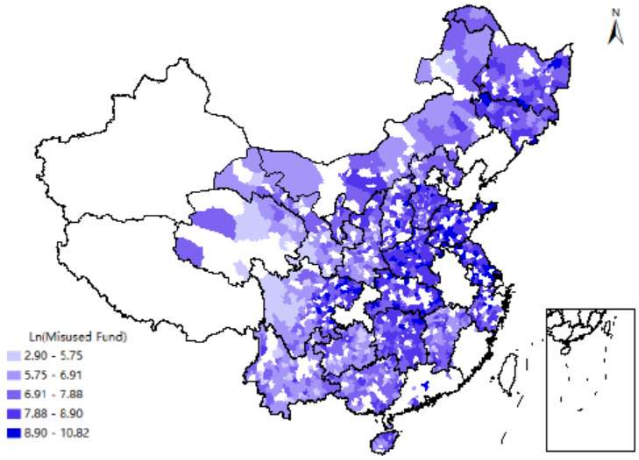


Fig. A3. Distribution of average suspicious expenditures

Notes: Average distribution of log suspicious expenditures in each county from 2000 to 2007.

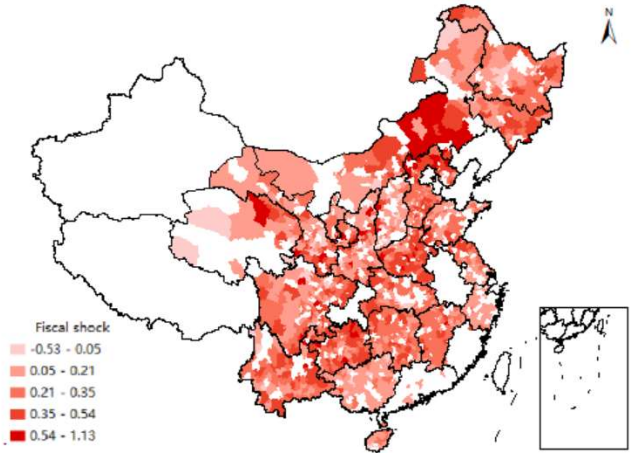


Fig. A4. Distribution of fiscal shocks

Notes: Figure shows distribution of the fiscal shock (measured by Eq. (2)) in each county.

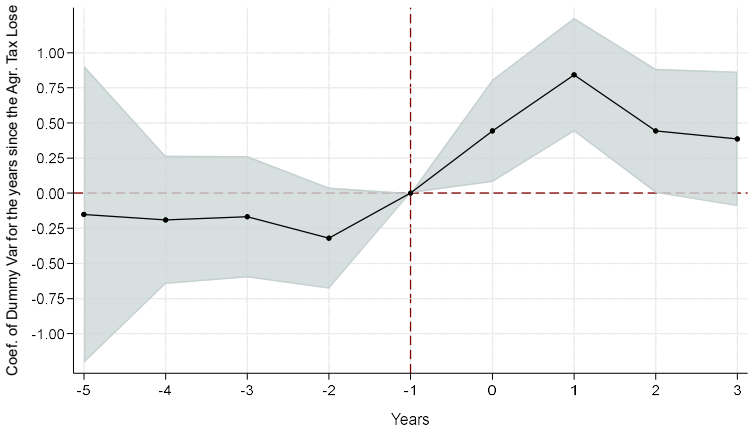
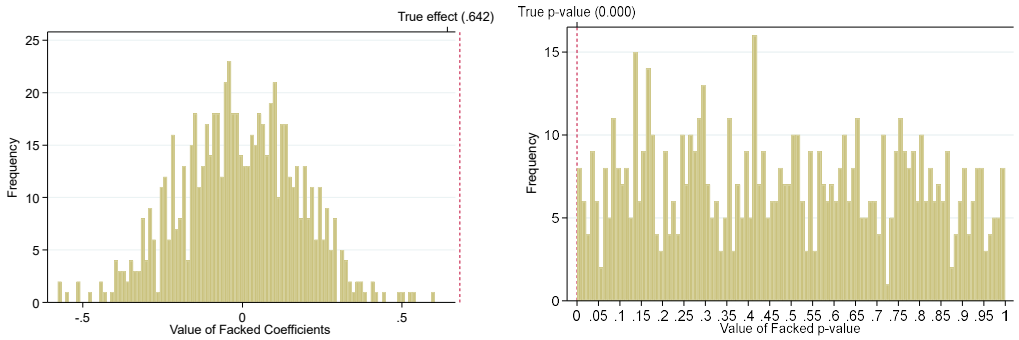


Fig. A5. Robustness check: dynamic effects

Notes: Figure depicts the dynamic effects of fiscal shocks on the amount of suspicious expenditures by county governments (in logarithm). Robust standard errors clustered at county level. Points connected by the solid line indicate the estimated coefficients of the fiscal shock interacted with the dummies relative to the reform. Dashed lines indicate 95% confidence intervals. Year 2003 is omitted as the reference year.



