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Decentralization, Incentives, and Tax Enforcement*

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Abstract

China initiated a major decentralization reform in recent years to simultaneously improve tax autonomy and fiscal transfers toward county governments. We use an instrumental variables strategy and a county-level panel dataset for years 1995-2014 to examine the incentive effects of the reform. We find that the reform significantly reduced tax enforcement of the county governments, for which the result appears to be driven by the opposing incentive effects of the increased local tax autonomy and fiscal transfers. In particular, while the reform motivated county governments to improve tax enforcement by enhancing local tax autonomy, it dampened local tax enforcement because of the increased fiscal transfers. Our findings provide support to the argument in the decentralization literature that improving local tax autonomy, compared to increasing fiscal transfers, is a more effective way to finance local governments while strengthening local fiscal discipline.

Keywords: Decentralization; Fiscal Incentives; Local Tax Enforcement; China
JEL Classifications: H11; H30; H77

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I. Introduction

Tax enforcement has been low in many developing countries (Gordon and Li, 2009; Besley and Persson, 2014). This contributes to the severe local fiscal difficulty in financing basic public services in these countries. In explaining this phenomenon, recent studies emphasize the roles of several external factors such as the existence of a large informal sector (Gordon and Li, 2009), limited sources of information in tax collection (Kopczuk and Slemrod, 2006; Kleven et al., 2011; Kumler et al., 2013; Pomeranz, 2015), and the lack of tax enforcement technology (Kleven et al., 2016). Another strand of literature stresses local tax incentives implied by different political and fiscal institutions (Besley and Persson, 2014; Casaburi and Troiano, 2015; Chen, 2017). For instance, Besley and Persson (2014) argue that political agency directly affects decisions about the level and type of taxation; Chen (2017) finds that fiscal incentives of local government, captured by the agricultural taxes revenue loss in China, can be essential to local tax enforcement. Along the same lines, this paper illustrates how incentives implies by different fiscal institutions may shape local tax enforcement differently.

Fiscal institutions create incentives for subnational officials, thereby affecting local fiscal discipline and the overall fiscal performance of local jurisdictions. Particularly, for addressing local fiscal difficulty, the first generation of fiscal federalism supports the use of intergovernmental fiscal transfers (Weingast, 2009). However, the use of this instrument may reduce local accountability, because subnational governments can draw from the common pool of resources and take undue advantage on the tax enforcement of others (Bahl and Linn, 1992; Shah, 1998; Baretti et al., 2002; Eyraud and Lusinyan, 2013).[1] By contrast, the second generation of fiscal federalism emphasizes the importance of local revenue generation in addressing local fiscal difficulties (Rodden, 2003; Jin et al.,

[1]Several authors have shown empirically how transfers may "crowd out" taxation. For instance, Eyraud and Lusinyan (2013) find that overall fiscal performance is negatively correlated with subnational governments' reliance on transfers and borrowing; on average, when one-tenth of the subnational expenditure shifts from transfers and/or subnational borrowing to subnational own revenue, the general government fiscal balance will be improved by one percent of the gross domestic product (GDP). Mogues and Benin (2012) find that the increase in external transfers reduces local governments' own-revenue generation. In addition, based on different contexts, Büttner (1999), and Garg et al. (2017) find similar evidence in that transfers can dampen local tax effort.

2005). It argues that subnational governments with greater tax autonomy tend to be more accountable to citizens and have stronger incentives to increase their revenue by fostering local economic prosperity (Groves et al., 1994; Foremny, 2014; Asatryan et al., 2015; Weingast, 2009).[2]

Despite the existence of some literature on discussing the incentive effects of local tax autonomy and fiscal transfers under decentralized economies, studies scrutinizing their effects simultaneously or under a systematic framework are rare.[3] In this paper, we exploit a major decentralization reform in China that simultaneously improved tax autonomy and fiscal transfers toward local governments. We take advantage of the quasi-experimental design of the reform to examine its net impacts on local tax enforcement and compare the incentive effects of the two financing instruments.

The reform, under the full name of "Province-Managing-County" (PMC) fiscal reform, was intended largely to improve administrative efficiency and to lessen the fiscal stress of county governments. This was done by allowing provincial governments to bypass prefecture-level city (hereafter, city) governments and directly administer county governments on fiscal matters, which significantly improved local tax autonomy and fiscal transfers toward county governments. The reform was initially implemented on a local pilot basis in 2004 and was then gradually expanded to other regions across the nation in the subsequent years.[4] Evaluating the effects of the reform, however, is not straightforward because of the potential non-randomness in the selection of the reformed counties. Particularly, the reform could be targeted toward counties with lower tax enforcement, which has been the reason for local fiscal difficulty. Such selection biases may hinder

[2]Many researchers have found empirical evidence on the positive relationship between local tax autonomy and governments' accountability. Foremny (2014) argues that less local tax autonomy creates incentives for subnational governments to run deficits because of bailout expectations. Han and Kung (2015) find that in response to the decrease in local governments' shared tax revenue, local governments in China tend to shift their efforts to cultivating non-tax revenue by exploiting their assigned monopoly rights in land. Asatryan et al. (2015) find that greater local-level revenue autonomy is positively associated with higher subnational discipline. Chen (2017) finds that when county governments experience a lower level of tax-sharing ratio, they tend to weaken their tax enforcement.

[3]Blöchliger and Petzold (2009) use the data of 28 OECD countries to compare the role of taxes and grants. They find that a higher share of taxes in total subnational revenues could promote efficiency and democratic accountability of public spending, while grants may reduce subnational governments' tax raising efforts, inflate government spending, and increase deficits and debts.

[4]See a more detailed description of the reform in subsection II.B.

any direct comparison of reformed and non-reformed counties to obtain a real treatment effect. In addition, confounding trends in different counties make it even more difficult to isolate the pure treatment effect of the reform.

On that account, we employ the instrumental variables (IV) strategy to identify the impacts of the reform, taking into account the endogeneity concern of reform selection. Conditional on the decision of a province to implement the reform, we use geographical distance between a county and its affiliating city to generate exogenous variation in selecting the reformed counties. The less the distance between a county and its affiliating city, the more integrated and inseparable the market between the two, making it less likely to prioritize these counties to adopt the PMC reform. We argue and provide evidence from a placebo test that geographical distance is unlikely to directly affect local tax enforcement, and hence, acts as a valid instrument for the estimations.

Our estimation results, based on a nationwide county-level panel dataset for years 1995-2014, suggest that the PMC fiscal reform significantly reduced the ratio of total fiscal revenues to GDP of a county. Since tax legislation in China is highly centralized with the central government setting uniform statutory tax rates across all local jurisdictions, the reduction of the ratio of total fiscal revenues to GDP reflects a reduction in local tax enforcement in the post-reform period. Consequently, the policy goal of the reform in alleviating local fiscal difficulties is somehow undermined by the induced decline of county tax enforcement. Quantitatively, relative to the non-reformed counties, the PMC fiscal reform reduced the reformed counties' tax enforcement by approximately one percentage point. We then show that the net incentive impact of the reform is a result of two unparalleled driving forces brought by the reform—while the enhanced tax autonomy motivated county governments to improve their tax enforcement, the increased fiscal transfers performed an opposite and dominant role in shaping the net negative impact of the reform on local tax enforcement.

This paper contributes to two strands of literature. The first is the current limited but growing literature on evaluating the policy impacts of the PMC fiscal reform in China. Research in this area, by far, has mainly concentrated on the reform's impacts

on economic growth and government spending patterns (Li et al., 2016; Liu and Alm, 2016; Wang et al., 2012). Our paper extends the studies to an important dimension by examining its impacts on local tax enforcement. Given that the primary objective of the reform is to alleviate local fiscal difficulties, its induced (positive or negative) incentive effects on local tax enforcement would either strengthen or weaken the realization of this primary policy objective. In this regard, we also address the endogeneity issue of the reform. From a technical perspective, a critical but unsolved issue with the existing work in examining the impacts of the PMC fiscal reform is that most contributions fail to address its potential selection bias. The instrument proposed in this paper, thus, offers a potential solution to any further studies on this subject.

The second strand of literature relates to the incentive effects of tax agency in collecting tax revenues. Some of this literature studies the incentives of tax inspectors (Besley and McLaren, 1993; Casaburi and Troiano, 2015; Khan et al., 2016) and the role of information disclosure (Pomeranz, 2015; Kleven et al., 2011, 2016). Other studies investigate the incentives of local governments (Besley and Persson, 2014; Chen, 2017). Contributing to this literature, our paper explicitly compares the incentive effects of the two traditional financing methods (i.e., local tax autonomy and fiscal transfers) favored by different decentralization theorems. Our findings lend support to the longstanding theoretical argument in the decentralization literature that improving local tax autonomy, compared to increasing fiscal transfers, appears to be a more effective way to finance local governments while strengthening local fiscal discipline.

The rest of the paper is organized as follows. Section II provides a brief introduction on the institutional background for the PMC fiscal reform in China. Section III explains the empirical methodology and describes the data. Section IV presents the main empirical results and robustness checks. Section V analyzes the mechanisms of the reform's impact and compares the incentive effects of the two financing methods. The last section concludes the paper.

II. Institutional Background

A. A Brief Introduction to China's Fiscal System

China has maintained a highly centralized political system with a homogeneous but "hierarchical" structure of governance since its formation in 1949. Currently, there are five levels of governments in China. Starting with the highest, these levels are the center, provinces, cities, counties, and townships. Under the hierarchical system, each subnational level of government is wholly subordinate to the next higher order of government. Thus, the intergovernmental fiscal relationships are typically defined and implemented between the government at the corresponding level and its immediate upper level of government such as center-managing-province, province-managing-city, city-managing-county, and county-managing-township. In the meantime, the general fiscal arrangements are only clearly defined between the central-province level, while the central government grants provincial governments the discretion to set up their own intergovernmental fiscal relationships within the provinces (Liu and Alm, 2016).

