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Fiscal space and government debt sustainability: empirical analysis based on Chinese national debt

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Annotation. Grounded in the intertemporal budget constraint theory, this paper defines 'fiscal space' as a core indicator of debt sustainability and employs a VECM model to analyze China's national debt data from 1994 to 2023. The findings reveal that economic growth is the most critical factor for expanding fiscal space, exerting a rapid and sustained positive effect in both the short and long term. The tax burden and population aging have a limited positive impact on fiscal space but may exert long-term pressure on its growth. The effect of inflation on fiscal space is minor and inconsistent. A mismatch between the fiscal revenue and expenditure significantly hinders the expansion of fiscal space. Fostering the high-quality economic growth, enhancing fiscal revenues, and optimizing the management of fiscal revenues and expenditures are crucial for safeguarding China's government debt sustainability.

Keywords: fiscal space, government debt sustainability, VAR, VECM, China.

JEL classification: H63, H62, C32.

Introduction

In recent years, the global economic landscape has been marked by complexity and volatility. Factors such as frequent geopolitical crises, the rise of trade protectionism, and the sluggish economic recovery following the COVID-19 pandemic have contributed to increased uncertainty in the world economy (Forrest, Liu, Solano, 2024). With the profound changes in the global economic landscape, the role of government debt as an important means of macroeconomic regulation has become increasingly prominent. Against this background, countries around the world have increased their debt issuance to

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cope with the complex economic situation (Kose *et al*., 2021). Does rising government debt year after year affect fiscal sustainability and thus make government debt unsustainable? This question has aroused the concern of many scholars and policymakers.

From the core of fiscal theory, the fundamental basis for government debt sustainability lies in meeting the government's intertemporal budget constraint. This theory posits that the present value of future government surpluses must at least equal its initial debt level to ensure long-term solvency and avoid Ponzi financing. This present-value repayment condition forms the theoretical foundation for fiscal sustainability research. If this constraint holds, it implies an inherent long-term equilibrium relationship among fiscal variables (such as revenue, expenditure, and debt). The Vector Error Correction Model (VECM) serves as the standard econometric tool for testing this long-term cointegration relationship implied by the intertemporal budget constraint. Therefore, the empirical analysis in this paper aims not only to identify factors influencing fiscal space but also, at a deeper theoretical level, to examine whether China's fiscal policy path aligns with the long-term equilibrium required by the intertemporal budget constraint. This result provides empirical support for government debt sustainability grounded in rigorous fiscal theory.

Li and Fang (2021) explore government debt sustainability from the perspective of residents‘ savings and find that residents’ savings affect the fiscal adjustment cost and the government's willingness to pay. Ji *et al*. (2022) point out, based on fiscal rules and policy practices, that the government's debt control needs to focus on the stability of leverage in the medium and long term, optimise fiscal rules, and prevent related risks. Liu *et al*. (2024) demonstrate that the magnitude of tax cuts and fee reductions is negatively correlated with debt sustainability. Tang and Wang (2022) employ the intertemporal budget constraint equation alongside the DEA model to demonstrate that an increase in fiscal expenditures has the most significant effect on local government debt ratios. Meanwhile, Zhu and Wang (2021) provide empirical evidence showing that the impact of population aging on local government debt tends to increase expenditures, thereby significantly elevating the debt-burden ratio. Zhang and Nie (2020) develop a debt sustainability assessment model that combines the characteristics of local governments' fiscal responses, arguing that improved fiscal transparency can effectively enhance debt sustainability. Li and Du (2021) review the literature and cases, highlighting that public risk has become a significant factor in driving the accumulation of public debt and fiscal risk. Scholars have not reached a consensus on the boundary of the debt scale. The government should incorporate multidimensional risk factors into the debt burden ratio, which is the most important factor.

Research has examined government debt sustainability through various lenses, including residents' savings, fiscal regulations, tax reductions, expenditure patterns, population aging, and public risk factors. However, these studies often overlook the core issue. All of these external elements influence 'fiscal space,' which, in turn, affects the sustainability of government debt. Fiscal space refers to the room within which the Government can implement fiscal policy safely and effectively over a certain period, based on its financial strength and the prevailing macroeconomic environment.