(a) (b)

Fig. A6. Randomization tests

Notes: Figures report the estimation of 1000 randomization placebo tests. Sub-figure (a) shows frequency distribution of the 1000 placebo coefficients. The vertical line shows the actual estimates of the treatment effect from specifications in Column (2) of Table 2. Sub-figure (b) plots the frequency distribution of the 1000 placebo p-values. The dashed line represents the estimated effect from the correctly assigned values.

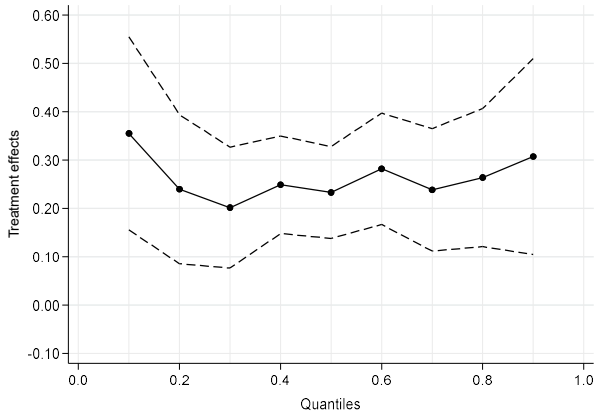
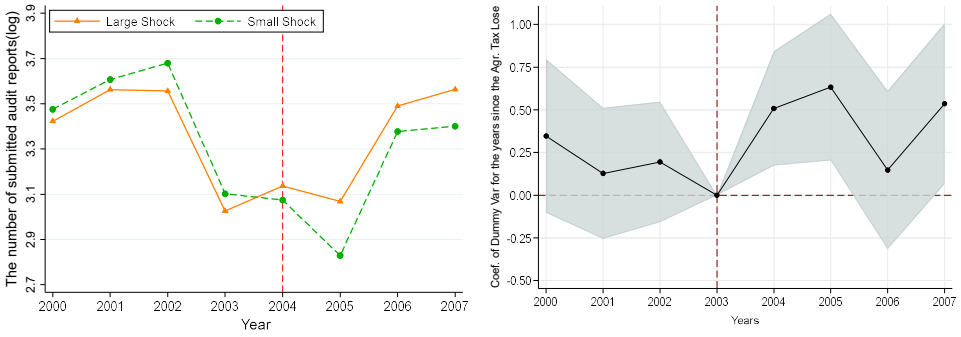
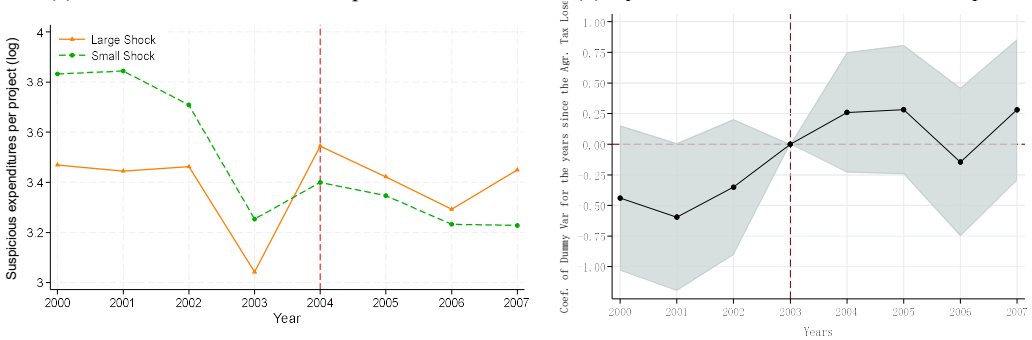


Fig. A7. Changes-in-changes estimation

Notes: Figure shows quantile treatment effects on the distribution estimated using CIC method. Solid line is the point estimates. Dashed lines represent the bootstrapped 95% confidence intervals. The estimation partials out county and year fixed effects.



