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Are government budgets a visible stabilizer? Evidence from China since the tax-assignment reform

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Abstract

Purpose – This study quantitatively examines the relationship between economic fluctuations and government budget size in the context of China's fiscal decentralization, drawing inspiration from theoretical predictions of the Keynesian view and empirical studies on other economies.

Design/methodology/approach – The panel comprises 31 provinces or equivalents in mainland China, spanning from 1994 to 2019. Diverse estimation strategies including two-way fixed effect regression, the generalized method of moments (GMM) and threshold regressions are, utilized.

Findings – The results suggest that under the "tax-assignment system", neither the central government's fiscal transfers nor the provincial budgetary revenues or expenditures help reduce economic volatility. Surprisingly, some regression outcomes suggest that government size measures destabilize business cycles.

Originality/value – While the study does not provide supportive evidence for the stabilizing effect of public budgets in Chinese provinces, it promotes a rethinking of the government's intricate role in macroeconomic stabilization in the context of China's fiscal decentralization.

Keywords Government budgets, Business cycles, Fiscal decentralization

Paper type Research paper

1. Introduction

In the field of macroeconomic theory and policy, few topics have received as much attention as the role of the government in business cycle stabilization. Although the relevance of these topics becomes especially pronounced during periods of dramatic economic turmoil, such as the Great Recession and the recent COVID-19 downturn, related debates have been ongoing for several decades. Around 90 years ago, John Maynard Keynes, the pioneer of modern macroeconomics, argued that cyclical fluctuations in economic aggregates could be, at least partially, stabilized by the visible hand of the government, which primarily operates through counter-cyclical fiscal measures and discretionary policies. Empirically, this proposition suggests a negative statistical relationship between government size and economic volatility.

Our study extends this strand of literature by considering whether government budgetary arrangements play the role of a visible stabilizer in China, which is not only the largest developing economy in the world but has also engaged in market-oriented reforms since the late 1970s. China is of paramount interest in this context for at least three reasons. First, it is

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well known that during the period of planned economy in China, the government was massively involved in mobilizing economic resources and thus played the role of an "engine" rather than a "stabilizer" of the sharp economic fluctuations that were experienced (see Naughton, 2018). It seems logical here to ask the extent to which such a role has altered as China proceeded with its market reform. Specifically, does the empirical regularity generally found in many mature markets (i.e. government taxes and spending help reduce output volatility) also hold for current China?

Second, even during the post-1978 era, the path of China's rapid emergence was by no means a smooth one. Over the past four decades, substantial boom/slump fluctuations in aggregate economic activities have been observed, often associated with the retreat and revival of determination to market reform (Naughton, 2018). To a large extent, this phenomenon reflects the lasting policy dilemma in China that "power concentration brings sluggishness, then delegating causes chaos". Accordingly, an unavoidable challenge emerges for Chinese policymakers, namely balancing out the dynamics of economic growth against macroeconomic stability.

Third, perhaps more interestingly, over the transition period the central-provincial fiscal relationships in China have witnessed dramatic changes due to various institutional arrangements, especially the revenue-sharing reform of the 1980s and "tax assignment" (*fen shui zhi*) reform of 1994. Since then, China's fiscal system has manifested features corresponding to *de facto* fiscal federalism, which creates strong incentives for local governments to promote the economic growth in their own jurisdictions. However, this decentralized division of taxing powers and expenditure responsibilities also triggers a remarkable divergence in macroeconomic objectives between localities and central authorities. An important question arises at this point: Do the fiscal policies adopted by different government levels within a country have consistent effects on business cycles?

Given these major concerns, this paper investigates the nexus between output fluctuations and government size using panel data from 31 Chinese provinces (or province-level regions, hereafter "province"). The main novelties of this paper are fourfold. First, considering the tax-assignment system, special attention is paid to the heterogenous features of central and provincial fiscal arrangements in dealing with economic fluctuations. Second, detailed revenue and expenditure items are examined to gain deeper insight into the mechanism through which fiscal policy affects macroeconomic aggregates. Third, alternative estimation strategies based on panel data are used to better tackle the problem of endogeneity and other econometric issues. Fourth, the empirical findings are carefully interpreted in relation to China's stabilization policies' characteristics.