Practically, two essential features emerge under the hierarchical system in virtually all provinces. First, the multilayer government structure seems to have hampered administrative efficiency. The intermediate layers of governments, usually city governments, tend to act as a "grabbing" rather than a "helping" hand, which distorts top-down communications and bottom-up reporting between the upper and lower levels of governments. Most often, to pursue their own interests, city governments have an incentive to retain the authority and resources obtained from the central or provincial governments that otherwise should be directed to county governments. Thus, lower-tiered governments (i.e., county and township governments) may lose their independence in devising appropriate policies for their jurisdictional development and in implementing them on the basis of local conditions. This expansion in city governments' discretion has also made it more difficult for the policy objectives of the center to be realized at the lower subnational level (Martinez-Vazquez et al., 2008).

Second, a large gap between revenue and expenditure assignments has emerged at

the local levels (Wang and Herd, 2013). The current fiscal system (the so-called "Tax-sharing System" (TSS)) was set up in 1994 to achieve the twin objectives of the central authority—raising the central government's revenues and strengthening the control of the central government in the fiscal system. As a result, the TSS successfully recentralized revenues at the central level via a clear classification of central taxes, local taxes, and shared taxes (Qiao et al., 2008).[5] A parallel centralizing trend of revenues appears to be occurring at the subnational levels as well, with increasing revenue shares at the provincial and city levels at the expense of county and township shares. By contrast, the TSS reform has left open an unclear assignment of expenditure responsibilities among the different levels of governments (Xu, 2011; Liu and Martinez-Vazquez, 2014). Expenditure assignments at different levels of government are today largely what they were decades ago under the planned economy, which assigned subnational governments (especially county and township governments) with excessive expenditure responsibilities. For instance, city and county governments account for all expenditure on unemployment insurance, social security, and welfare, and county and township governments together provide 70 percent of budgetary expenditures for education and nearly three-fifths of those for health (World Bank, 2002). This large gap between revenue and expenditure assignments has led to mounting fiscal pressures for financing public goods and services at local levels.

B. The PMC Fiscal Reform

As a response to these critical concerns, the central government launched the so-called PMC fiscal reform in the early 2000s. The reform eliminated the previous fiscal relationship between city and county governments and replaced it with a direct fiscal relationship between provincial and county governments. By doing so, the reform successfully increased counties' fiscal capacities, and thus, improved their abilities to provide public goods and services. This was largely achieved by the increased local tax autonomy and fiscal transfers brought about by the reform to the reformed counties. According

[5]Specifically, the TSS reform defined the value-added taxes (VAT) being shared at a ratio of 75% (central) and 25% (subnational), and personal and corporate income taxes being shared at a ratio of 60% (central) and 40% (subnational).

to the regulations of the central authority, for reformed counties, revenue assignments (and expenditure responsibilities[6]) must be clearly defined among provinces, cities, and counties. In the meantime, provincial governments must set up separate and independent accounts to manage all fiscal fund transactions between provinces and cities and also between provinces and counties, and provincial governments must directly determine the revenue-sharing schemes between cities and counties. Consequently, the revenue-sharing ratio is generally re-regulated at the sub-provincial level toward favoring the reformed counties to improve local tax autonomy. As summarized in Table A1 in the Appendix, out of the total 21 provinces that have implemented the PMC fiscal reform, five provinces clearly stated the increase in local tax autonomy in the reformed counties in their official instructions for implementing the reform;[7] some other provinces (such as Liaoning and Shandong) indicated in their official documents that city governments shall no longer share county revenues after the reform. All these imply an increase in the tax-sharing ratio for the reformed counties. Although a few provinces did not reveal their specific regulations of the reform, they were very likely to follow similar ways to improve local tax autonomy, as a result of complying with the aforementioned regulations of the central authority. This fact is clearly evidenced by Figure 1, which shows that, on average, the tax-sharing ratio of VAT has indeed significantly increased after the introduction of the PMC reform in 2004.[8]

Along the other dimension, the central authority has made clear regulations in that while implementing the reform, fiscal transfers, tax rebates, and other subsidies must be allocated separately and directly to cities and counties by provincial governments.[9] Any applications from cities and counties for additional ad hoc transfers have to be

[6] On the basis of these assignments, city governments are not allowed to shift any of their expenditure responsibilities to their own county governments (and vice versa).

[7] For instance, for some reformed counties in Shanxi province, the VAT-sharing ratio for county governments was increased from a rate of 8.75% before the reform to a rate of 13.75% after the reform.

[8] Given the data availability, we employ the VAT-sharing ratio of county governments as a proxy for local tax autonomy. Nevertheless, VAT is the most important source of revenue for the Chinese governments. See subsection V.A for a more detailed discussion.

[9] Other regulations of the central authority require that annual settlements of any kinds of financial accounts must be directly conducted between provinces and cities and also between provinces and counties. If any transactions remain to be settled between cities and counties, they have to go through the provincial governments.

sent directly to provincial governments, and these allocations must be evaluated and allocated directly by provincial governments. City governments may continue to make transfers to county governments; however, these transfers must go through the provincial governments' budget accounts. Owing to this strict regulation, city governments lost the authority to intentionally retain the resources (mostly fiscal transfers) designated to county governments from the central or provincial governments. This significantly increased fiscal transfers received by the reformed counties.[10] Additionally, as indicated in Table A1, some provinces even marked the increase in fiscal transfers to reformed counties in their official documents for implementing the reform. Consistent with the previous notion, Figure 2 clearly shows that fiscal transfers received by the reformed counties increase moderately post reform implementation.

The PMC fiscal reform was formally initiated in some provinces around 2004 and was widely implemented across the nation following this. By the end of 2014, 21 provinces in China had commenced the reform on a pilot basis.[11] In implementing the reform, the central authority has specified that provincial governments should "... largely incorporate counties that produce a large amount of grain, oil plants and cotton into the reform with priority."[12] Even so, the central authority generally leaves a large scope of discretion for the provinces to determine the detailed procedure of the reform within their territories.[13] Consequently, the provinces exhibit much variety in terms of reform modes, time, selection criteria, and processes. For instance, the provinces of Heilongjiang, Jilin, and Jiangsu pursued a "big-bang" approach, implementing the reform across the entire province in the initial year of the reform, instead of a more gradual approach used by the majority of other provinces. In terms of the selection criteria, the provinces of Jiangxi and Shanxi made it clear in their official documents that the initial set of reformed counties was those

[10] Li et al. (2016) provides direct empirical evidence on the impact of the PMC fiscal reform on improving fiscal transfers received by county governments.

[11] Zhejiang and Hainan provinces are an exception, where the fiscal PMC model has been maintained since the very beginning of the establishment of the country in 1949.

[12] The underlying reason for this regulation was to make sure that the policy can be better extended to the neediest agricultural counties where fiscal stress was the most severe in the pre-reform period.

[13] As stated in the guiding file of the central authority, "... all localities shall, in accordance with the relevant conditions such as level of economic development and infrastructure conditions, determine the modes, steps, and processes of the reform and avoid the approach of 'one-size-fits-all'."

identified as national poverty counties. By contrast, provinces such as Shaanxi combined the poverty counties in the initial set of the reform counties with some richer counties. Additionally, some other provinces (such as Hebei and Guangdong) generally indicated that they followed the guiding principle of the central authority to give greater priority to more agriculturally-intensive counties. Other provinces simply listed the counties that were included in the reform without giving explicit information about their selection criteria.

In sum, the PMC fiscal reform simultaneously increased local tax autonomy and available fiscal transfers, which significantly shaped local government behaviors; and the quasi-experimental design of the reform created a unique opportunity for us to evaluate its policy impacts and compare the incentive effects of the two financing instruments.

III. Empirical Strategy and Data

A. Econometric Specification

We exploit the fact that the PMC fiscal reform was introduced in different counties and years, to estimate its causal impact on local tax enforcement. More specifically, we estimate a difference-in-differences or, more generally, a fixed-effects model of the form:

$$y_{it} = \alpha + \beta PMC_{it} + \gamma \mathbf{X}_{it} + \mu_i + \psi_t + \varepsilon_{it} \tag{1}$$

where the dependent variable y_{it} represents tax enforcement of county i in year t. PMC_{it} is the variable of interest, which is a dummy variable indicating the implementation of the PMC fiscal reform in county i in year t; that is, PMC_{it} equals 0 for years before the PMC fiscal reform was introduced in a county, and equals 1 for the first year and for all the subsequent years of the implementation of the reform. μ_i is the time-invariant and county-specific effect for county i, ψ_t is a set of year dummies, and ε_{it} is an i.i.d. error term.