Using data from China’s Wind database (1994–2023), we analyze national debt issuance, fiscal revenue, and expenditure. The aim is to analyze the relationship between fiscal space and government debt sustainability. Through empirical analysis, we seek to identify the key factors that influence fiscal space and, consequently, government debt sustainability. This paper aims to examine the key factors that influence fiscal space and to propose coordinated policies that can be implemented to expand fiscal

capacity. The objective is particularly important in light of the accelerating growth rate of government debt worldwide.

In recent decades, China's economy has developed rapidly and has now become the primary driver of global economic growth, making it essential to analyse it. China's government work report in 2024 determined that from that year onwards, for many consecutive years of issuance of ultra-long-term special treasury bonds, the first year first issued 1 trillion yuan; the 2025 government work report is more clear that the total size of the new government debt of 11.86 trillion yuan, an increase of 2.9 trillion yuan over the previous year. China's government debt growth rate has accelerated significantly in recent years, making it a suitable example to analyse.

While a substantial body of literature examines government debt sustainability through the lens of debt-to-GDP ratios or fiscal rules, these approaches often provide a static or limited view of fiscal risk. They capture the stock of debt but fail to account for the government's capacity to service that debt under evolving macroeconomic conditions. Our paper offers a distinct and more nuanced contribution by operationalizing the concept of 'fiscal space', which captures the gap between a government's actual debt and its debt-carrying capacity. This framework, rooted in the 'fiscal fatigue' hypothesis, allows us to move beyond simple debt levels and analyze the dynamic capacity of the government to respond to accumulating debt. Unlike studies that focus on debt thresholds, we explicitly model the determinants of the debt buffer itself, providing a forward-looking assessment of China's fiscal health. By focusing on the determinants of this buffer in China, we address a critical gap left by studies that primarily examine historical debt ratios or static fiscal rules.

Furthermore, contemporary challenges to fiscal sustainability are being shaped by novel factors, including the role of financial technology in risk assessment (Lăzăroiu *et al*., 2023) and the importance of understanding financial predictors for market stability (Kliestik *et al*., 2020), which indirectly influence the fiscal environment. Our study situates China's fiscal trajectory within this broader context of evolving fiscal and financial risks.

The marginal contribution of this paper is that (1) in terms of practical significance, this paper takes the fiscal space as an entry point to explore the maintenance of government debt sustainability through regulating the fiscal space, which provides a new perspective for the study of debt sustainability. (2) In terms of theoretical significance, the research in this paper is both a reflection on the sustainability of fiscal policy in the context of increasing government debt globally and also provides ideas for countries to improve their fiscal policy.

The paper consists of five main parts: the literature review, the factual background and empirical evidence, empirical results, discussion, and finally, conclusions.

1. Literature Review

1.1 The Concept and Measurement of Fiscal Space

The concept of fiscal space has undergone significant evolution since its initial articulation. Heller (2005), in a seminal IMF discussion paper, originally defined fiscal space as “the availability of budgetary room that allows a government to provide resources for a desired purpose without any prejudice to the sustainability of its financial position.” This definition emphasizes the proactive allocation of fiscal resources for developmental objectives while maintaining fiscal stability. Subsequent scholarship has refined this concept. Ostry *et al*. (2010) connected fiscal space to debt sustainability by defining it as the

difference between the current debt level and the debt threshold beyond which fiscal policy becomes unsustainable, introducing the notion of an endogenous debt limit. Ghosh *et al*. (2013) further advanced this framework by identifying "fiscal fatigue"—the phenomenon whereby governments' ability to increase primary balances weakens at very high debt levels—and defining fiscal space as the gap between actual debt and this estimated debt limit.