The remainder of this paper is organized as follows. The next section reviews the existing studies on the role of government size in business cycles. Section 3 summarizes the main facts and features of China's government budgets and output volatility during the reform era. Section 4 presents a panel-based econometric investigation. Section 5 concludes this paper.

2. Literature review

In the spirit of Keynesian tradition, Galí (1994) investigates how government size affects output volatility through a standard, technology shock-driven *Real Business Cycle* (RBC) model. Theoretically, he argues that the government-business cycle relationship is ambiguous, and only under certain assumptions can the negative nexus between these two variables be observed. Thus, this problem turns out to be an empirical issue. Using a sample of Organization for Economic Co-operation and Development (OECD) member countries during the 1960 to 1990 period, Galí further conducts simple cross-country regressions and finds that government purchase size has a strong stabilizing effect on economic activity, while income taxes have a destabilizing one albeit to a smaller magnitude.

According to his analytical framework, such a phenomenon can be explained by an increase in labor supply elasticity due to higher tax rates.

Addressing Galí's empirical methodology, Rodrik (1998) argues that there exists a bidirectional causality between government size and economic volatility, which is mainly caused by some common relevant factors, such as economic openness. In particular, households in more open economies tend to encounter more exposure to external risks, hence demanding increased public expenditure as insurance. Therefore, government size may, in turn, be chosen by households to deal with external shocks. In omitting this factor, Galí's regression results could be biased.

To deal with the endogeneity problem, Fatás and Mihov (2001) revisit the issue raised by Galí (1994) using both international and intranational samples, namely the OECD countries and US states, respectively. Owing to the inclusion of some openness-related factors and alternative estimation strategies, their study is believed to better capture the fundamental sources of economic fluctuations and the stabilization mechanisms. Moreover, besides the conventional focus on taxes and transfers, these cited authors also direct their attention to the effect of government spending, thus going beyond the effect of tax elasticities incurred by different tax systems across economies. However, their findings, based on cross-sectional data, are still consistent with those proposed by Galí (1994).

To tackle the theoretical ambiguity in the effect of fiscal policy changes on economic activity, Andrés *et al.* (2008) first confirmed the negative correlation between government size and economic volatility using data from OECD countries. Then, these authors model the stabilizing effect of government size by adding some Keynesian features such as nominal rigidities and costs of capital adjustment. Based on this modified RBC framework, they provide a theoretical explanation for the findings presented above with a fixed monetary supply. They also argue that although a larger government may trigger more volatile consumption and investment, the stabilizing effect of government size may compensate for the increase in such volatility if the price rigidities are sufficiently strong.

In theory, the studies reviewed above primarily focus on the responses of private agents and government to technology shocks, while largely ignoring other types of shocks such as preference, monetary policy and expenditure shocks. To address this significant oversight, Collard *et al.* (2017) further examined the implications of government size for macroeconomic volatility based on a standard New-Keynesian model with multiple shocks. Importantly, they found that when economic fluctuations emanate from expenditure shocks rather than technology or other factors, government size tends to amplify output volatility. These results also imply a U-shaped pattern between the two variables because expenditure shocks appear to dominate when government size is beyond some threshold. Relying on parameterization based on actual US data for the period of 1960–2007, they further show that the size of the US government relative to its Gross Domestic Product (GDP) is still small, so its stabilizing role in business cycles dominates.

Notably, a major theoretical prediction of Collard *et al.* (2017) is that the role of government size may either amplify or mitigate business cycle volatility, depending on the size itself. This argument is further confirmed in a recent empirical study on OECD countries by Iseringhausen and Vierke (2019), which shows rather mixed results on the issue. More carefully controlling for the demographic composition and time-series properties of the relevant variables, they find that the size of public-consumption appears to enlarge business cycle fluctuations, while labor taxes work in favor of output stability.