As control variables $\mathbf{X}_{it}$, we include factors typically found to be significant in determining tax enforcement as well as variables for which data are available at the county

level in China. These variables include real GDP per capita, the shares of primary and secondary industry in total GDP, urbanization, population density, and a dummy of "County-Power-Expansion" reform (CPE). Real GDP per capita (in log form) stands for the economic development level of a county, reflecting the potential tax capacity of a county. The shares of primary and secondary industries in GDP capture the effect of economic structure. The urbanization level (measured by the proportion of urban population) and population density are proxies for the demographic features of a county that may also influence local governments' tax policies. The CPE reform dummy is included to isolate the effect of the PMC fiscal reform from other confounding factors potentially introduced by the CPE reform.[14]

Even with these controls, however, some unobserved factors such as political factors that could affect reform implementation are still of concern. Further, given that the objective of the reform is to reduce local fiscal difficulty, it is practically possible that some provinces may prioritize reform in poor counties associating them with low tax enforcement. This gives rise to reverse causality in specification (1). To overcome this concern of identification, we instrument for the reform implementation using an interaction term (denoted as "$Distance\_PPMC$") between the county-city geographical distance and a province-level PMC dummy variable. This latter province-level PMC dummy variable indicates whether a province has decided to implement the PMC fiscal reform in a particular year. Practically, there was a sequence for the implementation of the reform: it is usually the central government's mandate or the provincial government's own decision to implement the PMC reform in a particular province; upon that decision, the provincial government will then work on the details for selecting the reform counties within its domain. Thus, only if a province has decided to implement the reform, there is a chance for its affiliating counties to be selected as reformed counties. Furthermore, conditional on the decision of a province to implement the reform, the closer the distance between a county and its affiliating city within the province, the lower is the possibility of the

[14]The CPE reform was a reform of China's government administrative system in 2003. It aimed to empower county governments with more authority in the management of economic matters, and thus, may have a positive effect on the county governments' taxing behaviors.

county being selected as a reformed county. This is because the markets of the county and its affiliating city are, in general, more closely integrated and inseparable if they are geographically close to each other. Hence, it is politically less feasible for these counties, compared to the farther counties, to become a province-managing county, owing largely to the opposition of city governments. For these reasons, the selected interaction term appears to act as a potential good instrument for the endogenous variable (i.e., PMC_{it}) in the estimations. One concern with using this instrument is that the county-city geographical distance may directly affect the tax enforcement of county governments. While we do not see any particular reason to favor or go against this concern, we perform a placebo test in subsection IV.B to show that the geographical distance does not affect local tax enforcement independent of the assignment of a reform county.

B. Key Variables of Interest

Tax enforcement. We utilize the ratio of total (budgetary) fiscal revenues to GDP as the measure of tax enforcement of a county. This is grounded by the fact that tax legislation in China is highly centralized with the central government setting uniform statutory tax rates across all local jurisdictions; thus, conditional on other characteristics of the counties, a variation in the ratio of the total fiscal revenues to GDP should reflect the differences in tax enforcement across the counties. Lastly, total (budgetary) fiscal revenues is the sum of local share of total tax revenues generated in the county and total non-tax revenues,[15] which are both collected at some discretion of local governments.

The PMC reform variable. The key explanatory variable is a dummy variable for the introduction of the PMC fiscal reform. This variable is assembled manually by looking into the official documents released by each provincial government on implementing or enlarging the PMC fiscal reform within provinces.[16] These official documents generally

[15]Total tax revenues include the revenues of value added tax, business tax, corporate income tax, personal income tax, urban maintenance and construction tax, agricultural tax, and other taxes. Total non-tax revenues include administrative fees, penalty and confiscatory revenue, stated-owned assets operating revenue, and miscellaneous non-tax revenues (but not tax rebates and transfer payments from the upper-level governments). It is also notable that a lot of data on total tax revenues are missing at the county level; for that reason, we employ total fiscal revenues rather than total tax revenues to measure local tax enforcement.

[16]These official documents usually have the title of "Circular of the People's Government of X Province

highlight the background of the reform and explicitly lay out a detailed list of counties that will be included in the reform. Thus, we collect this information for all provinces and then create for every county a dummy variable for whether the PMC fiscal reform has been implemented in the county in each year.[17]

Figure A1 in the Appendix displays the number of counties that have implemented the PMC fiscal reform and their cumulative percentage in each year. As shown, except for the counties located in Zhejiang, Hainan, and the four province-level municipalities,[18] year 2004 was the start of the recent PMC fiscal reform in China. After that, the reform gradually spread to other parts of the country. By the end of 2014, 54% of the Chinese counties have implemented this reform. Among these reformed counties, 173 counties were included in the reform in year 2004, 76 counties were included in year 2005, 254 counties were included in year 2007, and another 449 counties were included between years 2008-2014.[19] Figure A2 in the Appendix shows the geographic distribution of PMC counties in 2014.

C. Data

The panel dataset we use for the quantitative analysis is county-level data for years 1995-2014. Since Hainan, Zhejiang, and the four province-level municipalities (i.e., Beijing, Tianjin, Shanghai, and Chongqing) have been maintaining the PMC fiscal model prior to the recent reform initiated in 2004, we exclude all counties located in these regions. Due to lack of data, all the counties in Tibet are also not included. In addition, we exclude the counties that have changed their administrative status to city districts or prefecture-level cities during the sample period, ensuring statistical consistency. Finally,

Concerning the Implementation of 'Province-Managing-County' Fiscal Reform'" or "Circular of the People's Government of X Province Concerning the Expansion of the Scope of 'Province-Managing-County' Fiscal Reform."

[17] It is noted that we use the presumable actual effective year as the initial year of the PMC reform. In particular, for those provinces that made the reform decision after July of the year, we assign the next year as the initial year of the reform; otherwise, if the decision was made before July of the reform, we take the current year as the initial year of the reform. As robustness checks, we have also directly used the decision-making year as the initial year of the reform and re-conducted the analysis; our results are largely unchanged, and they are not reported in the paper but available upon request.

[18] In total, there are 108 counties that had the PMC system in place before year 2004.

[19] For more detailed information on the reform, see Table A1 in the Appendix.

our working sample comprises an unbalanced panel of 1,799 counties over the 1995-2014 period.

Most of the data are taken from various issues of the *Prefecture, City, and County Public Finance Statistics (Quanguo Dishixian Caizheng Tongji Ziliao, 1996-2010)*, which provides the most detailed data on subnational public finance (such as fiscal revenues, different types of taxes, and fiscal transfers received) and some basic economic and socio-economic variables (such as GDP and population). However, these sources of data were only released up to 2009, with the disaggregated fiscal data on individual tax items being released only up to 2007. For these reasons, in the subsequent empirical analysis, while the data on transfer dependency is up to 2009, the data on measuring local tax autonomy (i.e., the VAT-sharing ratio) is only up to 2007. Nevertheless, we extend the data on all other variables to 2014 using other sources such as the *China Statistical Yearbook for Regional Economy (Zhongguo Quyu Jingji Tongji Nianjian)* and the *Statistical Yearbooks for each province*. Table A2 in the Appendix provides a detailed description and sources of all the variables, while their summary statistics are reported in Table 1.

IV. The Net Impact of the PMC Reform on Local Tax Enforcement

A. Graphical Evidence

Figure 3 provides an overview of the evolution of average tax enforcement of counties over time, classified by the groups of reformed counties and non-reformed counties. The lines with the circle symbol reflect the average tax enforcement for the counties that have ever implemented the PMC fiscal reform between 2004 and 2014, while the lines with the triangle symbol depict the corresponding average value across counties that have never implemented the reform throughout the entire period. The vertical dashed line represents year 2003, which is the year before the reform was initially introduced. The figure reveals a persistent tendency of lower tax enforcement in the eventually reformed counties than in the non-reformed counties in the pre-reform period (i.e., before 2004), suggesting that there may indeed exist sample selection issues. Nevertheless, after 2004, the gap in tax enforcement between reformed counties and non-reformed counties is enlarged to a

greater extent, shedding light on the potential effect of the PMC reform on reducing tax enforcement of county governments.

However, these figures only offer descriptive information about average tax enforcement. They do not control for the important differences across counties and years that are included in our formal specification. Besides, for the group of reformed counties, they were selected following different rules and criteria, which complicate the identification of the possible observable policy impacts of the reform. Below, we present more formal evidence from the empirical estimations.

B. Baseline Estimations

Table 2 presents the results for specification (1), alternatively using fixed effects and IV estimation approaches. Each column of the table represents an estimate from a separate regression, with only the coefficient of the PMC fiscal reform (and its clustered standard error) being reported.

We start off the estimation by only controlling for county fixed effects and year fixed effects in Column (1). It turns out that the PMC fiscal reform is negatively and statistically significantly associated with the county tax enforcement, suggesting that the reform has reduced local tax enforcement of the reformed counties in the post-reform period. This estimation, however, is less precise. Column (2) adds other control variables to the specification. The estimated coefficient remains negative and statistically significant at the 1% level. As shown, our results are quite robust across both specifications.

To address the potential endogeneity issue, we continue to report the IV estimates in Columns (3) and (4). As shown, the IV estimates remain significantly negative across both specifications, and are substantially larger than the fixed effects estimates. This may suggest that the counties with lower tax enforcement are more likely to be selected as reformed counties, resulting in an underestimated effect of the reform in the fixed effects estimations. In our preferred IV specification in Column (4), the coefficient of the PMC dummy is -1.012. This implies that after the PMC reform, the tax enforcement of the reformed counties (in terms of the ratio of total fiscal revenue to GDP) decreased

on average by one percentage point more than that of the non-reform counties. Being evaluated at the average tax enforcement of county governments in our sample (i.e., 4.55%, see Table 1), this translates into a 22 percent (i.e., 1.012/4.55) decrease in tax enforcement of county governments. Finally, for both IV specifications, the F-statistic is always over 10, suggesting that our IV estimates are not prone to the weak instrument concern.

Validity of the Instrument. The IV estimates are unbiased only if the instrument is valid. Technically, a valid instrument needs to meet both relevance and exogenous conditions. We now provide some more formal evidence that these two conditions are satisfied with the selected instrument. To start with, Columns (1) and (2) in Table 3 report the corresponding first-stage results in the IV estimations. Specifically, we regress the PMC reform dummy on the instrumental variable (i.e., "*Distance_PPMC*") plus the included exogenous variables in the specification. The coefficient of the instrument indicates that conditional on the decision of a province to implement the reform, a kilometer's increase in the geographical distance between the two significantly pushes up the probability for a county to be selected in the reform by 0.2 percentage points. This confirms the relevance condition of the selected instrument.

The exogenous condition requires that the instrument should not directly affect local tax enforcement, except through its impact on reform implementation. This condition itself is difficult to check directly. Nevertheless, we implement an indirect placebo test using data prior to 2004 (the initial year of the PMC reform). Our conjecture is that if the county-city distance does not affect local tax enforcement directly, then there should be no reduced-form relationship between the county-city geographical distance and county tax enforcement in the pre-reform period (i.e., 1995-2003) in those provinces that eventually decided to implement the PMC reform. To this end, we modify our baseline specification by replacing the PMC reform dummy variable with the county-city geographical distance variable; and then we estimate this modified specification with data covering the sample period 1995-2003 for those provinces that eventually implemented the reform after 2004.[20]

[20] We also apply this modified specification to the 1995-2003 samples for all provinces; the results are the same, with no statistically significant coefficient for the county-city geographical distance.

