Research on the Impact of Public Data Access on Financial Transparency

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Abstract: The improvement of fiscal transparency is a key way to alleviate social information asymmetry and optimize and improve the modern national governance system. As a new type of production factor, data has become a key strategic resource to promote the construction of digital China and the high-quality development of the economy, and the opening up of the government's public data platform has provided a new direction of change for realizing modernized government governance relying on data elements, and evaluating its economic impact on the fiscal transparency of the local government has become a prerequisite for scientific governance. This paper investigates the impact of public data access on fiscal transparency adopting a quasi-natural experimental approach. We find that public data access exerts a significantly positive influence on fiscal transparency. This effect is mainly attributed to the enhanced digital innovation and public finance awareness brought about by government data platforms access, and promotion incentives for officials serve as a crucial moderating factor influencing the relationship.

1. Introduction

Fiscal transparency reflects the allocation and utilization of public resources and improves social governance and government capacity (Alesina et al., 1999)[1]. China has been striving to improve its fiscal transparency with various regulations and systems, but still falls short of international standards. Digital technology and government construction improve the quality of public data access, which can promote public participation, social innovation and economic development (Janssen, 2011)[2]. However, there is little empirical evidence on how public data access affects local fiscal transparency.

China's State Council issued the Guiding Opinions on Strengthening the Construction of the Digital Government in June 2022, which emphasized the orderly development and utilization of public data resources and their role in promoting economic and social development. Public data access combines "digital innovation" and "public resources" attributes. With digital technology advancement, governments can access and integrate information better through government data platforms, and lower the transaction costs of financial openness and transparency. However, if the data is incomplete or hard to understand, it may hinder the public's comprehension of and involvement in financial affairs. The "dual attributes" of public data access make its theoretical

economic analysis difficult. Therefore, it is crucial to empirically examine the impact of public data access on fiscal transparency.

This paper has several contributions. First, we fill a gap in the existing literature that mainly analyzes the institutional, openness, and determinant factors of government data (Lee & Kwak, 2012; Zuiderwijk & Janssen, 2014; Wang & Shepherd, 2020)[3][4][5], but ignores the impact of public data access on local fiscal governance. Second, we reveal the potential logic between public data access and local finance governance through the "digital innovation" and "public resources" attributes of government data platforms, and explore the moderating role of promotion incentives for officials. Third, we empirically evaluate the fiscal governance effects of public data access using a multi-period DID method with a quasi-natural experiment based on the launch of local government data access platforms. This method reduces the endogeneity problems of traditional methods and ensures the robustness and validity of the results.

2. Research design

2.1 Model specifications

To quantitatively assess whether and how public data access affects cities' fiscal transparency, this study takes the launch of government data access platforms by local governments as a quasi-natural experiment and employ the multi-period difference-in-difference (DID) method for empirical estimation. The DID estimation equation was specified as follows:

$$\text{Trans}_{it} = \beta_0 + \beta_1 \text{PD}_{it} + \sum \beta_j X_{it} + \mu_i + \nu_t + \varepsilon_{it} \tag{1}$$

where i and t indicate the city and year, respectively. The dependent variable, Trans_{it}, represents the fiscal transparency of city i in year t. Fiscal transparency (Trans) is measured by the indicator from the Research Report on Fiscal Transparency of Chinese Municipal Governments published by Tsinghua University. The independent variable PD_{it} is a set of dummy variables according to whether a city has launched of public data access platforms by local governments, if the dummy variable takes 1, it represents the period when the local governments launched of public data access platforms in city i at time t, and otherwise 0. The vector of X_{it} contains city-year level characteristics. We also incorporated the city-fixed effect (μ_i) and the time-fixed effect (ν_t). Standard errors are clustered at the city level.

2.2 Data and descriptive

We collected city-level information primarily from the China City Statistical Yearbook of various years and the CEIC database. Missing values were filled using the interpolation method. In addition, the opening information on city government data platforms used in this paper comes from the websites of city governments and the China Local Government Data Openness Report published by Fudan University. In order to ensure the accuracy of the DID model identification, this paper also excludes the sample of cities that are launched of public data access platforms before 2013 and in 2020, and winsorized all continuous variables at the 1% level, our final sample includes 2003 city-year observations from 2013 to 2020. The definitions of variables and summary statistics are presented in Table 1.