To provide a more comprehensive assessment of automatic stabilizers and their impact on real output fluctuation mitigation, Karras and Yang (2022) employ a measurement framework based on revenue and expenditure elasticities derived from regression analysis. Using cross-sectional and panel regression analyses based on European countries, they deliver empirical findings revealing a significant and robust inverse

association between the magnitude of automatic stabilizers and output volatility, albeit statistical significance varies across countries.

Furthermore, it should be stressed that most existing studies, as exemplified above, focus on the experiences of developed economies, while significantly less attention has been devoted to emerging markets and developing countries. Such a biased focus is somewhat surprising given the fact that with vulnerable industrial structures, immature governance frameworks and underdeveloped social security systems, less-developed countries are generally subject to sharp and painful economic fluctuations. In this respect, an important exception is Debrun and Kapoor (2010), which addresses a sample covering economies with different development levels. Focusing on the hypothetical overall balance one would observe if output were on its potential level, they show that in both advanced and emerging market economies, the fiscal stabilization effectively works through automatic stabilizers, while such a mechanism is likely to be less pronounced in the latter group. Moreover, they also examine the role of central bank independence in macroeconomic stabilization and conclude that mitigating the conflicts between fiscal and monetary policies could reduce output volatility. In a recent study that encompasses a sample of 61 developing countries from 1990 to 2018, Stojanovikj (2022) probes into the interplay between fiscal and monetary policies and their stabilizing effects on economic activities. Considering the size of government as a proxy of fiscal policy – measured by the ratio of non-military government expenditure to GDP, this cited study finds that larger governments tend to dampen business cycle fluctuations without significantly stabilizing private consumption.

Although the effects of China's government size on business cycles and other related topics have also been discussed over recent years, quite a few research studies rely on model-based calibration rather than empirically addressing this issue. For example, with the help of a one-sector Dynamic Stochastic General Equilibrium (DSGE) model with persistent technological shocks, Deng and Tang (2012) demonstrate by calibration that at the national level, China's government spending does not properly play its role as an "automatic stabilizer". This finding, according to them, can be explained by the mix of government-dominated investment and the impulsive investment behavior of local governments, both of which are prevalent during China's economic transition. Likewise, in calibrating parameters through the Bayesian method, Rao and Liu (2014) investigated the relationship between government productive spending (such as infrastructure investment) and economic fluctuations when introducing the externality of productive government expenditure and market incompleteness into the model. They find that the shocks in the former account for a significant part of the aggregate output volatility, and crowd out (in) private demand in the short run (in the long run). These results are broadly in line with those reported by Yang and Zhan (2016). Within the framework of an extended DSGE model, they show that about 30% of output fluctuations can be attributed to the changes in the macro-level tax burden. Despite these insightful studies, little is known about the nexus between government size and business cycle fluctuations in China if confronting the theoretical analyses with observational facts [1].

3. Descriptive analysis

3.1 Government budget size and fiscal arrangements in China

Given the fact that China's tax assignment reform in 1994 has already been discussed in great depth by a number of studies, such as Wang and Hu (2001) and Naughton (2018), we do not intend to add a new comprehensive presentation on this issue. For our purposes, however, we focus on some general trends in "government budget size", as well as the central-provincial fiscal arrangements around the 1994 reform. Although partial, this description serves to improve clarity about our empirical analysis.

First, considering "general public budget" as a measure of government size, China witnessed a steady decline in overall government size since market reform inception, lasting up until 1994. As shown in Figure A1 [2], both the national (central plus provincial) government budgetary revenue and provincial counterparts had shrunk substantially compared to GDP over that period [3]. The relative size of the central government also followed a falling trend after the redesigning of the fiscal contract system in 1984. Indeed, this phenomenon, referred to as "decline of state capacity" by Wang and Hu (2001), constituted one of the major motivations for implementing the tax assignment reform. Clearly, as can be seen from the figure, since then, the government size relative to GDP, judged both from the central and provincial budgets, not only stopped declining but also has grown over the following two decades.