The results are reported in Columns (3) and (4) of Table 3. They show that the county-city geographical distance has no explanatory power for county tax enforcement in the pre-reform period, supporting the use of geographical distance as the base for the instrument.

C. Robustness Checks

Alternative subsamples. To check the robustness of the baseline results, we exploit several alternative subsamples that are restricted to be more comparable, and hence, less likely to be subject to certain sample selection issues. First, we restrict the initial sample to be a balanced one by ensuring the existence of data for the same county for all time periods between 1995 and 2014 (denoted as "Balanced sample"). This leads to an advantage in making the data directly comparable across periods.

Second, since the adoption of the fiscal PMC reform is staggered, the baseline identification compares early-adopting counties with later-adopting ones as well as with non-PMC counties. To make the sample more comparable, we exclude those counties that have never adopted the PMC reform by the end of 2014 (denoted as "PMC sample"), so that the new treatment effect relies only on the comparison of early-adopting counties with later-adopting ones.

Third, we exclude the counties belonging to the capital city of each province (denoted as "Non-capital sample"). The rationale is that the legal status of a county in the capital city is not really comparable to other counties in the same province because they may differ dramatically in terms of administrative and fiscal status. In addition, since provincial governments are physically located in capital cities and that these cities are also generally endowed with the best economic and political resources for development, the change in vertical fiscal management models may have less impact on these cities and their belonging counties.

The new estimation results for all these alternative subsamples are reported in Table 4. In all the subsample analyses, the PMC variable has a consistent negative and statistically significant coefficient, along with a similar estimated magnitude as the baseline estimate.

Alternative specifications. We furtherly allow for more flexibility in the estimations to

check the robustness of our results. To begin with, we control for differences in time trends between the treatment and control groups in Column (1) of Table 5. Next, following Li et al. (2016), we greatly exploit the time-varying effects of control variables and consider some additional controls. That is, (i) in Column (2) of Table 5, the control variables are made to interact with a third-order polynomial function of time trend; (ii) in Column (3) of Table 5, the control variables are made to interact with the year dummies, controlling the time effects of the control variables in another way; (iii) in Column (4) of Table 5, the control variables are made to interact with the eventual treatment status to allow the effect of control variables on the outcome variables to vary between the treatment and control groups; and (iv) in Column (5) of Table 5, we include as additional control variables the eight key selection criteria that mainly determined the selection of the PMC counties based on the central authority's reform guidelines.[21]

All these alternative specifications contribute, in certain ways, toward reducing the potential misspecification problems of the baseline model. As presented in Table 5, with all these alternative specifications, we obtain results that are similar to the baseline results.

Alternative measure of local tax enforcement. Some might be concerned about the use of realized revenue as a measure of local tax enforcement. In particular, realized revenue could be a function of both local tax enforcement and the underlying tax base. An alternative measure, more free of those concerns, would be the difference between the realized revenues and the potential revenues. Thus, we follow the regression approach initially pioneered by several IMF studies (e.g., Lotz and Morss, 1967; Bahl, 1971; Chelliah et al., 1975) to obtain an alternative measure of local tax enforcement. More specifically, the approach first regresses the ratio of the actual fiscal revenue to GDP on a set of explanatory variable proxies for tax bases and "tax handles."[22] Those estimates are then used

[21]The eight selection criteria are county-level city, national poor county, major food-producing county, provincial boundary county, altitude, average slope, fiscal gap, and urbanization rate. Governments generally choose the reformed counties based on these eight selection criteria. For example, according to the central government's guidelines, those counties that are being given the poverty county status or have a large production of grain and cotton in general should have been given priority to become PMC counties.

[22]More specifically, we regress the ratio of fiscal revenues to GDP on a set of explanatory variables including real GDP per capita, the shares of secondary industry and tertiary industry in the total GDP,

to obtain the potential (projected) local revenues. The index of local tax enforcement is finally calculated as the ratio of actual fiscal revenues to the predicted potential fiscal revenues. Table 6 repeats the estimations for specification (1) using this new tax enforcement index as the dependent variable. The estimation results are largely consistent with our baseline ones, lessening the concern over the measures of the dependent variable.

Addressing the concern of agricultural tax reforms. Around the similar time of the PMC reform, the Chinese governments initiate a series of major reforms on agricultural taxation—the so-called "tax-for-fee" reform implemented in selected provinces in 2001 and later on the complete abolishment of agricultural taxation in the whole nation in 2006.[23] Since the abolishment of agricultural taxation automatically results in a lower level of our measure of tax enforcement (i.e., the ratio of fiscal revenues to GDP), this gives rise of a concern that if the PMC reform was more likely to be implemented in the regions where agricultural taxes take up an important role in local revenues, then the negative impact of the PMC reform may be confounded by the agricultural tax reforms in a way that the obtained policy impact may be over-estimated.

To address this concern, we exclude from the sample those counties that rely relatively heavier on agricultural (primary) industry before 2004 (the first year of the PMC reform). More specifically, we respectively use the average share of agricultural tax to total fiscal revenues for 1995-2003 and the average share of agricultural (primary) industry to total GDP for 1995-2003 as criteria to exclude samples. We alternatively exclude those counties in the top 10, 20, and 30 percentiles of their relative reliance on agricultural sector and re-estimate the model. As shown in Table 7, the estimated coefficient of the VAT reform is persistently negative and statistically significant, implying that our main findings are not affected by the agricultural tax reforms in a significant way.

Addressing the concern of spillover effects. There may be a concern that the implementation of the PMC reform in a county may generate (either positive or negative)

urbanization, and population density.

[23] In 2004, the central government abolished the agricultural taxes in Jilin and Heilongjiang provinces, while lowered the agricultural taxes rate by 3 percentage point in 11 provinces, such as Hebei, Inner Mongolia, Liaoning, Jiangsu, and Shandong, etc. All of these are the main major grain-producing provinces. In other non-major grain-producing provinces, the agricultural taxes rates were lowered by 1 percentage point. In 2006, the agricultural taxes were completely abolished in all provinces in China.

spillover effects to the non-reformed counties located in the same city or other neighboring counties. For instance, depending on the relative "richness" of the county and its affiliating city, in the post-reform period, the city government may become either worse off or better off financially. If the city government is relatively poor, it loses the chance to exploit the resources of these reformed counties. Thus, the city governments may impose a stricter enforcement on tax collection of the non-reformed counties still affiliating to it for filling the revenue gap. In this case, the control group in the baseline estimation may be contaminated, potentially amplifying the negative effect of the PMC reform on tax enforcement of the reformed counties. Following similar logic, if the city government is relatively rich, it may release the burden from helping the counties in the post-reform period, and hence, lessen tax enforcement in the non-reformed counties. In this case, the baseline estimation may potentially underestimate the negative effect of the PMC reform on the tax enforcement in the reformed counties.

Another possible source of spillover effects is the inter-jurisdictional tax competition. Because the reform brought more financial resources to the reformed counties, it may intensify the motives for these counties to compete with others for mobile capital. Thus, the reduction in tax enforcement in the reformed counties may induce a simultaneous move of the neighboring counties in reducing their tax enforcement. Consequently, the baseline estimation may also potentially underestimate the negative effect of the PMC reform.

We address this potential concern of spillover effects with respect to two aspects. First, we restrict our working sample to those counties that have the same status within a city (denoted as "Same status sample")—counties in the same city are either all in the treated group or all in the control group—and re-estimate the model. The assumption is that provided the existence of spillover effects, it is more likely that spillovers emerge among counties located in the same city but with a different treatment status. Therefore, an examination of the subsample —only containing counties with the same status within the cities —should present a cleaner result. Second, we exclude those non-reform counties that are geographically close to the reformed counties. Again, the assumption here is that

the closer the non-reform counties are to the reformed ones, the more likely they are to suffer from spillover effects. We alternatively attempt to employ 50 km, 100 km, and 200 km as definitions of closeness to exclude sample.

The new estimation results for all these practices are reported in Table 8. As shown, the PMC variable has a persistent negative and statistically significant coefficient, indicating that our baseline results are immune to the consideration of the potential spillover effects.

V. Mechanisms of the Impact

The detected disincentive effect of the PMC fiscal reform on local tax enforcement is somehow discouraging. This is because it implies that the primary objective of the reform in alleviating local fiscal difficulty, to some extent, may be offset by the behavioral response of county governments. In this section, we proceed to empirically identify the sources of the impact and also as a way to compare the incentive effects of the two typical financing instruments—local tax autonomy and fiscal transfers. More specifically, we attribute the reform's net impact to the opposing incentive effects induced by the increases in local tax autonomy and fiscal transfers in the post-reform period.

A. The Increases in Tax-sharing Ratio and Fiscal Transfers

As explicitly illustrated in subsection II.B and from the evidence shown in Figures 1 and 2, the major policy tools for the PMC fiscal reform to alleviate local fiscal difficulties are the increases in local tax autonomy and fiscal transfers. Before we proceed, we demonstrate this stylized fact more precisely by providing further quantitative evidence. To do so, we replace the dependent variable in specification (1) with the tax-sharing ratio and transfer dependency of the county, alternatively, and test formally the impact of the PMC fiscal reform on both the financing tools.

Given the data availability, we employ the VAT-sharing ratio of county governments as a proxy for local tax autonomy. However, this selection may also be backed up by the fact that VAT is the most important source of revenue for the Chinese governments.