In the Chinese context, He (2021) systematically measured China's fiscal space from both stock and flow perspectives, finding that while debt space has narrowed with expanded statistical coverage, the debt burden ratio remains only about half the world average for countries at similar development stages. Li *et al*. (2017) incorporated budgetary fiscal reserves as a foundation for analyzing fiscal space, noting early signs of fiscal fatigue in China. More recently, Ruan *et al*. (2023), using a fiscal reaction function approach, estimated that local governments' debt-bearing capacity limit is approximately 1.3 times GDP, while Du *et al*. (2025) demonstrated that local government special bond multipliers are significantly constrained by fiscal space, with a threshold effect at 69.4% of the fund budget.

1.2 Nonlinear Debt Dynamics and Fiscal Sustainability

The relationship between government debt and fiscal sustainability has been increasingly understood as fundamentally nonlinear. Bohn (1998) established that a sufficient condition for governments to satisfy their intertemporal budget constraint is that the primary balance responds positively to lagged debt. However, Mendoza and Ostry (2008) found that emerging markets exhibit stronger fiscal responses than advanced economies when debt ratios are below 50%, converging to lower equilibrium debt levels.

The fiscal fatigue hypothesis advanced by Ghosh *et al*. (2013) provides a crucial theoretical insight: the primary balance responds to debt in a cubic functional form—at low debt levels, the relationship is weak; as debt increases, the primary balance strengthens but eventually weakens and actually decreases at very high debt levels. This nonlinearity explains why financing costs can escalate rapidly from essentially risk-free rates to prohibitively costly levels within a narrow range of debt ratios. Ciaffi *et al*. (2024) extended this analysis by demonstrating that government investment multipliers (averaging around 2) are significantly higher than government consumption multipliers (averaging around 1.5), and that all spending shocks reduce the public debt-to-GDP ratio, with government investment being most effective in promoting debt sustainability.

Heimberger *et al*. (2024) critically assessed the European Commission's Debt Sustainability Analysis framework, showing that assumptions about fiscal multipliers and output gap closure rates significantly affect debt sustainability projections. Their simulations suggest that when more realistic assumptions—a fiscal multiplier of 0.9, five-year output gap closure, and cross-country spillovers—are employed, public debt ratios end up substantially higher than baseline projections.

1.3 Determinants of Fiscal Space: Emerging Perspectives

Population aging affects fiscal space through multiple channels. Yi *et al*. (2021) demonstrate that aging reduces real interest rates, thereby lowering debt service costs and expanding fiscal space. Their simulations suggest demographic factors alone could reduce China's real interest rate by 1.35 percentage points by 2050. Conversely, Huang *et al*. (2025) find that aging reduces fiscal sustainability through three pathways: lowering tax revenues, increasing pension expenditures, and raising healthcare expenditures. Yu (2022), Zhu and Wang (2021) document regional heterogeneity in these effects, with pressures most acute in areas with higher dependency ratios.

Li and Fang (2021) offer a novel perspective by linking household savings to government debt sustainability through what they term "debt tolerance." Their theoretical and empirical analysis reveals that household savings affect fiscal sustainability through two distinct effects: a "level effect" that lowers the threshold for fiscal leverage, and a "vertical effect" that increases fiscal adjustment costs. Critically, they identify a threshold household savings rate of 77.99%, beyond which further savings significantly raise fiscal adjustment costs and may amplify economic inefficiency. This finding helps explain the apparent paradox of high-debt countries like Japan maintaining debt sustainability—high domestic savings, combined with low interest rates, raise debt ceilings and sustain market access.

Recent scholarship has identified digital economic development as a promising pathway for expanding fiscal space. Fu and Mei (2023) demonstrate that digital economy development significantly increases local governments' fiscal environmental expenditure bias through fiscal space expansion, with this effect exhibiting diminishing marginal utility and a threshold of 0.403. Using the "Broadband China" policy as a quasi-natural experiment, Ruan *et al*. (2023) find that digital economy expansion operates through two channels: increasing fiscal revenues (by broadening the tax base and optimizing industrial structure) and enhancing fiscal expenditure efficiency (through improved information flows and fiscal transparency). Deng *et al*. (2021) and Liu *et al*. (2021) confirm these findings, noting significant spatial spillover effects and regional heterogeneity.

