

Can the Digital Economy Alleviate Local Fiscal Pressure? Evidence from Prefecture-Level Panel Data in China

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Abstract. At present, the contradiction between local government fiscal revenue and expenditure is intensifying. Against this background, it is of great significance to explore whether the development of the digital economy can alleviate local fiscal pressure. Taking panel data of prefecture-level cities in China from 2001 to 2022 as samples, this study adopts empirical analysis methods to examine the effect of the digital economy on local fiscal pressure and its transmission mechanism. The empirical results show that the development of the digital economy has a significant alleviating effect on local fiscal pressure. This conclusion remains robust after a series of robustness tests such as winsorization, sample interval sensitivity test, and high-dimensional fixed effect adjustment. The mechanism test shows that the digital economy improves the fiscal situation mainly by improving fiscal expenditure efficiency and reducing the proportion of social security and employment expenditure, rather than simply compressing the scale of public service expenditure, which verifies the governance effectiveness of the digital economy in "improving quality and efficiency". Heterogeneity analysis shows that in regions with heavy fiscal support burdens and fierce tax competition, the marginal effect of the digital economy on alleviating fiscal pressure is more significant. Further analysis indicates that higher fiscal transparency and richer financial resources are important supporting conditions for enhancing the positive role of the digital economy. This study supplements new micro empirical evidence for understanding fiscal governance issues in the context of the digital economy, and provides corresponding policy implications for solving local fiscal dilemmas by means of digital transformation.

Keywords: fiscal pressure, digital economy, tax competition, fiscal expenditure efficiency

1. Introduction

Fiscal expenditure is an important means for the government to regulate the economy, maintain public services and social security, and also a key driving force for socio-economic development. The government can adjust resource allocation, restructure industries and promote economic growth by optimizing the structure of fiscal expenditure. According to the *Report on the Final Accounts of the Central Government for 2025* released by the Ministry of Finance, the national general public budget revenue reached 21.6 trillion yuan in 2025, while expenditure stood at 28.74 trillion yuan, leaving a revenue-expenditure gap of approximately 7.14 trillion yuan. The huge fiscal gap exerts

enormous pressure on fiscal balance. To cover fiscal deficits and guarantee basic public service expenditure, the scale of local government debt has continued to rise. By the end of 2024, the balance of local government debt nationwide reached 47.54 trillion yuan, an increase of nearly 9 trillion yuan compared with 2020. The debt burden has increased significantly, and local fiscal operation faces considerable pressure¹. At present, fiscal pressure mainly comes from two aspects. First, investment in key areas has increased significantly, such as scientific and technological innovation, people's livelihood security and green transformation, all of which require large amounts of fiscal funds. Second, interest payments from existing debt are growing, and this part of expenditure is hard to compress. The slowdown in revenue growth and the increase in rigid expenditure have widened the revenue-expenditure gap, making the contradiction between income and expenditure increasingly sharp. The traditional budget management model is inefficient, and the current fund allocation method is not precise enough. The key to solving the practical dilemma of fiscal revenue-expenditure contradiction lies in promoting digital transformation. As the core support of digital transformation, digital technology features strong data integration capability, high information traceability and fast decision-making response. Through systematic collection of fiscal data with digital technology, local governments can realize whole-process visual monitoring of capital flows and automatically optimize resource allocation based on data analysis results. This mechanism can not only effectively prevent the risk of fund loss, but also improve the accuracy and effectiveness of fiscal expenditure, so as to alleviate the fiscal revenue-expenditure contradiction and enhance policy implementation efficiency.