For instance, the revenue from VAT was 230.83 billion Yuan in 1994, accounting for 45% of the total tax revenue. It increased steadily thereafter, reaching 3,110.95 billion Yuan in 2015 that was 25% of total tax revenue.[24] The estimation results for using the VAT-sharing ratio as the dependent variable are reported in Panel A of Table 9. As shown, the estimated coefficient of the PMC fiscal reform is positive and statistically significant, confirming the increase in local tax autonomy brought about by the reform. Based on Column (4) of Panel A, the reform has increased the VAT-sharing ratio of the reformed counties by around 1.1 percentage points. At the mean, this translates into a five percent (i.e., 0.011/0.22) increase in the VAT-sharing ratio.

As for fiscal transfers received by the counties, we use the transfer dependency (i.e., the ratio of total fiscal transfers to total county expenditures) as the dependent variable. The corresponding results are stored in Panel B of Table 9. As expected, the estimations point to significant increases in the scale of fiscal transfers received by county governments. Quantitatively, Column (4) of Panel B indicates a 5.9 percentage points, translating to a 10.5 percent (i.e., 0.059/0.56), higher increase in transfer dependency in reformed counties relative to that in non-reformed counties. This supports the argument that the PMC fiscal reform increased county fiscal transfers by preventing city governments from exploiting the resources designated to county governments.

B. The Incentive Effects of Local Tax Autonomy and Fiscal Transfers

Having established the evidence for the increases in both the financing tools, we now test for the incentive effects implied by the two financing tools and how they eventually shape the net impact of the reform on local tax enforcement.

To proceed, we add to specification (1) two additional control variables, the VAT-sharing ratio and transfer dependency, and re-estimate the models. A confirmation of our hypothesized mechanism of the PMC fiscal reform would then predict a diminishing (if not completely vanishing) estimated effect of the PMC dummy variable in the new specification. In addition, the new specification provides an opportunity to compare the

[24] Notably, this figure is still much higher than the other collected taxes such as corporate income tax.

effects of the two financing tools.

The fixed effects estimation results are reported in Columns (1) to (4) of Table 10. To ensure the comparison of estimates across specifications, we restrict all estimations in Table 10 to the same time period, 1995-2007, for which the county data on the VAT-sharing ratio are available.[25] Column (1) repeats the baseline result in Column (2) of Table 2 but restricts the estimation sample to 1995-2007. In line with our prediction, after adding the VAT-sharing ratio to the model in Column (2), the magnitude of the PMC coefficient becomes quantitatively larger in absolute value, compared to the corresponding coefficient in Column (1). The estimated coefficient of the VAT-sharing ratio in Column (2) reveals a positive association between the VAT-sharing ratio and local tax enforcement. This persistently points to the fact that local tax autonomy generates a positive incentive effect on local tax enforcement. By isolating the positive influence of the increase in local tax autonomy, the disincentive effects of the PMC reform is likely to be enlarged.

Turning to the effect of transfer dependency, in Column (3) of Table 10, we add to the model the variable of transfer dependency. The PMC coefficient changes from a significant negative one in Column (1) to a positive but insignificant one. In the meantime, the coefficient of transfer dependency shows a negative and statistically significant impact on local tax enforcement. This reflects the usual concern in the literature that with the increased reliance on fiscal transfers, local governments may become less accountable for their fiscal decisions. Additionally, both the estimated coefficients clearly reveal the dominant role of the increment in fiscal transfers in lessening the discipline of local tax behaviors during the reform. Finally, in Column (4), we add both the variables to the specification, where we find that the results hold true.

Columns (5) to (8) report the corresponding IV estimates, where we take into account the endogeneity issue of reform implementation, VAT-sharing ratio, and transfer dependency. Since the levels of both VAT-sharing ratio and transfer dependency may be inversely correlated with tax enforcement of a county, as counties with higher level of

[25]Note that the data on transfer dependency at the county level is available up to 2009.

tax enforcement may be arranged to lower levels of tax-sharing ratio and fiscal transfers by the upper-level governments, which makes these two variables potentially endogenous as well. To instrument these two additional endogenous variables, we use the weighted average VAT-sharing ratio and the weighted average transfer dependency of other counties within the same city.[26] The rationale of these two instruments is that the level of tax enforcement in a county is less likely to affect the levels of VAT-sharing ratio and transfer dependency in other counties, while the levels of VAT-sharing ratio and transfer dependency are somewhat correlated among the counties within a same city, potentially ensuring the correlation and exogeneity of the instruments. As shown, the IV estimates reveal a consistent story, confirming the functional role of the two financing instruments.

To sum up, the analysis in subsections V.A and V.B establishes the linkage running from the implementation of the PMC fiscal reform to the increases in local tax autonomy and fiscal transfers toward county governments. This eventually leads to opposing incentive effects on local tax enforcement, with fiscal transfers having the dominant effect.

C. The Dominant Effect of Fiscal Transfers

According to the Chinese institutional setting, the increase in fiscal transfers in the reformed counties largely implies the existence of "grabbing hands" of city governments in the pre-reform period. During this period of time, city governments may have exploited the resources that otherwise, would be directed to county governments. Given our conclusion regarding the dominant role played by fiscal transfers in shaping the net impact of the PMC reform, we would anticipate the negative effect of the reform to be more salient in the reformed counties that were originally affiliating to relatively poor cities. These poor cities are usually deemed more likely to have "grabbing hands" in the pre-reform period, largely due to their fiscal circumstances.

As a way of providing further evidence on the dominant role of fiscal transfers, we split all counties in two groups (denoted as "Poor Cities" and "Rich Cities", respectively), based on the relative richness of their affiliating cities. In particular, we define the rela-

[26] The weight is the inversed distance between the two counties in the same city.

tive richness of the city as the ratio of the GDP per capita of city districts to the GDP per capita of the counties (within the same city), and use the mean median value of this variable to split the sample. As indicated in Columns (1) and (2) of Table 11, while the estimated PMC coefficient in the group of rich cities is positive but statistically insignificant, the coefficient in the group of poor cities is negative and statistically significant . These findings support our previous conjecture.[27]

Along the same line, for those reformed counties that have experienced a large change (increase) in fiscal transfers before and after the PMC reform, we would expect that they should have a larger policy response. To show evidence in this regard, we further split the sample into two groups (denoted as "Large Change" and "Small Change", respectively), based on the median value of the change in fiscal transfers received by reformed counties before and after the PMC reform. Similarly, as revealed by Columns (3) and (4) of Table 11, those reformed counties that have experienced a relatively large change in fiscal transfers are significantly responsive to the PMC reform by reducing local tax enforcement; on the contrary, those counties that have experienced a relatively small change in fiscal transfers have experienced insignificant change in their tax enforcement. This indicates that with a small change in fiscal transfers, the positive impact of the increased local tax autonomy may offset the negative impact of fiscal transfers in these counties, which, in turn, is consistent with the results in Table 10.

D. Ruling out Alternative Explanations

So far, we have shown reasonable evidence to support the argument that the net disincentive effect of the PMC reform is largely due to the changes in financing recourses available to local governments in the post-reform period. However, there may exist two alternative explanations for the detected lower tax enforcement of the reformed counties. The first is related to the possible re-assignment of the expenditure responsibility for county governments in the post-reform period. Particularly, one may suspect that

[27] From a different perspective, we also use transfer dependency as the dependent variable and apply the specification separately to the two groups of cities (i.e., rich versus poor cities). The results, as reported in Table A3 of the Appendix, show that fiscal transfers only increased significantly in the poor cities rather than the rich cities. This is consistent with our main conjecture.

the decrease in tax enforcement may also be driven by negative shocks on government expenditure induced by the reform (i.e., lowering expenditure responsibilities of county governments). To rule out this explanation, we replace the outcome variable in specification (1) with government expenditures (alternatively defined as the ratio of expenditures to GDP, the logarithm of expenditures, and the logarithm of expenditure per capita), and re-estimate the model. As reported in Columns (1) to (3) of Table 12, the PMC coefficients are all positive and statistically significant, indicating an expansion rather than a reduction in county expenditures in the post-reform period. This helps rule out the previous competing explanation.

Further, one may also argue that the decrease in our measure of local tax enforcement (i.e., the ratio of total fiscal revenues to GDP) may be induced by the expansion of the tax base (i.e., GDP), rather than the tax collection effort of local governments. Similarly, to reduce this concern, we replace the outcome variable in specification (1) alternatively with the logarithm of fiscal revenues and the logarithm of fiscal revenue per capita and re-estimate the model. The results in Columns (4) and (5) of Table 12 confirm that our baseline results are mainly driven by the change in local tax enforcement.

VI. Concluding Remarks

The PMC fiscal reform initiated in 2004 was among the most significant reforms in China's fiscal system in recent years. This reform has largely reshaped the landscape of fiscal balance sheets at the local level, thus influencing local fiscal behaviors to a considerable extent. This paper uses a nationwide county panel dataset for years 1995-2014, to test the incentive effects of the reform on local tax enforcement. It also examines the mechanisms of the reform's impact, which is of equal importance. We find that the PMC fiscal reform has reduced tax enforcement of county governments (in terms of the ratio of the total fiscal revenues to GDP) by around 22 percent. Further evidence validates our conjectures that the sources of the detected impact are rooted in the reform-induced increases in the two financing sources—local tax autonomy and fiscal transfers—received by county governments. While the increase in local tax autonomy incentivized county governments

to impose stronger tax enforcement for retaining a larger portion of tax revenues, the increment in fiscal transfers generated a detrimental effect on local tax enforcement. Consequently, the net impact of the PMC fiscal reform relies on the offsetting of the two opposing induced effects, and our results suggest that the negative effect of the increased fiscal transfers appear to outweigh the positive effect of the increased local tax autonomy.