Table 1: Descriptive statistics of core variables

Variables	Definition	Num	Mean	SD	Max	Min
Trans	the indicator from the Research Report on Fiscal Transparency of Chinese Municipal Governments published by Tsinghua University	2003	0.4153	0.1991	0.9215	0.0000
PD	whether a city has launched of public data access platforms by local governments	2003	0.1178	0.3225	1.0000	0.0000
Pgdp	the logarithm of the gross domestic product (GDP) per capita based on purchasing power parity of a city	2003	10.9913	0.5351	12.5793	9.4672
FDI	the logarithm of actual utilization of foreign capital	2003	8.8260	3.0343	14.1424	-1.3081
Interuse	the logarithm of Internet broadband access subscribers (in 10,000 households) of a city	2003	13.5164	0.8589	15.7726	11.1856
Fin	the share of government public finance revenue in public financial expenditure	2003	2.4772	1.7672	13.9601	0.6787
Edu	the average number of students enrolled in higher education per 100,000 population	2003	0.0321	0.0135	0.0964	0.0060
Resource	the share of employment in mining in total employment	2003	0.0473	0.0834	0.5346	-0.0458
industy	the share of secondary and tertiary industries in GDP	2003	0.9368	0.0535	0.9984	0.6893
firm_f	the logarithm of the number of foreign-owned enterprises	2003	2.4235	1.5930	7.0335	0.0000
sps	the percentage of employed persons in public administration and social organizations	2003	0.0571	0.0294	0.2173	0.0107

3. Empirical results and analysis

3.1 Benchmark regression results

Table 2: Benchmark regression results

	(1)	(2)
	Trans	Trans
PD	0.0441***	0.0451***
	(3.1639)	(3.2205)
pgdp		-0.0220
		(-1.1313)
fdi		0.0001
		(0.0491)
Interuse		0.0415**
		(2.2276)
finance		0.0009
		(0.1407)
industy		0.0819
		(0.4592)
firm_f		0.0032
		(0.2344)
reosource		0.2783**
		(2.0947)
edu		-0.6670
		(-1.4287)
sps		-0.0680
		(-0.2934)
Constant	0.4101***	0.0152
	(249.8295)	(0.0497)
City FE	YES	YES
Year FE	YES	YES
Observations	2 003	2 003
Adj R2	0.6020	0.6029

Note: T-statistics are shown in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

The results of the baseline regression are shown in Table 2. Column (1) represents the regression results without controlling for any variables, the column (2) presents the estimated results after adding city-level control variables. It can be observed that regardless of whether control variables are added or not, the public data access has a positive impact on the fiscal transparency of cities, and this impact is statistically significant at the 1% significance level. This indicates that public data access has significantly improved fiscal transparency.

3.2 Robustness test

First, to ensure the results meet the unbiasedness, this study employs the event study method to conduct parallel trend tests. The results in Fig.1 shows that the pre-event interaction terms are not statistically significant, indicating no significant differences between the treatment group and the control group before the launch of government data access platforms, thus satisfying the parallel trend assumption of the DID model.
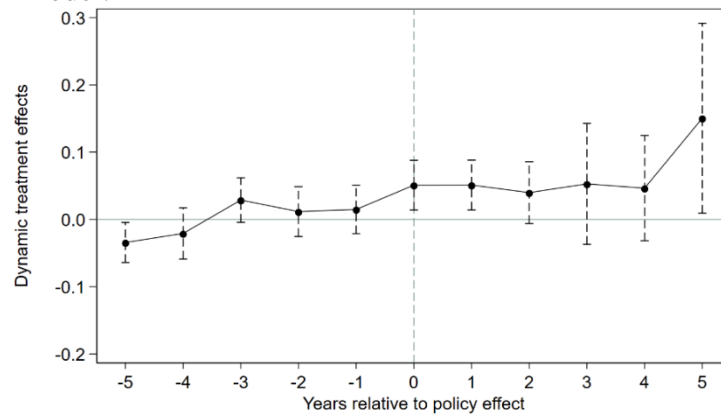

Figure 1: The dynamic effects of public data access on fiscal transparency.

Second, the propensity score matching (PSM) method is used in this part to match each treated group city with a control group city that exhibits the most similar characteristics. Once the matching process is completed, the study further estimates the matched control group sample. The estimated result is presented in column (1) of Table 3.

Third, to mitigate estimation bias, this study employs a Tobit approach for robustness testing. The estimated results are presented in column (2) of Table 3.