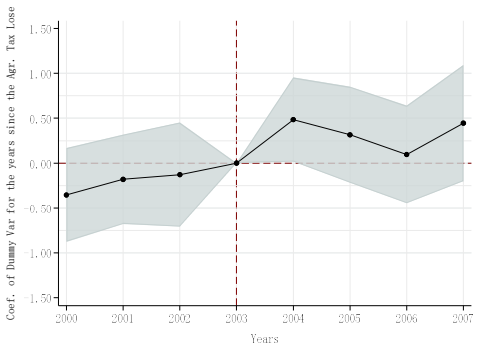
(a) Trends of submitted audit reports (b) Dynamic effects of submitted audit reports



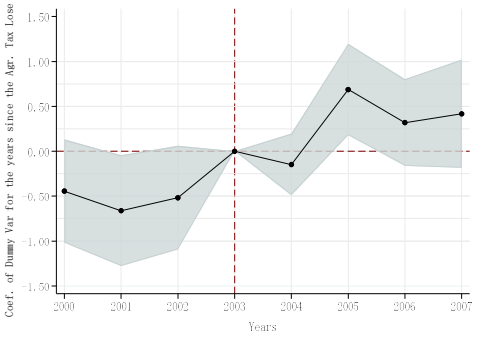
(c) Trends of suspicious expenditures per audit project (d) Dynamic effects of suspicious expenditures per project

Fig. A8. Fiscal shocks on audit reports or suspicious expenditures per project

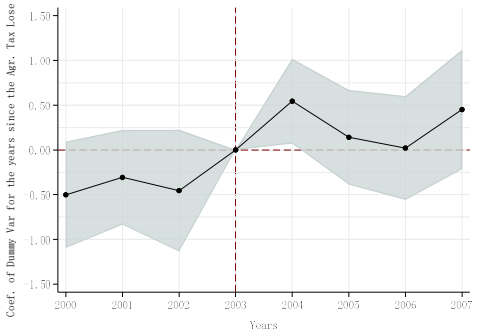
Notes: Sub-figure (a) depicts average number of audit reports submitted by local auditors in counties with large (above median value) and small (below median value) fiscal shocks, respectively. Sub-figure (b) depicts dynamic effects with log number of audit reports as outcome variable. Sub-figure (c) depicts average numbers of audit projects in counties with large (above median value) and small (below median value) fiscal shocks, respectively. Sub-figure (d) depicts dynamic effects with log values of suspicious expenditures per project as outcome variable.



(a) Dynamic effects of suspicious expenditures (IV results)



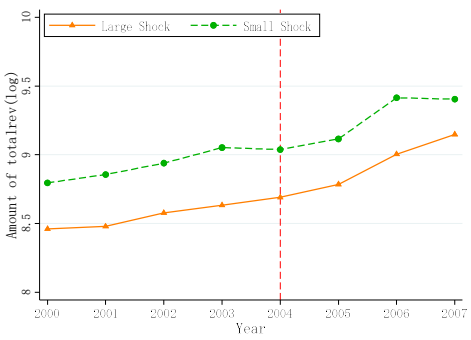
(b) Dynamic effects of submitted audit reports (IV results)



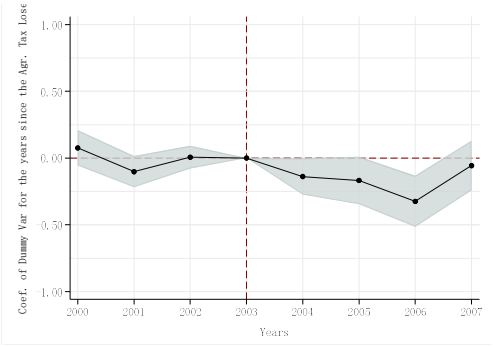
(c) Dynamic effects of suspicious expenditures per project (IV results)

Fig. A9. Fiscal shocks on suspicious expenditures, audit reports and suspicious expenditures per project (IV estimation)