From a policy perspective, the negative finding of the reform's impact on local tax enforcement delivers an important message; that is, the actions of the central authority in alleviating local fiscal difficulty may be undermined due to the negative behavioral responses of local governments. Nevertheless, this finding is not surprising and is indeed in line with the longstanding emphasis in the fiscal federalism literature regarding the importance of revenue generation by local governments. That is, local governments that raise a substantial portion of their own revenue tend to be more accountable to their residents; and while financing local governments with fiscal transfers helps achieve equalization, it comes at the expense of local fiscal indiscipline. In all, if the primary policy target is to fight against fiscal difficulty (rather than equity considerations) at the local level, assigning local governments with more tax autonomy appears to be a more effective approach in achieving the objective while avoiding the unnecessary negative behavioral responses of local governments.

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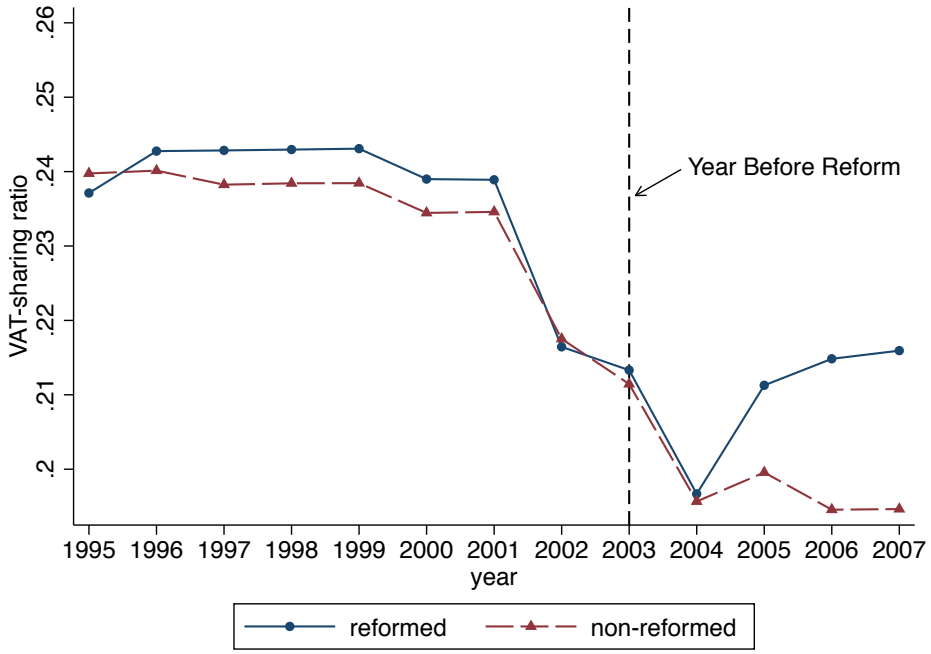
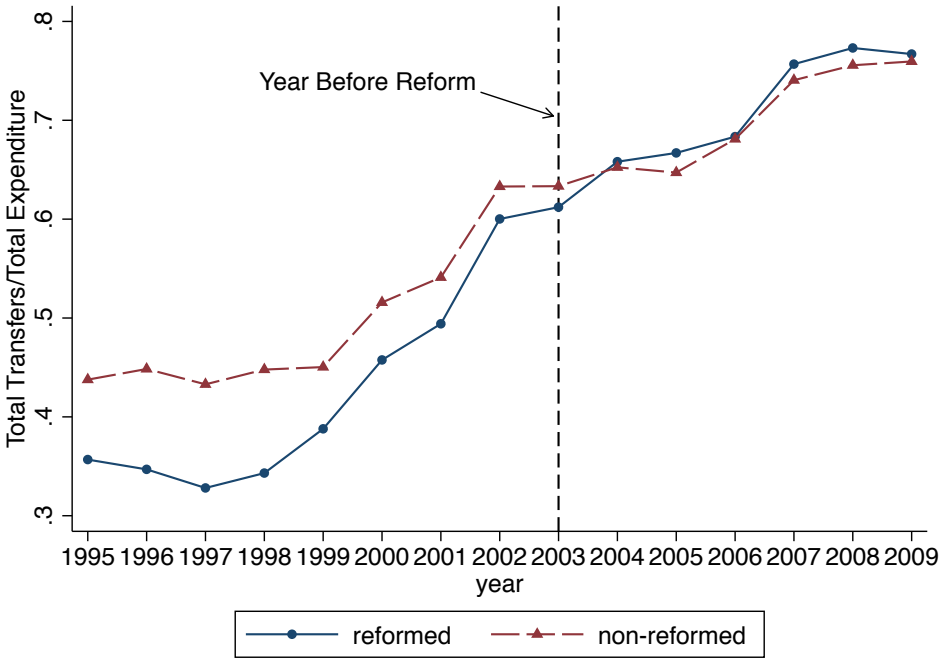
Figure 1: Trends in VAT-sharing Ratio of County Governments



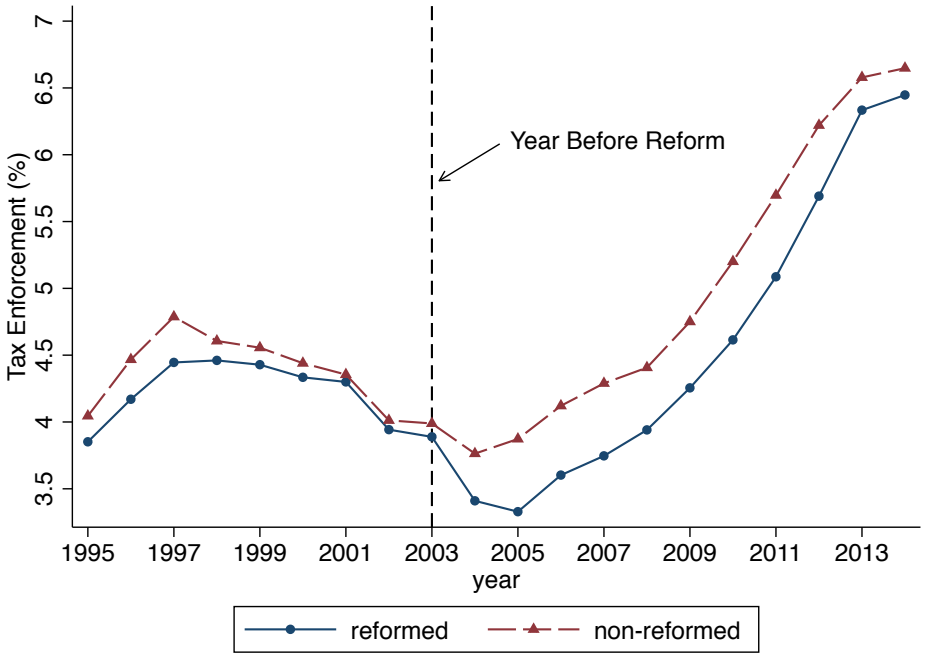
*Notes:*This figure illustrates the time trends of average VAT-sharing ratio for reformed and non-reformed counties. The VAT-sharing ratio is defined by the ratio of remained VAT revenue at county level to total VAT revenue generated by the county. The data on VAT-sharing ratio was only released up to 2007. The line with circle symbol reflects the average value for the counties that have ever implemented the PMC fiscal reform, while the dash line with triangle symbol depicts the average value across counties that have never implemented the reform throughout the entire period, and the vertical dashed line is the year before the reform was initially introduced.

Figure 2: Trends in Transfer Dependency of County Governments



*Notes:*This figure illustrates the time trends of average transfer dependency for reformed and non-reformed counties. Transfer dependency is defined by the ratio of total fiscal transfers to total fiscal expenditures of county government. The data on fiscal transfers was only released up to 2009. The line with circle symbol reflects the average value for the counties that have ever implemented the PMC fiscal reform, while the dash line with triangle symbol depicts the average value across counties that have never implemented the reform throughout the entire period, and the vertical dashed line is the year before the reform was initially introduced.

Figure 3: Trends in Tax Enforcement of County Governments



*Notes:*This figure illustrates the time trends of average tax enforcement for reformed and non-reformed counties. Tax enforcement is defined by the ratio of fiscal revenues to GDP (%). The lines with circle symbol reflect the average tax enforcement for the counties that have ever implemented the PMC fiscal reform between 1995 and 2014, while the dash lines with triangle symbol depict the corresponding average value across counties that have never implemented the reform throughout the entire period, and the vertical dashed line is the year before the reform was initially introduced.

Table 1: Summary Statistics

Variables	Obs.	Mean	Std Dev	Min	Max
Tax Enforcement (%)	33,705	4.55	2.43	0.167	15.02
PMC reform	35,904	0.19	0.40	0.00	1.00
VAT-sharing ratio	22,901	0.22	0.05	0.05	0.37
Transfer Dependency	22,340	0.56	0.22	0.07	1.05
GDP per capita (log)	33,984	3.02	0.89	1.16	5.31
Primary Industry/GDP	32,508	0.30	0.15	0.03	0.69
Secondary Industry/GDP	32,444	0.39	0.16	0.08	0.79
Population Density (log)	35,214	5.07	1.38	0.42	6.99
Urbanization	34,685	0.19	0.14	0.00	0.74
CPE	35,980	0.17	0.38	0.00	1.00
Distance_PPMC	35,980	37.36	60.25	0.00	568.34

Note: Authors' calcuations.

Table 2: The Net Impact of PMC Fiscal Reform on Local Tax Enforcement

	Fixed effects estimation		IV estimation	
	(1)	(2)	(3)	(4)
PMC reform	-0.151**	-0.306***	-1.017***	-1.012***
	(0.075)	(0.077)	(0.362)	(0.343)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	33,694	31,211	33,694	31,210
R-squared	0.251	0.275	0.232	0.263
IV F-stats	-	-	57.93	69.10

Note: "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. ** and *** denote the significance at the 5% and 1% level, respectively.