Gnangnon (2023) provides important cross-country evidence that productive capacities—defined by UNCTAD as the resources, entrepreneurial capabilities, and production linkages that determine a country's capacity to produce goods and services—significantly reduce fiscal space volatility in developing countries. Conversely, structural economic vulnerability heightens fiscal space volatility, with highly vulnerable countries experiencing a stronger negative effect from productive capacity development. These findings suggest that strengthening productive capacities not only promotes growth but also enhances fiscal resilience, particularly in countries facing greater exposure to external shocks.

Beirne *et al*. (2024) examine the moderating role of political stability and financial development in the climate risk–fiscal space nexus, finding that political stability and financial development significantly mitigate the adverse fiscal impacts of climate vulnerability. Chien *et al*. (2022) demonstrate that external debt exhibits a nonlinear (inverted U-shaped) relationship with economic growth in South Asian economies, with high debt levels constraining fiscal policy effectiveness. Reis (2022) introduces the concept of "debt revenue"—the fiscal revenue generated when government bond yields fall below private capital returns—and shows that this revenue has become a significant factor sustaining high debt levels in advanced economies. This insight has important implications for understanding fiscal sustainability in low-interest-rate environments.

1.4 Fiscal-Monetary Policy Coordination and Fiscal Rules

The interdependence of fiscal and monetary policies fundamentally affects fiscal space. Ren *et al*. (2022), using a New Keynesian DSGE framework, find that forward-looking expenditure rules provide greater policy space than general expenditure rules, and that central bank behavior preferences significantly affect fiscal space availability. As monetary policy shifts from accommodative to a more prudent stance, the policy space advantage of forward-looking rules becomes more pronounced.

Beetsma (2022) provides a comprehensive analysis of EU fiscal rules, highlighting the trade-offs between debt sustainability and economic growth. He emphasizes that the choice of fiscal anchors and the design of escape clauses have profound implications for fiscal space, particularly during crises. The European

Fiscal Board's proposals to simplify fiscal rules and focus on expenditure benchmarks represent important efforts to balance fiscal discipline with policy flexibility.

1.5 Literature Gap and Research Contributions

The preceding review reveals several important research gaps. First, while existing studies examine individual determinants of fiscal space, few provide a unified dynamic analysis of how these factors interact over time. Second, the literature on fiscal fatigue has seen limited application in decomposing the relative contributions of different factors to fiscal space variations. Third, although scholars have identified nonlinear relationships such as the "U-shaped" effect of aging on fiscal space (Gong and Yu, 2015), the Chinese context over our sample period exhibits a steady linear increase in aging pressure without clear evidence of a turning point. Moreover, the tax burden has remained within a relatively stable range. Therefore, a log-linear specification is appropriate for estimating average marginal effects while acknowledging that nonlinearities may emerge over longer horizons. This approach reflects the empirical regularity of the sample period and provides a baseline against which future nonlinear hypotheses can be tested.

This study addresses these gaps by operationalizing the concept of fiscal space as defined by Ghosh *et al*. (2013) and employing a VECM framework to systematically analyze the dynamic relationships between fiscal space and its key determinants, e.g., economic growth, tax burden, inflation, fiscal revenue-expenditure growth mismatch, and population aging, using China's national debt data from 1994 to 2023. By decomposing both long-run cointegration relationships and short-run adjustment dynamics, we provide a comprehensive assessment of the factors sustaining China's fiscal space and government debt sustainability.

1.6 Hypothesis Proposed

Building on the foregoing literature review, we derive four testable hypotheses that guide our empirical analysis. The literature suggests that economic growth (G) is a fundamental driver of fiscal space, as it broadens the tax base and enhances debt-servicing capacity (He, 2021; Ciaffi *et al*., 2024; Du *et al*., 2025). However, the dynamic transmission mechanism—whether the effect is immediate or gradual, and how it interacts with other variables over time—remains underexplored in the Chinese context. Therefore, we propose:

H1: Economic growth can significantly increase fiscal space and improve the sustainability of government debt.