Second, regarding the central-provincial fiscal relationship, provincial fiscal powers were greatly weakened by the tax sharing arrangements from 1994 onwards. In fact, as illustrated in Figure A2 [2], the share of provincial budgetary revenue in the total national budget had declined sharply from 78% in 1993 to 44% in 1994, and since then remains relatively stable despite some cyclical movements. In contrast, the share of provincial budgetary expenditure has not been largely affected by the reform. Notably, after a few years of fluctuations, it appears to continuously rise since the beginning of the new century and to stabilize around 85% over recent years.

Third, because of the tax assignment, the dramatic changes in the central-provincial fiscal status following the 1994 tax reform led to a marked imbalance in provincial budgets. To finance widened deficits, provinces depend almost entirely upon the fiscal transfers from the central authorities. In Figure A3 [2], we set out the major trends in fiscal transfers from 1990 onwards, for which the data are available. As displayed in the figure, the net central transfers have come to play an important role both in the provincial budget and the national economy. On average, the item accounts for 39% of provincial budgetary expenditure, and 6% of provincial GDP over 1994–2019 [4].

3.2 Output volatility in China

Although China has yet to experience, during its market-oriented reform, a full-blown business cycle comparable to those defined by the National Bureau of Economic Research (NBER) for the USA, the path of its economic emergence is by no means a smooth one. In Figure A4 [2], we show the annual growth rates of China's real GDP and the "output gap", namely the percentage difference between actual GDP and its potential level. As displayed in the figure, although a proper contraction characterized as a period of negative growth remains still absent, one can observe a marked cyclical pattern of GDP growth, especially over the first half of the 1990s.

Furthermore, business cycle fluctuations in China have declined since the mid-1990s. More specifically, Table A1 [2] describes the GDP growth path of China and its regions before and after the tax reform. Again, judging from the coefficient of variation, all sampled Chinese provinces exhibited larger output volatility over the first subperiod than the second. Similar results can also be obtained by using the standard deviation of the output gap as an alternative measure of volatility. Roughly speaking, this phenomenon is primarily due to China's transition program (see Laurenceson and Rodgers, 2010).

4. Empirical analysis

4.1 Benchmark regressions

Our empirical analysis relies on a sample of 31 provinces in mainland China over the years of 1994–2019, namely the period under the tax-assignment system. Unlike most existing

studies, which base their work on a cross-sectional sample, we construct a panel by taking the ten-year moving standard deviation of real provincial GDP growth as the benchmark output volatility measure shown in Equation (1) as follows:

$$Output\ volatility_{it} = Std.(GDP\ growth)_{it};\ i = 1 \ldots 31, t = 2003 \ldots 2019 \quad (1)$$

It thus serves as the dependent variable in Equation (2) presented below. Accordingly, the independent variables are expressed as a 10-year moving average, unless otherwise indicated.

$$Output\ volatility_{it} = \beta_0 G_{it} + \beta_1 \boldsymbol{X}_{it} + u_i + u_t + \varepsilon_{it}, \quad (2)$$

Provincial government size, G, is the variable of interest, and is measured as the ratio of general public budgetary expenditure or revenue (final account) to GDP, denoted as *expenditure* and *revenue,* respectively. Vector $\boldsymbol{X}$ refers to a set of control variables, which will be detailed below. The model includes the province- and year-dummies (denoted as u_i and u_t, respectively) because they may also have a significant impact on economic fluctuations alongside the explicitly observed control variables while i and t denotes province and year. For example, as pointed out by Malik and Temple (2009), geographic location constitutes an important determinant of output volatility due to its relevance to market access. In addition, it is widely acknowledged that conventional monetary policy operations, significant financial or economic crises and institutional reforms are among the key factors that can have a common impact on the business cycles of Chinese provinces. With the help of the panel data, such unobserved time-invariant and individual-invariant factors can be neutralized through two-way fixed-effect regressions.

The estimation results are reported in Table 1. As can be seen from the first two columns of the table, both government size measures are associated with positive estimates. In particular, although the *expenditure* coefficient is statistically insignificant, the *revenue* measure is shown to have a significant and important destabilizing impact on output volatility. Arguably, the latter finding can be explained by the fact that the value-added tax, which is shown to be strongly procyclical, still dominates in China's taxation structure. For instance, in 2019, it constituted 35% of the central budgetary revenue and 31% of its provincial counterparts in China. In summary, our results are in contrast with the traditional Keynesian view that a larger government tends to better stabilize the economy.