Table 3: IV Validity Test

Dep. Var.	First-stage Result		Exogeneity	
	PMC reform		Local tax enforcement	
	(1)	(2)	(3)	(4)
Distance_PPMC	0.002***	0.002***		
	(7.248)	(8.366)		
Distance			0.001	0.000
			(0.518)	(0.016)
County FE	Yes	Yes	No	No
City FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Time Period	1995-2014	1995-2014	1995-2003	1995-2003
Observations	35,904	31,537	14,756	12,968
R-squared	0.424	0.498	0.442	0.467

Note: The dependent variables in Columns (1)-(2) and Columns (3)-(4) are the PMC reform dummy for a county and tax enforcement of county governments, respectively; "Distance_PPMC" is the instrumental variable, which is the interaction term between the county-city geographical distance and a province PMC dummy variable (indicating whether a province has decided to implement the PMC fiscal reform); "Distance" represents the county-city geographical distance; "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. *** denotes the significance at the 1% level.

Table 4: Robustness Checks: Alternative Subsamples

	Balanced sample	PMC sample	Non-capital
	(1)	(2)	(3)
PMC reform	-0.757**	-0.762***	-0.969***
	(0.338)	(0.264)	(0.368)
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	22,643	17,029	29,030
R-squared	0.308	0.280	0.262
IV F-stat	58.35	188.5	62.50

Note: In Column (1), we restrict the sample to be a balanced one by ensuring the existence of data for the same county for all time period between 1995 and 2014; in Column (2), we exclude those counties that have never adopted the PMC reform by the end of 2014; in Column (3), we exclude the counties belonging to the capital city of each province. "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. ** and *** denote the significance at the 5% and 1% level, respectively.

Table 5: Robustness Checks: Alternative Specifications

	(1)	(2)	(3)	(4)	(5)
PMC reform	-1.153**	-0.738**	-0.961***	-1.056**	-0.842***
	(0.496)	(0.361)	(0.329)	(0.469)	(0.284)
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes				Yes
Treatment-time Trend	Yes				
Controls×T		Yes			
Controls×T^2		Yes			
Controls×T^3		Yes			
Controls×Year			Yes		
Controls×Treat				Yes	
Eight Selection Criteria					Yes
Observations	31,210	31,210	31,210	31,210	30,012
R-squared	0.260	0.309	0.318	0.255	0.296
IV F-stat	95.52	68.42	126.1	85.60	195.5

Note: In Column (1), we include treatment time trend; in Column (2), we interact the control variables with a third-order polynomial function of time trend; in Column (3), the control variables are interacted with the year dummies; in Column (4), the control variables are interacted with eventual treatment status of the counties; in Column (5), we include as additional control variables the eight key selection criteria that mainly determined the selection of the PMC counties based on the central authority's reform guidelines, including the dummies of county-level city, national poor county, major food-producing county, provincial boundary county, altitude, average slope, fiscal gap, and urbanization rate. "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. *, ** and *** denote the significance at the 10%, 5% and 1% level, respectively.

Table 6. Robustness Checks: Alternative Measure of Local Tax Enforcement

	Fixed effects estimation		IV estimation	
	(1)	(2)	(4)	(5)
PMC reform	-0.027*	-0.058***	-0.232***	-0.259***
	(0.015)	(0.015)	(0.067)	(0.070)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	31,184	31,184	31,183	31,183
R-squared	0.001	0.007	-0.031	-0.020
IV F-stats	-	-	58.77	68.99

Note: The alternative local tax enforcement is obtained by the regression approach (see subsection IV.C in the text). "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. * and *** denote the significance at the 10% and 1% level, respectively.

Table 7. Robustness Checks: Addressing the Concern of Agricultural Tax Reforms

	Agricultural Tax/Total Fiscal Revenue			Agricultural Industry/GDP		
	10%	20%	30%	10%	20%	30%
	(1)	(2)	(3)	(4)	(5)	(6)
PMC reform	-0.962***	-0.942**	-1.156***	-0.680**	-0.734**	-0.714**
	(0.357)	(0.369)	(0.417)	(0.308)	(0.321)	(0.354)
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	28,086	25,155	22,075	28,012	24,875	21,782
R-squared	0.279	0.289	0.288	0.282	0.283	0.293
IV F-stat	57.69	49.36	39.67	86.12	78.05	68.87

Note: In Columns (1)-(3), we exclude those counties that the average ratio of agricultural tax to total fiscal revenue for 1995-2003 is above 10, 20 and 30 percentile of the sample, respectively. In Columns (4)-(6), we exclude those counties that the average ratio of agricultural (primary) industry to GDP for 1995-2003 is above 10, 20 and 30 percentile of the sample, respectively. "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. ** and *** denote the significance at the 5% and 1% level, respectively.

Table 8: Robustness Checks: Addressing the Concern of Spillover Effects

	Same status sample	Drop distance<50km	Drop distance<100km	Drop distance<200km
	(1)	(2)	(3)	(4)
PMC reform	-0.918**	-0.941***	-0.855***	-0.905***
	(0.387)	(0.336)	(0.323)	(0.323)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	26,239	30,574	29,654	28,406
R-squared	0.278	0.267	0.270	0.271
IV F-stat	49.98	68.07	66	60.73

Note: In Column (1), we restrict the sample to those counties having the same status within a city; that is counties in a same city are either all in the treated group or all in the control group; in Columns (2), (3) and (4), we excluded those non-reformed counties that are within 50 km, 100 km and 200 km away from the reformed counties, respectively. "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. ** and *** denote the significance at the 5% and 1% level, respectively.

Table 9: The Increases of the VAT-sharing Ratio and Transfer Dependency

	Fixed effects estimation		IV estimation	
	(1)	(2)	(4)	(5)
Panel A. The dependent variable is the VAT-sharing ratio (1995-2007)				
PMC reform	0.020***	0.017***	0.009	0.011*
	(0.002)	(0.002)	(0.006)	(0.006)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	22,901	19,780	22,901	19,780
R-squared	0.230	0.244	0.227	0.243
IV F-stat	-	-	124.3	137.2
Panel B. The dependent variable is transfer dependency (1995-2009)				
PMC reform	0.062***	0.039***	0.113***	0.059***
	(0.007)	(0.006)	(0.023)	(0.017)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	22,340	19,354	22,327	19,320
R-squared	0.610	0.664	0.606	0.664
IV F-stat	-	-	58.26	71.37

Note: "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. *, ** and *** denote the significance at the 10%, 5% and 1% level, respectively. It is noted that the data on VAT-sharing ratio and fiscal transfers were only released up to 2007 and 2009, respectively.

Table 10: The Incentive Effects of the VAT-sharing Ratio and Transfer Dependency

	Fixed effects Estimation				IV Estimation			
	Baseline	VAT Channel	Transfer Channel	Both Channels	Baseline	VAT Channel	Transfer Channel	Both Channels
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PMC reform	-0.241***	-0.317***	0.005	-0.043	-0.451**	-0.455**	0.130	0.185
	(0.071)	(0.072)	(0.068)	(0.069)	(0.207)	(0.213)	(0.251)	(0.253)
VAT-sharing Ratio		4.880***		1.836***		5.500***		1.415*
		(0.436)		(0.448)		(0.523)		(0.738)
Transfer Dependency			-5.596***	-5.481***			-5.536***	-5.893***
			(0.234)	(0.241)			(0.742)	(0.719)
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,001	19,762	16,562	16,496	20,001	19,615	16,059	15,990
R-squared	0.112	0.131	0.308	0.311	0.111	0.131	0.309	0.311
IV F-stat					140.3	69.05	96.68	70.50

Note: The estimation time period is 1995-2007. In Columns (5)-(8), the variables of PMC reform, VAT-sharing ratio, and transfer dependency are treated as endogenous variables and they are instrumented by the interaction term between the county-city geographical distance and a province PMC dummy variable, the weighted average of VAT-sharing ratio, and the weighted average transfer dependency of other counties in the same city, respectively. "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. *, ** and *** denote the significance at the 10%, 5% and 1% level, respectively.

Table 11: The Dominant Effect of Fiscal Transfers

	Rich Cities	Poor Cities	Small Change	Large Change
	(1)	(2)	(3)	(4)
PMC reform	0.024	-0.694***	-0.434	-1.596***
	(0.203)	(0.254)	(0.420)	(0.499)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	8,549	8,551	22,016	22,119
R-squared	0.120	0.102	0.093	0.098
IV F-stat	289.4	142.2	60.68	50.70

Note: Given data availability on fiscal transfers and for comparison purpose, the time period for regressions in this table is 1995-2009. "Rich Cities" ("Poor Cities") denotes the county sample that is located in a relatively richer (poor) city, where the ratio of the GDP per capita of city districts to the GDP per capita of the counties within the same city is above (below) 50% of the sample mean. "Small Change" ("Large Change") represents those reformed countries, where the change of the mean value of transfer dependency before and after the PMC reform is below (above) 50% of the sample mean. Both regressions in Columns (3) and (4) employ the same control group, which are counties that have never adopted PMC reform until 2009. "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. *** denote the significance at the 1% level.