The *Overall Layout Plan for Digital China Construction*, issued by the Communist Party of China Central Committee and the State Council in 2023, clearly defines the strategic position of the digital economy. In recent years, the digital economy has exerted positive effects on the construction of the economic system, the stimulation of entrepreneurial vitality and the high-quality development of the real economy [1-3]. In terms of fiscal revenue, existing studies point out that the digital economy has significantly promoted local tax growth by expanding the tax base, optimizing tax source quality and improving collection and management efficiency. On the one hand, the positive effect of the digital economy on tax revenue is positively moderated by the intensity of tax collection and management; the sounder the collection and management system, the more obvious its enabling effect on fiscal sustainability [4]. On the other hand, driven by the digital economy, tax collection and management reform has accelerated, industrial structure has been upgraded, and labor misallocation has been alleviated. These changes jointly promote the "quality improvement and quantity increase" of local tax sources, thus providing a solid guarantee for the sustainable growth of fiscal revenue [5]. In terms of fiscal expenditure, on the one hand, the digital economy enables the government to build a multi-level, all-round and three-dimensional fiscal supervision system through big data platforms, so as to improve fiscal transparency, strengthen fiscal supervision, reduce rent-seeking space, cut waste of fiscal funds and the risk of financial power capitalization, and raise fiscal expenditure efficiency [6]. On the other hand, the in-depth integration of the digital economy with various macroeconomic sectors reconstructs industrial chain upgrading and value chains, improves resource allocation, and enables fiscal expenditure to be more effectively converted into various public goods [7]. In addition, the development of the digital economy can increase fiscal revenue and enhance local fiscal sustainability [8]. To sum up, the digital economy

¹ Ministry of Finance: Issuance of Local Government Bonds and Debt Balance as of December 2024, <https://www.mof.gov.cn>, January 2025.

can not only improve the efficiency and effect of expenditure, but also positively alleviate fiscal expenditure pressure by reducing administrative costs and enhancing supervision capacity.

Existing literature on the digital economy and finance can be divided into three categories. First, regarding the impact of the digital economy on fiscal revenue, existing studies mainly focus on two dimensions: income-increasing mechanisms and regional differences. On the one hand, in terms of the income-increasing mechanism, the digital economy directly drives the growth of value-added tax and individual income tax by promoting industrial structure optimization and employment quality improvement through digital technology, thus consolidating the foundation of urban fiscal revenue [9]. On the other hand, in terms of regional effects, the development of the digital economy shows a notable "Matthew effect". Compared with less developed regions, developed regions have significantly stronger tax revenue growth effects due to better digital infrastructure and first-mover advantages. This unbalanced development pattern has objectively widened the tax revenue gap between regions [10].

In terms of fiscal expenditure efficiency, digital technology has significantly improved local government fiscal expenditure efficiency and promoted regional economic growth through approaches such as online budget supervision [11], digitalized government procurement [12] and government information connectivity [13]. In terms of regional differences, the enabling effect of digital technology is more prominent in regions with improved institutional development [12], higher fiscal decentralization [11], sounder information infrastructure and deeper digital application [13]. This indicates that the governance effectiveness of digital technology depends not only on the tool itself, but also on the institutional environment and basic conditions of digital transformation. This study provides important support with both theoretical value and practical reference for promoting the digital upgrading of budget supervision and implementing the fiscal reform of "gaining policy space through efficiency".

Third, the application of the digital economy has multi-dimensional risk transmission to local fiscal operation through paths such as the fiscal expenditure efficiency mechanism [14], reshaping of regional tax distribution [15] and the dilemma of intergovernmental financial resource allocation [16]. In terms of regional differences, the tax agglomeration effect of digital technology is more conducive to developed regions in improving their fiscal capacity [14, 15], which objectively widens the fiscal gap between regions [15, 16]. It can be seen that the governance effect of the digital economy is subject to both technical conditions and, to a greater extent, the existing development foundation and corresponding institutional arrangements of the region. To sum up, the digital economy alleviates local fiscal pressure mainly through two paths: promoting fiscal revenue growth and improving fiscal expenditure efficiency. However, in the process of using the digital economy to alleviate fiscal pressure, problems such as intensified local fiscal risks, inter-regional fiscal imbalance and tax revenue concentration in developed regions – a "robbing the poor to feed the rich" effect – may also arise. Based on the actual situation of China's digital economy development and local fiscal operation, this study uses prefecture-level city panel data from 2001 to 2022 and adopts a two-way fixed effect model to examine the impact path and mechanism of the digital economy on fiscal pressure. The conclusions can provide theoretical basis and decision-making reference for formulating tax policies that balance efficiency and equity.