Of course, output fluctuations can be influenced by factors other than government behavior, and thus three major control variables are incorporated in the following models: (1) Provincial GDP in logarithm (denoted by *ln GDP*), which is expected to have a stabilizing effect on output (thus a negative sign) because a bigger economy tends to better absorb shocks. In addition, it is believed that the size of economy also negatively affects the size of government due to the existence of fixed cost in setting up public sector (see Fatás and Mihov, 2001). (2) Standard deviation of provincial total factor productivity (*TFP volatility*), which the mainstream RBC model considers as the main driving force of economic cycles (sourced from Zhang *et al*., 2022). (3) Provincial credit-to-GDP ratio (*credit*), which measures the financial leverage of the economy in question. As argued in, among many others, Jordà *et al.* (2013), credit cycle plays a vital role in business cycle fluctuations. Thus, it is assumed to have a positive impact on output volatility.

As shown in Columns (3) and (4) of Table 1, the goodness-of-fit of the two regressions increases nontrivially and the control variables enter the model significantly with expected sign, except for *credit* in the *revenue* model. For the variable of interest, the coefficient of government expenditure now turns to be significantly positive. This demonstrates that given the control variables in consideration, budgetary expenditure size tends to exert some destabilizing effect on output. However, its magnitude (0.0147) remains much smaller than that of *revenue* size (0.1098).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Expenditure	0.0038	–	0.0147 *	–	0.0171 *	–	0.0147***	–
	(0.0049)		(0.0080)		(0.0091)		(0.0016)	
Revenue	–	0.1215***	–	0.1098 ***	–	0.1103***	–	0.1091***
		(0.0247)		(0.0282)		(0.0285)		(0.0061)
Ln GDP	–	–	−0.0093 ***	−0.0092***	−0.0083**	−0.0097***	−0.0090***	−0.0092***
			(0.0030)	(0.0029)	(0.0033)	(0.0032)	(0.0010)	(0.0009)
TFP volatility	–	–	0.1181 ***	0.1199 ***	0.1199 ***	0.1164***	0.1149***	0.1181***
			(0.0330)	(0.0305)	(0.0332)	(0.0316)	(0.0069)	(0.0053)
Credit	–	–	0.0047 **	0.0016	0.0045 **	0.0017	0.0047***	0.0017***
			(0.0019)	(0.0021)	(0.0020)	(0.0021)	(0.0004)	(0.0004)
Trade openness	–	–	–	–	−0.0008	−0.0008	–	–
					(0.0035)	(0.0069)		
Krugman index	–	–	–	–	0.0014	−0.0019	–	–
					(0.0075)	(0.0069)		
GDP growth	–	–		–	−0.0188	0.0081	–	–
					(0.0308)	(0.0300)		
*R*Squared(within)	0.2964	0.3293	0.3590	0.3748	0.3598	0.3752	–	–
No. Observations	527	527	510	510	510	510	510	510

Note(s): Normal standard errors are presented in parentheses, with ***, **, and * representing significance at the 1%, 5%, and 10% levels, respectively
Source(s): Authors' own work

Table 1.
Government size and output volatility (benchmark regressions)

We next consider three additional controls: (1) The sum of provincial imports and exports scaled by GDP (*trade openness*). As documented in Rodrik (1998), more open economies tend to be more volatile because of the exposure to external shocks. Accordingly, the government size may also become larger to tackle them. (2) Production concentration measured by the Krugman specialization index (*Krugman index*; Krugman, 1991). In theory, the more concentrated (or specialized) the production of a region, the more volatile the regional economy owing to industry-specific shocks. (3) Growth rate of provincial GDP (*GDP growth*). As discussed in Fatás and Mihov (2001), economies with smaller governments might grow faster, whereas higher rates of growth are often associated with a more volatile growth path. However, as can be seen from the table, despite the above justifications for introducing these additional controls, the estimated coefficients for the government size measures appear to be unaffected in the new augmented regressions [5].