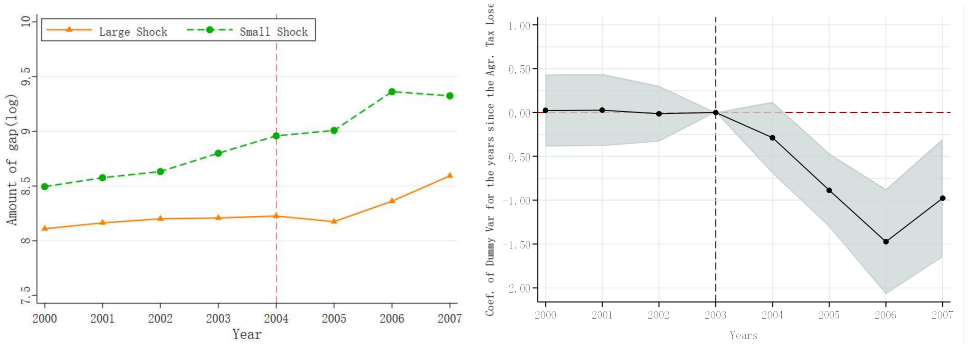
Notes: Dynamic effects are based on IV estimation. Sub-figure (a) depicts dynamic effects with log values of suspicious expenditures as outcome variable. Sub-figure (b) depicts dynamic effects with log number of audit reports as outcome variable. Sub-figure (c) depicts dynamic effects with log values of suspicious expenditures per project as outcome variable.



(a) Trends of budget revenue



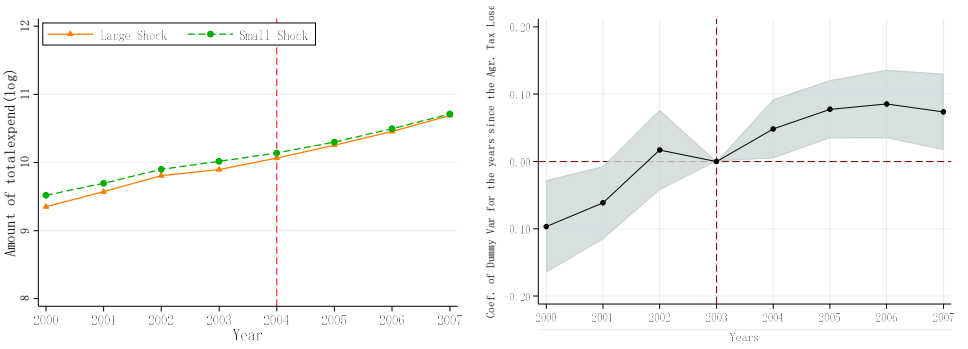
(b) Dynamic effects of budget revenue



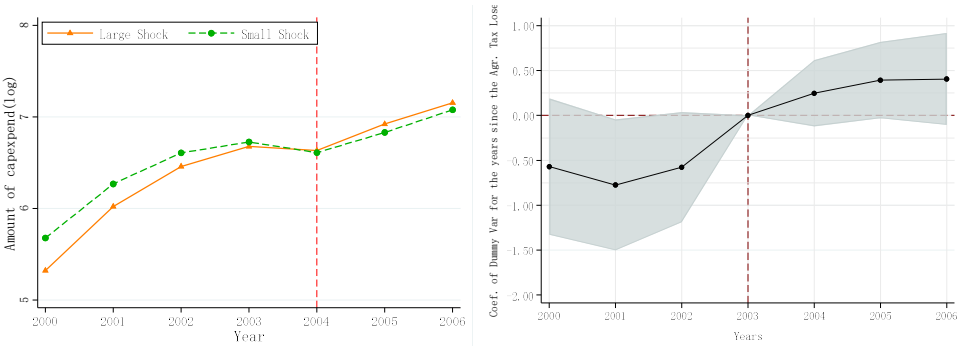
(c) Trends of budget revenue minus STPs (d) Dynamic effects of budget revenue minus STPs

Fig. A10. Fiscal shocks on county revenue

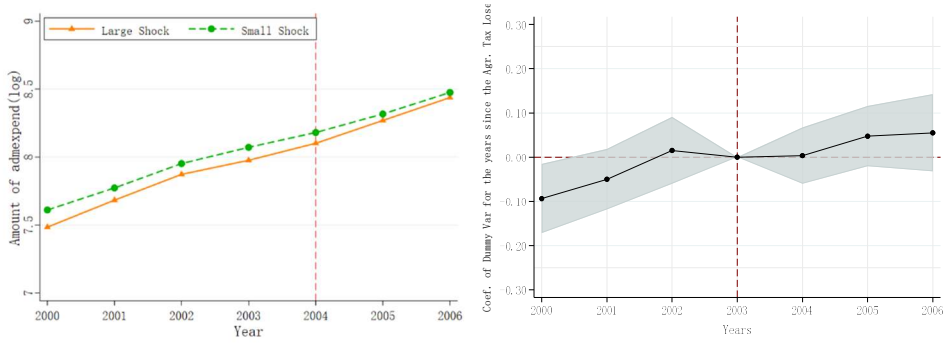
Notes: Sub-figure (a) depicts average values of budget revenue in counties with large (above median value) and small (below median value) fiscal shocks, respectively. Sub-figure (b) depicts dynamic effects with log values of budget revenue as outcome variable. Sub-figure (c) depicts average values of budget revenue minus special transfer payments in counties with large (above median value) and small (below median value) fiscal shocks, respectively. Sub-figure (d) depicts dynamic effects with log values of budget revenue minus special transfer payments as outcome variable.