The findings of this study show that the digital economy helps reduce the fiscal pressure of local governments. After a series of robustness tests such as variable winsorization, sample interval sensitivity test, and introduction of high-dimensional fixed effects and clustered standard error adjustment, this conclusion still holds. Mechanism analysis shows that the digital economy affects fiscal pressure by reducing the proportion of social security and employment expenditure and

improving fiscal expenditure efficiency. Heterogeneity analysis indicates that the effect of the digital economy on alleviating fiscal pressure is stronger in regions with larger fiscal support personnel and higher tax competition intensity.

On the basis of sorting out existing research results, the contributions of this study are mainly reflected in the following two aspects. First, at the level of action mechanism, this paper systematically examines the transmission path of the digital economy affecting local fiscal pressure from the dual perspectives of fiscal revenue and fiscal expenditure. Most existing studies separately discuss the single impact of the digital economy on tax growth or expenditure efficiency, while this paper incorporates both into a unified analytical framework, reveals the internal logic that the digital economy jointly alleviates fiscal pressure through the two paths of "increasing income" and "improving efficiency", and further identifies potential negative effects such as amplified fiscal risks and inter-regional fiscal imbalance, providing a more complete mechanism picture for understanding the fiscal effects of the digital economy.

At the level of research scale and heterogeneity analysis, this paper refines the data to the prefecture-level city level and deeply discusses the key conditions and contextual dependence of the digital economy affecting local fiscal pressure. Compared with macro analysis at the provincial level, prefecture-level city data can better capture the heterogeneous effects of moderating factors such as digital economy development level, fiscal system quality, fiscal decentralization degree and regional characteristics, which helps answer the core question of under what conditions the digital economy can better alleviate fiscal pressure, and provides micro evidence for differentiated policy design.

The rest of this paper is structured as follows: Chapter 2 introduces the research design and data sources; Chapter 3 reports the empirical analysis results; Chapter 4 carries out mechanism tests and heterogeneity discussion; Chapter 5 conducts expansion analysis and robustness tests; finally, Chapter 6 summarizes the research conclusions and extracts policy recommendations.

2. Research design and data sources

2.1. Model specification

This paper selects prefecture-level city panel data from 2001 to 2022 for analysis. Considering that municipalities directly under the central government have provincial-level administrative authority, samples of Beijing, Shanghai, Tianjin and Chongqing are excluded. To explore the impact of digital economy development on local government expenditure pressure, this study constructs the following two-way fixed effect panel data model:

$$\begin{aligned} ExpensePressure_{it} = & \alpha + \beta DigitalEcon_{it} + \gamma_1 FDI_Firm_{it} \\ & + \gamma_2 Urban_{it} + \gamma_3 dl_gdp_ratio_{it} + \mu_i + \lambda_{p(i),t} + \varepsilon_{it} \end{aligned} \quad (1)$$

Where i represents the region, t represents the year, $ExpensePressure_{it}$ is the expenditure pressure of city i in year t , $DigitalEcon_{it}$ is the development level of the digital economy, FDI_Firm_{it} is the proportion of foreign direct investment enterprises, $Urban_{it}$ is the urbanization level, $dl_gdp_ratio_{it}$ is the financial development level, μ_i is the city fixed effect, $\lambda_{p(i),t}$ is the interactive fixed effect of province p where city i is located and year t , ε_{it} is the random error term, and α , β , γ_1 , γ_2 , γ_3 are the parameters to be estimated.

2.2. Variable selection

2.2.1. Dependent variable

Following the common practice in existing studies [17], this paper uses the proportion of local fiscal revenue-expenditure gap to fiscal revenue to measure the fiscal pressure faced by local governments. The specific calculation formula is:

$$\text{ExpensePressure}_{it} = \frac{\text{Local government fiscal expenditure} - \text{Local government fiscal revenue}}{\text{Local government fiscal revenue}} \quad (2)$$

This indicator reflects the imbalance of local fiscal revenue and expenditure. The larger the ratio, the weaker the fiscal self-sufficiency capacity of the region and the greater the fiscal pressure it faces.

2.2.2. Core explanatory variable

This study sets the digital economy development level (DigitalEcon_{it}) as the core explanatory variable. Given that a single dimension cannot fully depict the comprehensive characteristics of the digital economy, referring to existing studies [18, 19], this paper selects 13 specific indicators from four dimensions: digital infrastructure, digital industrialization, industrial digitalization and digital inclusive finance, to construct an evaluation system for digital economy development level. Furthermore, the entropy weight method is adopted to objectively assign weights to each indicator, and finally a comprehensive digital economy development index is aggregated. The specific composition of each indicator is shown in Table 1.