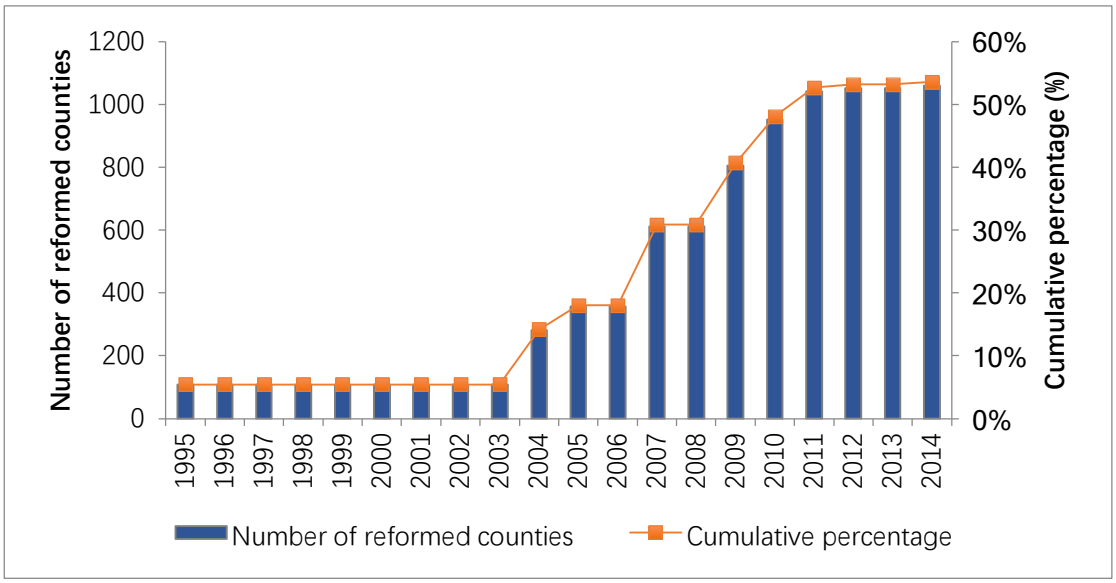
Table 12: Ruling out Alternative Explanations

Dep. Var.	Log(Expenditure/GDP)	Log(Expenditure)	Log(Expenditure per capita)	Log(Revenue)	Log(Revenue per capita)
	(1)	(2)	(3)	(4)	(5)
PMC reform	0.211***	0.321***	0.286***	-0.265***	-0.317***
	(0.038)	(0.054)	(0.051)	(0.069)	(0.067)
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Observations	30,841	30,977	30,903	30,915	30,905
R-squared	0.810	0.961	0.960	0.860	0.851
IV F-stat	93.74	71.99	72.57	91.95	86.30

Note: "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. *** denotes the significance at the 1% level.

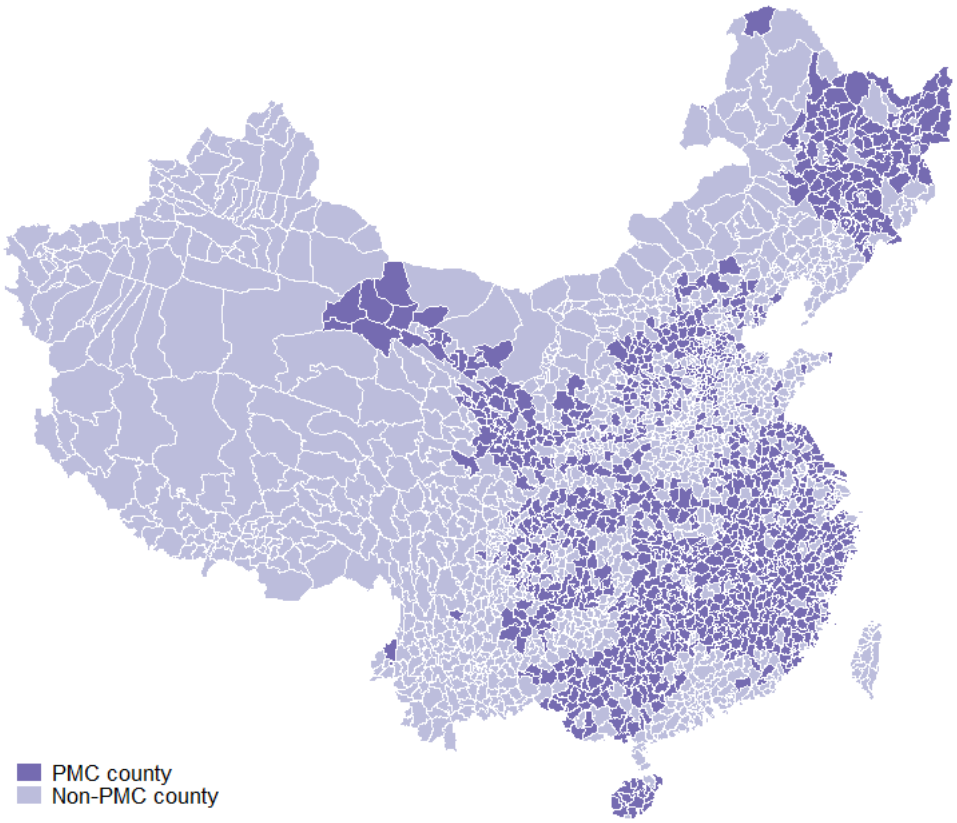
Appendix

Figure A1: Introduction of the PMC Fiscal Reform in China



Note: There are 108 counties that had the PMC system in place before year 2004. These counties are mainly locating in Zhejiang, Hainan and the four province-level municipalities. We have excluded these counties in our regressions.

Figure A2: Spatial Distribution of the Implementation of PMC Reform in 2014



Source: Authors' calculation.

Table A1: The Regulation of PMC Fiscal Reform in Each Province

Province	Implementation time	Selecting criteria	Tax-sharing ratio	Fiscal transfers
Hebei	2009, 2013, 2015	Major agricultural county	Increase	Not mention
Shanxi	2006, 2012	National Poor County; Major agricultural county	Increase	No less than
Liaoning	2010, 2011	Location advantage; Resources-rich	City-excluded	Not mention
Jilin	2005	No criteria listed	Increase	Encourage
Heilongjiang	2006, 2011	No criteria listed	Did not reveal	Not mention
Jiangsu	2007, 2011	No criteria listed	Did not reveal	Not mention
Anhui	2004, 2011	No criteria listed	Not change	Increase
Fujian	2004	No criteria listed	Not mention	Not change
Jiangxi	2005, 2007, 2009, 2014	National Poor Counties	Not change	Not mention
Shandong	2009	No criteria listed	City-excluded	Increase
Henan	2004, 2006, 2007, 2009, 2011, 2013	Location advantage	Increase	Increase
Hubei	2004	No criteria listed	Mostly not change	Not mention
Hunan	2010, 2015	No criteria listed	Increase	Encourage
Guangdong	2010, 2011, 2012, 2013, 2014	Major agricultural county	Not mention	Not mention
Guangxi	2009, 2010	No criteria listed	Not mention	Not mention
Sichuan	2007, 2009, 2014	Large-scale population; Major agricultural county; Well-developed county	Not mention	Increase
Guizhou	2009, 2012, 2013	Major agricultural county; Resources-deficiency	Not mention	Not mention
Yunnan	2009	Large-scale population; Major agricultural county; Major tourism county	City-excluded	Not mention
Shaanxi	2007, 2009, 2014	Ecological preservation; National Poor County	City-excluded	Not mention
Gansu	2007, 2009, 2011	No criteria listed	City-excluded	Not mention
Qinghai	2007	No criteria listed	Not mention	Not mention

Note: "City-excluded" means that the city governments will no longer share the revenue collected by county governments in the post-reform period. "Not change" means that the tax-sharing ratio remains the same after the reform. "Mostly not change" means that the tax-sharing ratio remains the same in most of the reformed counties except for a few cases.

Table A2: Description and Sources of Variables

Variable	Definition	Source	Data coverage
Tax enforcement	Ratio of fiscal revenues to GDP (%)	Prefecture, City, and County Public Finance Statistics (PCCPFS), and "other sources"	1995-2014
PMC reform	=1 if a county adopted PMC reform in year t and afterwards; =0 otherwise	Official documents from provincial governments	1995-2014
VAT-sharing ratio	Ratio of remained VAT revenue in county level to total VAT revenue generated by the county	PCCPFS	1995-2007
Transfer dependency	Ratio of total fiscal transfers to total expenditures of county government	PCCPFS	1995-2009
GDP per capita	Real GDP per capita (log), 1985 fixed price	PCCPFS and "other sources"	1995-2014
Primary industry/GDP	Ratio of primary industry to total GDP	PCCPFS and "other sources"	1995-2014
Secondary industry/GDP	Ratio of secondary industry to total GDP	PCCPFS and "other sources"	1995-2014
Population density	Ratio of population to area	PCCPFS and "other sources"	1995-2014
Urban	Ratio of urban population to total population	PCCPFS and "other sources"	1995-2014
CPE	=1 if a county adopted CPE reform in year t and afterwards; =0 otherwise	Official documents from provincial governments	1995-2014
Distance_PPMC	The interaction term between the county-city geographical distance and a province PMC dummy variable (indicating whether a province has decided to implement the PMC fiscal reform)	Authors' calculation	1995-2014
Weighted VAT-sharing ratio	Weighted average of other counties' VAT-sharing ratio within the same city, weighted by inversed geographical distance	PCCPFS and Authors' calculation	1995-2007
Weighted Fiscal Transfers	Weighted average of other counties' transfer dependency within the same city, weighted by inversed geographical distance	PCCPFS and Authors' calculation	1995-2009

Note: "other sources" mainly include China Statistical Yearbook for Regional Economy (Zhongguo Quyu Jingji Tongji Nianjian) and the Statistical Yearbooks for each province.

Table A3. The Change of Fiscal Transfers in Rich and Poor Cities

	Rich Cities		Poor Cities	
	(1)	(2)	(3)	(4)
PMC reform	0.014	0.010	0.049***	0.029***
	(0.009)	(0.008)	(0.011)	(0.009)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	7,978	7,549	6,691	6,262
R-squared	0.657	0.688	0.591	0.649
IV F-stat	289.4	142.2	60.68	50.70

Note: Given data availability on fiscal transfers, the time period for regressions in this table is 1995-2009. "Rich Cities" ("Poor Cities") denotes the county sample that is located in a relatively richer (poor) city, where the ratio of the GDP per capita of city districts to the GDP per capita of the counties within the same city is above (below) 50% of the sample mean. "Controls" represents a set of control variables, including real GDP per capita, the shares of primary industry and secondary industry in total GDP, urbanization, population density, and CPE dummy. The standard errors are reported in parentheses, clustered by county. *** denote the significance at the 1% level.