Furthermore, there is a belief that the business cycles are correlated with provinces through various channels such as trade and movement of production factors. In addition, the nexus between government size and output volatility may vary across provinces of different sizes. Given these concerns, we also employ the *Feasible Generalized Least Squares* (FGLS) estimator, which accommodates both cross-sectional correlation and heteroskedasticity in the error structure. However, as shown in the last two columns of Table 1, the main results remain unaffected.

4.2 Alternative government size indicators

Thanks to the detailed subnational data, we next focus on the impact of different budgetary items on output volatility. Here, six governmental variables are considered. They include: (1) Total budgetary revenue/expenditure balance (*total balance*), which equals approximately the sum of provincial revenue and the gross transfer from the central government. By definition, the item also amounts to the sum of provincial expenditure and the fiscal remittances to the central government. (2) Net central transfer (*central transfer*), which equals the difference between the above gross central transfer and the local remittances to the center. (3) Tax revenue (*tax revenue*), which represents about 80% of provincial budgetary revenue (calculated by authors, based on data from Finance Yearbook of China (Appendix B)). (4) Revenue from sources other than tax (*nontax revenue*), such as "income from use of state-owned resources". (5) Revenue from corporate and individual taxes (*income tax*), which is slightly less than one-fifth of provincial revenue. (6) Expenditure on social security (*social security*), which accounts for approximately 13% of total provincial expenditure (calculated by authors, based on data from Finance Yearbook of China (Appendix B)).

As shown in Table A2 [2], all the six government size measures are associated with positive coefficients. Of these, the estimates of *total balance*, *tax revenue* and *nontax revenue* appear to be statistically significant, suggesting that they tend to destabilize the economy. In the meanwhile, the financial transfer from the central government, which constitutes a main source of provincial budgetary balance under the tax assignment system, plays no role in provincial economic stabilization. This is also the case for income tax revenue and expenditure on social security, despite the common belief that one of their main functions is to smooth income and consumption fluctuations during business cycles.

Next, to accommodate the transitional dynamics of economic growth, we use the standard deviation of the provincial output gap as an alternative indicator of output volatility. As shown in columns (1) and (2) of Table A3 [2], both budgetary expenditure and revenue have positive and significant coefficients, thereby lending additional support to the destabilizing effects of provincial budget on macroeconomy.

Moreover, as Fatás and Mihov (2001) point out, the traditional Keynesian view emphasizes merely the smoothing role of fiscal policies on disposable income and private consumption without making clear predictions about their effects on the volatility of aggregate GDP, which also contains the government spending. In the light of this contention, the last four columns of

Table A3 [2] reproduce the two-way fixed-effect regressions with two alternative measures of private output volatility: the standard deviation of nominal household consumption growth and the standard deviation of nominal gross capital formation growth. To neutralize the price effect, the provincial GDP deflator is also incorporated into the model as a control variable. From the table, it can be seen that both government expenditure and revenue sizes are positively and significantly correlated with the volatility in consumption and capital formation (namely, investment). More interestingly, associated with bigger coefficients, their destabilizer role seems even more pronounced for the fluctuations of these two GDP components than the overall GDP. In a sense, this finding can be taken as an indication that the provincial government budget arrangements complement, rather than substitute, private economic activity in China.

4.3 Sensibility analysis: endogeneity and nonlinearity

As documented in Rodrik (1998), a large government size may be chosen to tackle the effects of external shocks as the economy opens up; thus, it raises a typical endogeneity issue due to the bidirectional causality between government size and output volatility. In addition, other variables, such as the fluctuations in technological progress (measured by TFP) may be affected by the changes in other production factor inputs such as capital and labor. This would lead to a violation of the exogenous assumption of the variable *TFP volatility*.