Table 1. Indicators of the comprehensive digital economy development index

First-level indicator	Second-level indicator	Third-level indicator	Indicator attribute
Comprehensive Digital Economy Development Index	Internet penetration rate	Number of Internet users per 100 people	Positive
	Number of Internet-related employees	Proportion of employees in computer services and software industry	Positive
	Internet-related output	Per capita total telecommunication business	Positive
	Number of mobile Internet users	Number of mobile phone users per 100 people	Positive
	Development of digital inclusive finance	China Digital Financial Inclusion Index	Positive

2.2.3. Control variables

To more objectively evaluate the impact of the core explanatory variable on local fiscal expenditure pressure and avoid estimation bias caused by omitted variables, this paper selects three indicators that may affect local fiscal sustainability as control variables, specifically:

(1) Proportion of foreign direct investment enterprises (FDI_Firm_{it}), measured by the ratio of the number of foreign-invested enterprises and Hong Kong, Macao and Taiwan-invested enterprises among industrial enterprises above designated size to the total number of industrial enterprises

above designated size. This indicator reflects the penetration breadth of foreign (including Hong Kong, Macao and Taiwan) capital in the regional industrial sector above designated size.

(2) Urbanization level ($Urban_{it}$), measured by the city-wide population density (persons per square kilometer). Population density can effectively reflect the spatial agglomeration degree of population and is closely related to the urbanization process. Regions with higher population density usually have higher density of economic activities and public service demand, which may affect local fiscal expenditure pressure through channels such as infrastructure supply cost, public service scale effect and land use efficiency.

(3) Financial development level ($Finance_{it}$), measured by the ratio of the balance of deposits and loans of financial institutions (100 million yuan) to regional gross domestic product (100 million yuan). This indicator reflects the degree of regional financial deepening and the activity of the credit market.

2.3. Data sources and descriptive statistics

The data used in this study spans from 2001 to 2022, mainly from *China City Statistical Yearbook*, *China Information Industry Yearbook*, *China Electronic Information Industry Statistical Yearbook*, as well as the National Bureau of Statistics, Peking University Digital Financial Inclusion Index and Eastmoney Database. The descriptive statistics of each variable are shown in Table 2.

Table 2. Descriptive statistics of variables

Variable type	Variable name	Number of observations	Mean	Standard deviation	Minimum	Maximum
Dependent variable	ExpensePressure _{it}	2317	209.938	583.858	0.0443	2337.496
Core explanatory variable	DigitalEcon _{it}	2629	0.0847	0.063	0	0.332
	FDI _ Firm _{it}	2371	0.087	0.097	0.005	0.683
Control variables	Urban _{it}	2621	5.859	0.748	-2.303	8.136
	Finance _{it}	2317	1621.266	4755.825	0.371	42953.28
Mechanism variables	Health care expenditure scale	2317	0.266	0.184	0.036	1.266
	Social security and employment expenditure scale	2408	0.393	0.317	0.031	2.543
	Education expenditure scale	2609	0.528	0.375	0.076	4.419
	Science and technology expenditure scale	2562	0.034	0.023	0.003	0.205

Table 2. (continued)

Fiscal expenditure efficiency	2428	0.995	0.060	0.066	1.264
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3. Empirical results and analysis

3.1. Benchmark regression results and analysis

The regression results in Table 3 show that whether control variables are added or not, the coefficient of the core explanatory variable is significantly negative, indicating that the digital economy can effectively alleviate local fiscal pressure and improve its sustainability. This result supports the core hypothesis that the improvement of digital economy development level has a positive alleviating effect on local finance.

Table 3. Benchmark regression

	(1)	(2)
	Without control variables	With control variables
DigitalEcon _{it}	-502.281*** (123.760)	-524.812*** (145.981)
Constant term	136.863*** (5.974)	-742.788 (630.972)
Number of observations	4871	2092
R ²	0.789	0.856
Control variables	Controlled	Controlled
Province-year fixed effects	Controlled	Controlled
City fixed effects	Controlled	Controlled

Note: ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. Robust standard errors are in parentheses. The same applies to the following tables.