Regarding the tax burden (TAX) and population aging (AGING), the literature presents nuanced findings. While Gong and Yu (2015) propose a 'U-shaped' relationship between aging and fiscal space, the Chinese context over our sample period exhibits a steady linear increase in aging pressure without evidence of a turning point. Similarly, tax increases may raise short-term revenue but potentially suppress long-term economic vitality (Li, Fang, 2021; Huang *et al*., 2025). These considerations lead to our second hypothesis:

H2: While the tax burden and population aging can positively influence fiscal space, their impact is limited.

Inflation (IR) presents a complex case. Aizenman *et al*. (2013) argue that inflation may temporarily increase government revenues through the "inflation tax," but ultimately undermines fiscal sustainability.

More recent evidence (Heimberger *et al.*, 2024) suggests that the effects of fiscal policy shocks depend critically on macroeconomic conditions. Thus, we hypothesize:

H3: The effects of inflation on fiscal space are inconsistent and unpredictable.

Finally, the mismatch between fiscal revenue and expenditure growth rates has been identified as a critical risk factor (Liu, Zhong, 2018; Ruan *et al.*, 2023). The "expenditure rigidity" argument suggests that revenue growth during booms often triggers permanent spending commitments, leading to a long-term squeeze on fiscal space (Li, Fang, 2021). This leads to our final hypothesis:

H4: A discrepancy between the growth rates of fiscal revenues and expenditures can negatively affect fiscal space.

2. Factual Background

2.1 China's National Debt Issuance

The enactment of the Budget Law in the People's Republic of China in 1994 resulted in a prohibition on the treasury overdrawing funds from the central bank to address deficits. Instead, the law mandated the issuance of treasury bonds.

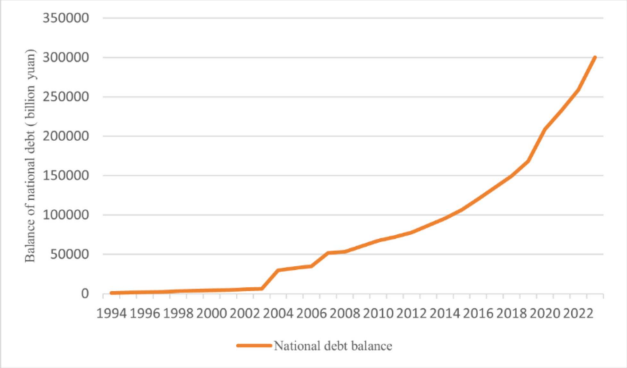

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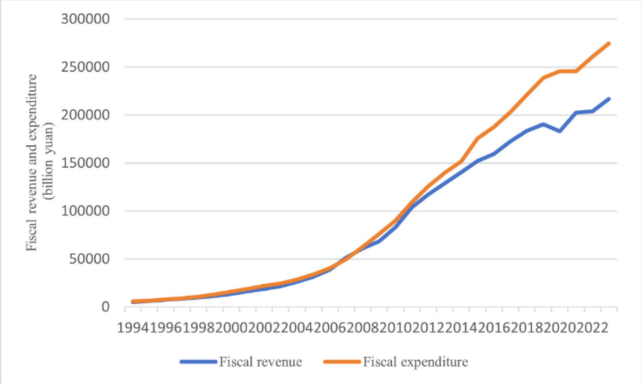
Figure 1. **Balance of China's National Debt (billion yuan)**

Consequently, the balance of treasury bonds began to increase relatively swiftly, although the overall amount remained comparatively low (*Figure 1*). With the emergence of the SARS epidemic in 2003, the government increased its expenditures on healthcare and other essential services. Coupled with the global economic downturn, China maintained a proactive fiscal policy, leading to a significant rise in national debt during the 2003-2004 period. In 2007, the country issued 1.55 trillion yuan in special treasury bonds, resulting in a notable jump in the balance of treasury bonds. Excluding exceptional years, the trend of China's national debt balance was relatively stable yet gradually increasing from 1994 to 2008. However, starting from 2008, the growth rate of the national debt began to accelerate steadily, particularly in 2020 when China issued a special national debt of 1 trillion yuan to address the impacts of the COVID-19 pandemic.