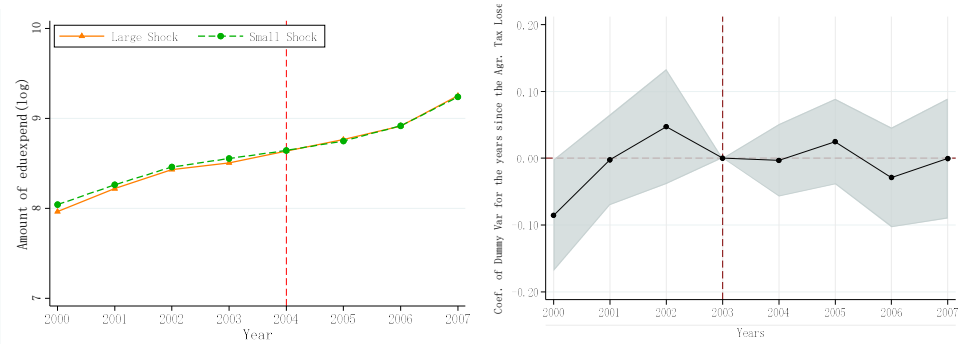
(a) Trends of total budget expenditure (b) Dynamic effects of total budget expenditure



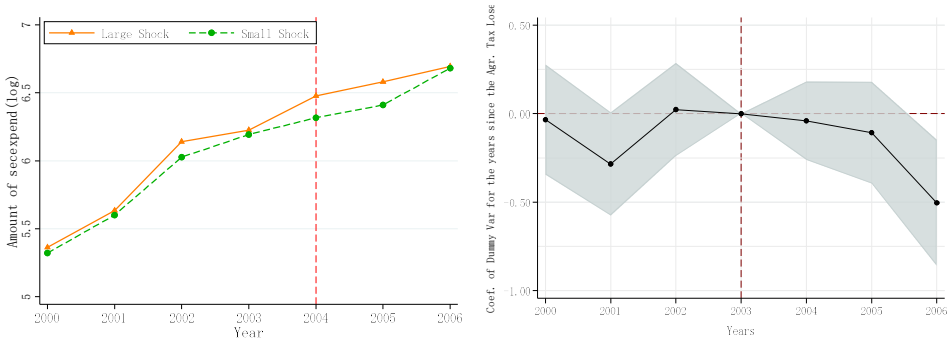
(c) Trends of capital construction expenditure (d) Dynamic effects of capital construction expenditure



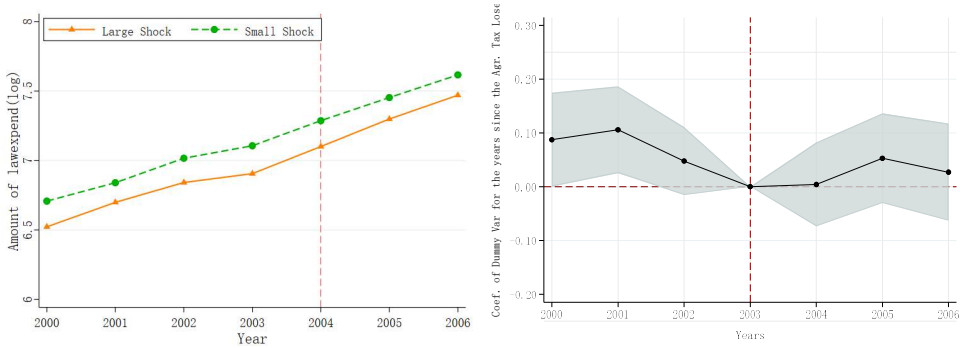
(e) Trends of administrative expenditure (f) Dynamic effects of administrative expenditure