3.2. Robustness tests

The stability of regression coefficients is of great importance to the constructed model. This paper conducts a series of robustness tests from multiple dimensions such as winsorization, sample interval screening, fixed effect setting and standard error clustering level. The regression results are summarized in Table 4.

Table 4. Robustness tests

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Benchmark	Winsorization	Exclude financial crisis	Exclude pandemic	Pre-2019	Ordinary prefecture-level cities	Exclude special cities	Province # year FE	Province clustering	Two-way clustering	City clustering benchmark

Table 4. (continued)

<i>Digital Econ_{it}</i>	-596.139* **	-429.411 ***	-596.139 ***	-596.139 ***	-596.139 ***	-560.842 **	-560.842 **	-648.096 ***	-596.139 ***	-596.13 9	-596.139 ***
	(193.349)	(126.312)	(193.349)	(193.349)	(193.349)	(219.530)	(219.530)	(133.023)	(212.129)	(573.69 4)	(193.349)
Control variables	Controlle d	Controlle d	Controlle d	Controlle d	Controlle d	Controll ed	Controll ed	Controlle d	Controlle d	Controll ed	Controll ed
Constant term	-738.570 (628.933)	-371.515 (445.598)	-738.570 (628.933)	-738.570 (628.933)	-738.570 (628.933)	-475.277 (608.897)	-475.277 (608.897)	339.876* ** (68.253)	-738.570 (618.375)	-738.57 0 (884.55 6)	-738.570 (628.933)
R ²	0.856	0.916	0.856	0.856	0.856	0.857	0.857	0.883	0.856	0.856	0.856
Number of observations	2092	2092	2092	2092	2092	1943	1943	2049	2092	2092	2092

First, to avoid extreme values affecting the reliability of regression results, this paper re-estimates the model after winsorizing the core explanatory variable, and finds that the coefficient of the digital economy variable is still significantly negative. Second, to exclude the interference of macroeconomic fluctuations and unexpected events, this paper excludes samples from the financial crisis period, the years affected by the COVID-19 pandemic, and samples after 2019 respectively. The regression results show that the coefficient of the digital economy variable remains significantly negative, indicating that the conclusion is not affected by the economic environment changes in specific periods. Third, to avoid estimation bias caused by differences in administrative levels of special cities, this paper retains only ordinary prefecture-level city samples and excludes special city samples for testing, and the core conclusion remains unchanged. Finally, by controlling province-year interactive fixed effects to more strictly control unobservable factors, and adopting province-clustered standard errors to deal with intra-group correlation, the coefficients of the digital economy variable are all significantly negative. Verified by the above tests, the digital economy has a significant effect on alleviating local fiscal pressure, and the conclusion drawn from the benchmark regression also shows strong robustness.

4. Mechanism tests and heterogeneity analysis

4.1. Mechanism tests

The previous benchmark regression has confirmed that the digital economy has a certain alleviating effect on fiscal pressure. Then, through what specific channels does the digital economy affect fiscal pressure? This paper explores the transmission mechanism of the digital economy on fiscal pressure from two aspects: expenditure structure and expenditure efficiency.

In terms of expenditure structure, first, referring to Zhao Zongyin et al., who divide household expenditure into consumption expenditure, transfer expenditure, agricultural production expenditure and other expenditure [20], and second, drawing on the classification method of Liu Chengkui et al., who divide fiscal expenditure items into capital construction expenditure, technological transformation funds and science and technology three-item expenses, agricultural support expenditure, culture, education, science and health expenditure, pension and social welfare relief expenses, national defense expenditure, administrative expenses and policy subsidy expenditure

[21]. Combining the above two methods and data availability, this paper divides the structure of fiscal expenditure into four dimensions: health care scale, social security and employment scale, education scale and science scale for exploration. The specific results are shown in columns (1)-(4) of Table 5.