2.2 China's Fiscal Revenue and Expenditure

In 1994, China carried out a reform of the tax-sharing system aimed at regulating the distribution of finances between the central and local authorities. During the initial phase of the reform, there was a notable increase in fiscal revenues; however, this growth rate has not significantly accelerated due to economic restructuring and various other factors. Consequently, from 1994 to 2007, both fiscal revenues and expenditures exhibited a relatively stable growth trend, with their growth rates remaining comparable with differences. In response to the global financial crisis that erupted in 2008, the Chinese government implemented a range of economic stimulus measures, including a RMB 4 trillion investment program. This initiative significantly boosted fiscal spending aimed at stabilizing economic growth, leading to a notable rise in overall fiscal expenditures.

Meanwhile, with China's economic restructuring and the implementation of tax and fee reduction policies, fiscal revenue growth is under some pressure. Since then, the overall growth rate of fiscal expenditures has outpaced that of fiscal revenues. In 2020, the COVID-19 pandemic prompted the government to increase spending on anti-epidemic measures, livelihood support, and fiscal initiatives aimed at economic recovery. However, the epidemic also had a ripple effect on the economy, causing operational difficulties for businesses and negatively impacting fiscal revenues, such as tax receipts. This development, in turn, contributed to a significant expansion of the fiscal balance, reflecting a broader improvement in the overall financial position and stability (*Figure 2*).



Source: created by the authors.

Figure 2. **China's Fiscal Revenue and Expenditure**

From the above analysis, it is evident that China's fiscal balance has been widening since approximately 2008. To offset the fiscal deficit, it has been increasing the issuance of treasury bonds, resulting in a steady rise in the balance of treasury bonds. The gradually widening gap between fiscal revenues and expenditures has continued to eat into the fiscal space, and the steadily increasing balance of the national debt has brought rising pressure on the fiscal debt service.

2.3 Empirical Evidence

Following the conceptual framework of fiscal space established by Ghosh *et al*. (2013), which defines it as the difference between the government's debt limit and its actual debt level, this paper employs the fiscal space index F developed by Liu and Zhong (2018) as its empirical proxy. This index is particularly suitable for the Chinese context as it incorporates key fiscal and macroeconomic drivers (the fiscal