(g) Trends of education expenditure (h) Dynamic effects of education expenditure



(i) Trends of social security subsidies expenditure (j) Dynamic effects of social security subsidies expenditure



(k) Trends of public security expenditure (l) Dynamic effects of public security expenditure

Fig. A11. Fiscal shocks on county expenditure

Notes: Sub-figure (a) depicts average values of total budget expenditure in counties with large (above median value) and small (below median value) fiscal shocks, respectively. Sub-figure (b) depicts dynamic effects with log values of total budget expenditure as outcome variable. Sub-figure (c) depicts average expenditure on capital construction in counties with large and small fiscal shocks, respectively. Sub-figure (d) depicts dynamic effects

with log expenditure on capital construction as outcome variable. Sub-figure (e) depicts average expenditure on administration in counties with large and small fiscal shocks, respectively. Sub-figure (f) depicts dynamic effects with log expenditure on of administration as outcome variable. Sub-figure (g) depicts average expenditure on education in counties with large and small fiscal shocks, respectively. Sub-figure (h) depicts dynamic effects with log expenditure on education expenditure as outcome variable. Sub-figure (i) depicts average expenditure on social-security subsidy in counties with large and small fiscal shocks, respectively. Sub-figure (j) depicts dynamic effects with log expenditure on social-security subsidy as outcome variable. Sub-figure (k) depicts average expenditure on PPC (public-security organizations, procuratorial organizations and people's courts) in counties with large and small fiscal shocks, respectively. Sub-figure (l) depicts dynamic effects with log expenditure on PPC as outcome variable.

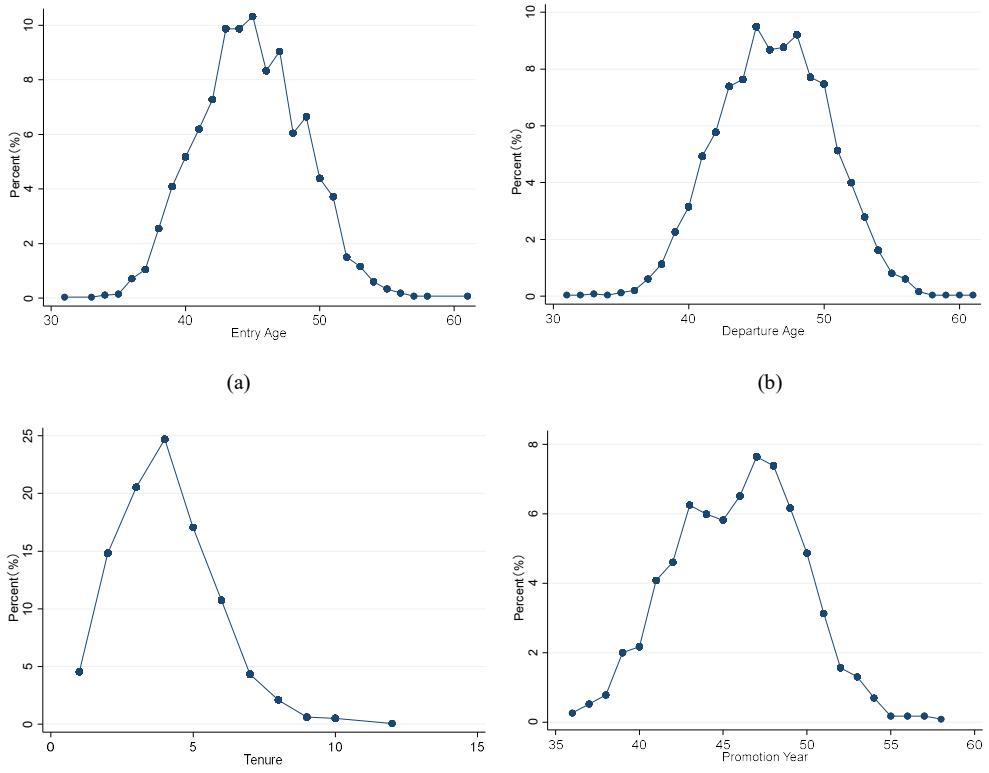


Fig. A12. Distribution of secretaries' career information

Note: Sub-figures (a)–(b) are age distribution of CCP sectaries when they assume and leave office, respectively. Sub-figure (c) is distribution of secretaries' tenure length. Sub-figure (d) is distribution of secretaries' promotion age.

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