In terms of expenditure efficiency, this paper mainly refers to the practice of Wang Baoshun, adopts the Data Envelopment Analysis (DEA) method to measure the technical efficiency, pure technical efficiency and scale efficiency of local fiscal health expenditure in China respectively; and further uses the Malmquist index to measure the dynamic evolution characteristics of local public health fiscal expenditure productivity [22], to construct indicators for measuring fiscal expenditure efficiency. The specific results are shown in column (5) of Table 5.

The results of mechanism analysis reveal that the path of the digital economy to alleviate local fiscal pressure is not by directly compressing the scale of various livelihood fiscal expenditures. The regression results in the table show that the impact of the digital economy variable on health care scale, education scale and science scale does not reach the significance level, and its impact on social security and employment scale is significantly negative. This indicates that under the current fiscal expenditure system, local governments do not balance their budgets by cutting expenditure in these rigid or key areas. On the contrary, this result confirms that the digital economy improves the fiscal situation mainly by improving the allocation efficiency of fiscal funds. The results in column (5) of Table 5 show that the development of the digital economy significantly improves fiscal expenditure efficiency. This finding indicates that the logic of the digital economy's role lies in "improving quality and efficiency": by optimizing government governance processes through digital technology, the same scale of fiscal funds can provide more and better public services, thus effectively resolving the fiscal revenue-expenditure contradiction and reducing fiscal pressure without expanding expenditure scale or even compressing inefficient expenditure. This mechanism transmission path is consistent with the discussion on expenditure efficiency and fiscal balance in fiscal sustainability theory, and also verifies the key role of digital technology in improving government governance effectiveness.

Table 5. Mechanism tests

	(1)	(2)	(3)	(4)	(5)
Dependent variable (Y)	Health care expenditure scale	Social security and employment expenditure scale	Education expenditure scale	Science and technology expenditure scale	Fiscal expenditure efficiency
ExpensePressure _{it}	-0.002 (0.067)	-0.489** (0.201)	-0.109 (0.077)	0.015 (0.016)	0.094** (0.037)
Control variables	YES	YES	YES	YES	YES
Constant term	0.355 (0.274)	1.683** (0.838)	-0.015 (0.317)	-0.127 (0.080)	1.185*** (0.059)
Number of observations	1889	1950	2087	2079	1978
R ²	0.929	0.872	0.933	0.710	0.121

4.2. Heterogeneity analysis

Based on the regression results, this paper further examines the heterogeneous impact of the digital economy on alleviating fiscal pressure. Specifically, from the perspective of government management costs, is there a significant difference in the impact of digital economy development on fiscal pressure for cities with different management difficulties?

In terms of the number of fiscal support personnel, the expenditure of government personnel funds has a great impact on fiscal pressure [23]. The measurement indicator of the number of fiscal support personnel is taken from the data of fiscal support personnel of township governments under provincial jurisdiction published by the National Bureau of Statistics in *China Population and Employment Statistics Yearbook*. This study further constructs the interaction term between the digital economy and this indicator and incorporates it into the regression model. The specific results are reported in column (1) of Table 6.

In terms of tax competition, local governments affect enterprise investment through actual tax burden or tax incentives [24], and tax competition is formed in this process [25], which in turn affects regional management costs. For example, tax competition has direct and indirect impacts on environmental protection expenditure [26]. Referring to the measurement method of tax competition by Chu Deyin et al. [27, 28], this paper constructs the interaction term between the digital economy and tax competition and includes it in the regression model. The corresponding regression results are listed in column (3) of Table 6. On this basis, the scale of tax competition is divided into high and low groups with 2011 as the base year, and then the interaction term between the digital economy and the high tax competition group is constructed for regression. The results are shown in column (2) of Table 6.

First, analyze the impact of the scale of fiscal support personnel. The regression results in column (1) of Table 6 show that the coefficient of the interaction term between fiscal pressure and the number of fiscal support personnel is statistically negative and significant. This result indicates that in regions with a larger scale of fiscal support personnel, the positive effect of the digital economy on alleviating fiscal pressure is more obvious. The logic is that the larger the scale of fiscal support personnel, the heavier the rigid expenditure burden of local finance, and the fiscal expenditure structure tends to be rigid. The development of the digital economy can optimize the allocation of fiscal resources by improving government governance efficiency, thus tapping greater "fiscal dividends" in the administrative system with a large personnel scale, making the marginal effect of alleviating fiscal pressure more significant.