With these concerns in mind, we next consider the two-step efficient *Generalized Method of Moments* (GMM) estimator. Loosely speaking, by estimating the covariance matrix of orthogonality conditions, this procedure allows to gain efficiency relative to traditional instrument-variable (IV) estimator. In our case, we treat various government size measures and TFP volatility as endogenous variables, and introduce a set of external instruments, which are assumed to be correlated with the endogenous variables, but uncorrelated with the error terms: (1) Trade openness, which, as discussed above, can be positively correlated with government size. (2) GDP per capita (in logarithm), which, as the Wagner's law suggests, can equally act as a positive determinant for government size (see Fatás and Mihov, 2001). (3) The level of urbanization, as measured by the share of the urban population in the total population, which is believed to be positively correlated with the government size because of the increasing demand of urban residents for public services. (4) The gross dependency ratio measured by the ratio of nonworking population to the working population, whose relationship with the government size is similar to that of urbanization. (5) The initial account of budgetary expenditure or revenue, which is generally enacted in mid-January. Logically, they do not fully reflect the economic situation over the entire budget year (same as calendar year in China), especially for the unexpected shocks. Moreover, it should be stressed that the first four instruments directly affect technological progress (thus TFP growth) either positively, such as engagement in international trade, income level and urbanization rate or negatively, such as age structure of population measured by dependency ratio. As shown in Table A4 [2], the associated p-values of Anderson test for under-identification suggest that the instruments are significantly correlated with endogenous variables. The Sargan test for over-identification suggests that the hypothesis of exogeneity of the instruments cannot be rejected at conventional levels.

Regarding the regression outcomes, the table shows that, on the one hand, the coefficients of all government size measures appear to be statistically insignificant, indicating no consistent impact of government budgets on macroeconomic stabilization. On the other hand, the results for the variables of control are relatively insensitive to this alternative estimator, except that the magnitude of the TFP volatility coefficient increases greatly. This is likely due to the bias caused by the endogeneity of the TFP variable.

The final step in our empirical analysis is to examine the nonlinearity potentially existing in the relationship between government size and business cycle fluctuations. As mentioned in Section 2, Collard *et al.* (2017) theoretically demonstrate a U-shaped pattern between them, because the role of expenditure shocks on macroeconomic stability changes with respect to different government sizes. With this concern in mind, we next turn to investigate such a possible nonlinear relationship by carrying out regressions with threshold regressions. The basic estimation strategy can be expressed in Equation (3):

$$Output\ volatility_{it} = \beta_0 G_{it} + \beta_1 d_{it}^{G*}(G_{it} - G^*) + \beta_2 \boldsymbol{X}_{it} + u_i + u_t + \varepsilon_{it}, \quad (3)$$

where, G is the regime-dependent variable with the threshold level denoted as G^*. d is a dummy variable that takes the value one for G greater than the threshold G*, and zero otherwise. Thus, the impact of government size on output volatility is given by β_0 when $G \leq G^*$, and $\beta_0 + \beta_1$ when $G > G^*$. It is also worth noting that, as indicated by Hansen (1999), threshold regressions may be subject to bias because of endogeneity in the threshold variable itself. To address this issue, we utilize the initial account of budgetary expenditure (scaled by GDP) as the variable defining the different regimes in our regression analysis. As previously mentioned, these initial provincial budgets are typically established at the beginning of each year, rendering them exogenous.

Table A5 [2] presents the results of the threshold regressions with standard deviations of GDP growth and of the output gap as dependent variables. It emerges that, although the threshold effects with respect to the size of the initial account of budgetary expenditure are mostly significant, the coefficients on the various government size measures are, in most cases, either insignificant or significantly positive. In short, the results based on threshold regressions, which differ from those obtained by Collard *et al.* (2017), further support our previous findings that provincial public budgets tend to either play no role or act as a destabilizer in output fluctuations.

5. Conclusions

This study examines the relationship between government budget size and output volatility in the context of China's fiscal decentralization. Somewhat surprisingly, using a panel of 31 provinces for the period of 1994–2019, we find that there is no evidence for the stabilizing effect of provincial government budgets, central transfers and other main budgetary items. Such results are shown to be robust across different model specifications, volatility measures and estimation techniques. Even more interestingly, two points are particularly noteworthy. For one, among various government size measures, budgetary revenue tends to significantly enlarge macroeconomic fluctuations. For another, even when considering potential threshold effects among the examined variables, provincial budgetary size still exerts no significant impact on, and may actually even exacerbate, the destabilization of provincial business cycles.