Table 3: Robustness tests

Variables	PSM-DID	Tobit	Exclude other policies	Exclude peer competition
	(1)	(2)	(3)	(4)
PD	0.0337**	0.0450***	0.0428***	0.0328**
	(0.0158)	(0.00962)	(0.0139)	(0.0145)
RC_Trans				0.5488***
				(9.8619)
Controls	YES	YES	YES	YES
City FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	1,296	2,003	2,003	1,987
Adj R2	0.6259	—	0.6581	0.6771

Note: Standard errors are shown in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

In addition, considering some other relevant policies related to the sustainable development of cities may affect the basic result. In this study, the policies including Smart City pilot policy,

Broadband China pilot policy and the Golden Tax project III pilot policy are controlled to do a new regression, with the results presented in column (3) of Table 3. In the end, column (4) of Table 3 reports the impact of public data access on fiscal transparency after excluding the interference from regional competition. Given that the competitive and learning effects between cities in the same province due to geographical proximity or administrative affiliation may introduce interference to the estimation results, this study use the average value of fiscal transparency of Cities other than ours in the same province as the regional competition indicator (RC) and performs the estimation again.

4. Further discussions

4.1 Mechanism test

This study further explores the underlying action mechanisms. According to Cui et al. (2023)[6], we construct the mechanism testing model as follows:

$$M_{it} = \beta_0 + \beta_1 PD_{it} + \sum \beta_j X_{it} + \mu_i + \nu_t + \varepsilon_{it} \tag{2}$$

The mediating variable (M_{it}) comprises the following components: digital innovation (D_inno) and public finance awareness (PFin_aware). The measure of digital innovation is the number of authorized digital patents (D_inno) that are based on patent data from the China Intellectual Property Office (CIPO), aggregated at the city level and obtained by taking the natural logarithm. Public finance awareness (PFin_aware) is characterized using the Baidu Three Public Expenditures Search Index of PC and mobile devices in the city. Other indicators are consistent with the above.

The mechanism testing of the impact of public data access on fiscal transparency is presented in Table 4. From the results in column (1) of Table 4, it can be observed that the public data access significantly increases the number of digital patents authorized in cities. Column (2) of Table 4 indicates that the public data access significantly increases public finance awareness. This suggests that the access of government data platforms can promote the transparency of local government finances by increasing the digital innovation and enhancing public finance awareness.

4.2 Do promotion incentives for officials matter?

In the context of China's centralized political power, local chief officials have a crucial role to play in policy implementation and economic development (Li et al., 2019)[7]. In order to gain promotion opportunities, officials are likely to push for higher levels of financial governance. As a result, the impact of public data access on government fiscal transparency may be stronger in regions with stronger promotion incentives for officials. Therefore, the promotion effect of public data access on fiscal transparency is likely affected by the promotion incentives for officials.

We use the level of education and age of local governors to proxy for the level of promotion incentives for officials. Officials' degree and Officials' age in Table 4 are indicators of the more educated and younger official, respectively. The coefficient of the interaction term is statistically significant at least at the 1% level except the column (4). In general, the results indicate that public data access enhances the level of fiscal transparency more in cities with stronger promotion incentives for officials.

Table 4: Potential action mechanisms test

Variables	D_inno	PFin_aware	The moderating role of promotion incentives for officials	
	(1)	(2)	(3)	(4)
PD	0.1839***	0.1210***	-0.0498***	0.4723**
	(3.4027)	(3.8986)	(-3.5395)	(1.9922)
PD*Officials' degree			0.0955***	
			(6.9949)	
PD*Officials' age				-0.0073*
				(-1.8164)
Officials' degree			-0.0094	
			(-0.6857)	
Officials' age				-0.0010
				(-0.6983)
Controls	YES	YES	YES	YES
City FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	2 003	2 003	2 003	2 003
Adj R2	0.9513	0.9218	0.6026	0.6035

Note: T-Statistics are shown in parentheses; *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

5. Conclusions

This paper employs the launch of public data access platforms by local governments as a quasi-natural experiment to reveal the promotion effect of public data access on fiscal transparency. The empirical analysis is based on a comprehensive administrative dataset of Chinese cities from 2013 to 2020.

Our findings suggest that public data access effectively enhances fiscal transparency by promoting digital innovation and increasing public awareness of fiscal affairs. We also find that promotion incentives for officials can enhance the fiscal governance effect of public data access.

This study enhances our understanding of public data access from a government governance perspective and provides empirical evidence for the development of data factor market.

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