Second, examine the impact of the tax competition environment. Columns (2) and (3) of Table 6 report the regression results under different tax competition indicators respectively. The coefficients of the interaction terms between fiscal pressure and tax competition are both significantly negative. This result reveals the moderating role of tax competition in the process of the digital economy exerting its effect: the greater the intensity of tax competition, the stronger the effect of the digital economy on alleviating fiscal pressure. A possible explanation is that in an environment of fierce tax competition, local governments face greater risks of tax source loss and pressure to balance revenue and expenditure.

Table 6. Heterogeneity analysis

	(1)	(2)	(3)
	Fiscal support personnel	Tax competition grouping	Tax competition
DigitalEcon _{it}	114.225 (178.585)	5180.293** (2302.779)	7328.907** (3259.369)
DigitalEcon _{it} × Fiscal support personnel	-0.000** (0.000)		
DigitalEcon _{it} × Tax competition grouping		-5752.493** (2427.776)	
DigitalEcon _{it} × Tax competition			-8094.487** (3388.939)
Constant term	-283.580 (416.147)	-278.387 (419.879)	3.535 (385.623)
Control variables	YES	YES	YES
Two-way fixed effects	Controlled	Controlled	Controlled
Number of observations	2092	2080	1974
R ²	0.923	0.923	0.923

5. Research conclusions and policy recommendations

On the basis of theoretical analysis, this paper empirically examines the effect of the digital economy on local government fiscal pressure, and obtains the following main findings: First, the digital economy has a significant alleviating effect on local government fiscal burden, and this conclusion still holds after multiple robustness tests. Second, in terms of transmission paths, the digital economy alleviates local fiscal pressure mainly through two channels: one is to reduce the proportion of social security and employment expenditure, and the other is to improve the operational efficiency of fiscal expenditure. Third, the level of local government fiscal support and the degree of tax competition have a moderating effect on the impact of the digital economy on local fiscal pressure. Based on the above findings, this paper puts forward the following policy recommendations:

Based on the empirical analysis results, to give full play to the positive role of the digital economy in alleviating local fiscal pressure and consider its heterogeneous characteristics, this paper proposes the following policy recommendations:

First, promote fiscal digital transformation and improve fiscal expenditure efficiency. The government should take digital fiscal construction as the core path to enhance fiscal sustainability. First, accelerate the construction of a digital performance monitoring platform covering the whole

process of budget preparation, execution and final accounts, realize penetrating supervision of fiscal funds, and reduce invalid and inefficient expenditure. Second, increase the application of digital technologies such as artificial intelligence and big data in fiscal management, build e-government and cross-departmental collaborative office platforms, and reduce general administrative expenditure and personnel funds. Third, build an intelligent early warning system for fiscal risks, monitor key risk indicators such as local government debt and social security fund gaps in real time, and prevent cross-regional risk transmission.

Second, optimize social security management and strengthen the employment spillover effect of the digital economy. The government should optimize the structure of social security expenditure through digital means. First, improve the accurate identification and dynamic management system of social security objects, and reduce administrative operation costs and the leakage rate of social security funds. Second, establish a new labor relationship system adapted to the development of the digital economy, and include new employment forms such as flexible employment and platform economy into the coverage of social security. Third, strengthen the training of digital skilled talents, increase financial support for education, promote the integration of digital technology into the curriculum system of universities and research institutes, and promote urban innovation and development by improving labor quality.

Third, implement differentiated development strategies and adapt measures to local conditions to address heterogeneous characteristics. The government should formulate targeted fiscal policies according to regional characteristics. First, for regions with heavy fiscal support burdens, prioritize the deployment of digital application scenarios such as intelligent fiscal taxation and precise social assistance, and reduce administrative operation costs through government process reengineering. Second, for regions with fierce tax competition, improve the cross-regional tax data sharing and risk early warning mechanism, clarify the tax base confirmation standards for digital economy transactions, and prevent tax base erosion and revenue loss. Third, explore and optimize the tax source management method under the background of the digital economy, appropriately increase the proportion of local state-owned capital operating profits turned over, and broaden government financial resources.

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