Therefore, in sharp contrast to the experiences of most developed countries, China's provincial governments and central authorities (through fiscal transfers) appear not to rely on budgetary arrangements, especially revenue policy, to dampen business cycle fluctuations. In some cases, government budgets even become a trigger for macroeconomic volatility. This gives rise to a question: how can we reconcile such empirical results with the fact that China experienced relatively mild economic upheaval during its rapid economic expansion, especially from the early 1990s onwards?

A straightforward answer to this legitimate question is that China's handling of business cycles, especially crisis episodes, can be mainly attributed to the instruments beyond narrowly-defined government budgets and conventional monetary policy operations. That can be understood from two aspects. First, it should be emphasized that the "general public

budget", on which we exclusively focus in the empirical analysis, represents only a part of the government financial capacity in China. In a sense, the latter can be better described from the perspective of the "full-covered budget" (*quan kou jin yu suan*). This system, which was formally institutionalized in the "New Budget Law" enacted in 2014, is mainly composed of four distinctive accounts. Besides the aforementioned "general public budget", they also include "budgets of government funds", "budgets of state-owned capital" and "budgets of social security funds". Although they cannot be simply summed up to get a more comprehensive figure of government finance because of their different statistical scopes, their roles in business cycles, whether as a stabilizer or a destabilizer, deserve much attention.

Second, as a matter of fact, both the central and provincial governments in China also intervene in the market for the stabilization purposes through a mix of non-budget policy instruments, such as industrial policy, credit allocation, macroprudential measures and special initiatives via the State-Owned Enterprises (SOEs). Take the latter for example: as a salient feature of China's socialist market system, maintaining macroeconomic stability is explicitly defined as one of the objectives of SOEs (see Naughton, 2018). In practice, with the help of non-market-oriented business strategies and operations, this stabilizer role seems to be significant and omnipresent. For instance, as empirically shown by Guo and Ma (2019), the investment of China's SOEs is less volatile than that of non-state-owned sectors, and even manifests a certain counter-cyclicality.

Arguably, the abovementioned policy instruments and intervention channels, which are unusual for a mature market economy, might have contributed to the relative stability of China's growth path during the reform era. Nevertheless, the lack of a stabilizing mechanism through predefined and well-regulated government budgets is not without limitations. In fact, overreliance on non-standard budgetary arrangements, rather than formal ones, could lead to increased market uncertainty due to their discretionary nature, thus amplifying economic fluctuations. For example, the land-sale revenue, a major source of funding for local urbanization since the tax-assignment reform, has been shown to exhibit significant pro-cyclicality, particularly in response to fluctuations in the housing market (Naughton, 2018). Moreover, if non-government agents, such as the SOEs, are given the role of economic stabilizers, some concerns will be raised over the market mechanism and economic performance. Furthermore, the lack of clarity and transparency regarding the monetary policy framework and its instruments (for example, discretionary credit allocation) can also make it difficult for markets to effectively understand and respond to policy measures (see Das and Song, 2023).

Given such characteristics associated with China's public finances and broader economic system, the evidence presented in this study should be regarded as a partial representation of how the government, as a powerful *visible hand*, intervenes in business cycles. However, we hope that our preliminary findings offer insights into the implications of the fiscal relations between the central and provincial governments for macroeconomic stability in the country, as well as encourage additional research and discussions on the subject.

Notes

1. Relatedly, there has been a growing focus on the implications of fiscal decentralization for local economic growth in China. Examples include Ding *et al.* (2019) and Fan *et al.* (2020).
2. See online Appendix A for tables and figures.
3. See online Appendix B for details on data sources and variable definitions.
4. Shortly before the 1994 reform, central and provincial extrabudgetary budgets began decreasing sharply. By 2011, when they were incorporated into formal budgets, their size relative to GDP was less than 2%, so we exclude them from our analysis.

5. Additional control variables, such as population density, secondary sector share of GDP and urban population ratio, have been considered. In general, from these new regressions, the coefficients of various government size indicators remain largely unchanged.

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Appendix

Supplementary material for this article can be found online.

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