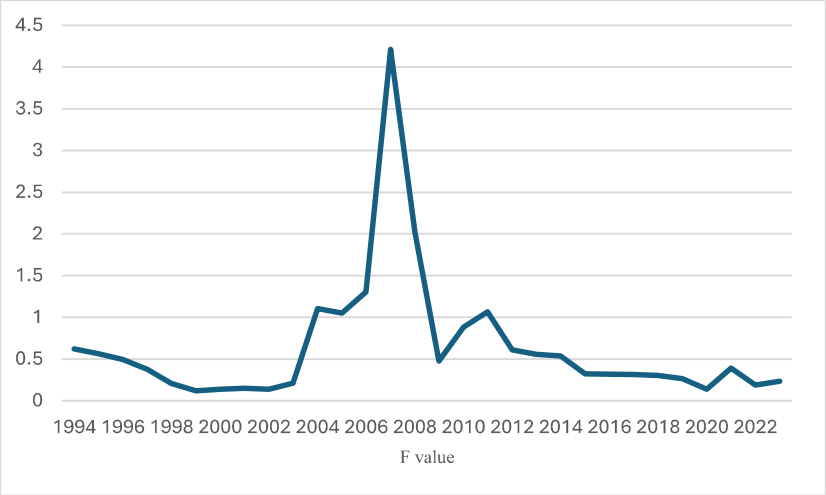
deficit ratio, GDP growth rate, and inflation rate), which align closely with the primary levers of fiscal policy and debt management in China. This index captures the relative looseness of the debt burden under given conditions of economic growth, inflation, and fiscal deficits, thereby aligning with the core notion of a 'debt buffer' inherent in the theoretical definition. Therefore, the fiscal space index is defined as: $F = DEBT_t \cdot (IR_t + G_t)/\ \mathrm{FDR_t}$. $\mathrm{DEBT_t}$ represents the percentage of the national debt balance relative to GDP in year t. $\mathrm{IR_t}$ signifies the inflation rate at time t, and $\mathrm{G_t}$ indicates the GDP growth rate at time t. $\mathrm{FDR_t}$ is the fiscal deficit ratio at time t (the fiscal deficit as a percentage of GDP). This composite index is superior to a simple debt-to-GDP ratio because it adjusts the raw debt burden for the macroeconomic environment that determines its sustainability. A given level of debt provides more fiscal space when the economy is growing rapidly and when inflation erodes the real value of outstanding debt, as these factors enhance the government's future debt-servicing capacity. By incorporating these dynamics, the index offers a more nuanced, forward-looking measure of fiscal health. By substituting the data from China for the years 1994 to 2023, we can calculate the fiscal space for each year. The F value can be classified as follows: a value above 1.5 indicates sufficient fiscal space, a value between 1 and 1.5 signifies adequate fiscal space, a value between 0.5 and 1 reflects insufficient fiscal space, and a value below 0.5 indicates deficient fiscal space. The results of these calculations are presented in *Table 1*.

Table 1. Calculation of China's fiscal space, 1994-2023

year	F	Fiscal space	year	F	Fiscal space
1994	0.620	insufficient	2009	0.477	deficient
1995	0.563	insufficient	2010	0.881	insufficient
1996	0.492	deficient	2011	1.065	adequate
1997	0.374	deficient	2012	0.610	insufficient
1998	0.205	deficient	2013	0.556	insufficient
1999	0.118	deficient	2014	0.537	insufficient
2000	0.135	deficient	2015	0.320	deficient
2001	0.149	deficient	2016	0.318	deficient
2002	0.137	deficient	2017	0.315	deficient
2003	0.211	deficient	2018	0.300	deficient
2004	1.107	adequate	2019	0.266	deficient
2005	1.049	adequate	2020	0.135	deficient
2006	1.305	adequate	2021	0.391	deficient
2007	4.211	sufficient	2022	0.188	deficient
2008	2.019	sufficient	2023	0.233	deficient

Source: created by the authors.

The analysis of *Table 1* and *Figure 3* indicates that China's fiscal space initially declined from 1994 to 2007, followed by a notable increase. This trend reflects the delayed effects of the tax-sharing reform. Following the global financial crisis in 2008, China's four trillion yuan stimulus package led to a significant decline in fiscal space for two consecutive years, before recovery began in 2010. Since 2012, China's economy has entered a phase characterized by a "new normal," with the growth rate shifting away from the high-growth trajectory of previous years. As a result, GDP growth has slowed, and fiscal space has gradually diminished, remaining in a "deficient" state for nine consecutive years since 2015. Consequently, the potential risks associated with public debt continue to accumulate.



Source: created by the authors.

Figure 3. **Changes in Fiscal Space in China, 1994-2023**

The factual context and empirical evidence suggest that the sustainability of government debt is intricately tied to fiscal space. Since 2008, the rapid increase in China's national debt has coincided with a widening fiscal balance and a gradual reduction in fiscal space. Currently, the Chinese government is bolstering the positive aspects of fiscal policy by constraining the growth of government debt. Policymakers must carefully manage this trade-off: tolerating the short-term 'negative effect' of higher fiscal deficits and an expanding debt stock—which manifest as increased debt servicing costs and potential crowding-out of private investment—in order to secure the 'positive effect' of sustained development potential, such as infrastructure-led growth and social stability. This delicate balance is crucial for long-term fiscal sustainability. In leveraging the "negative effect" of a gradual increase in the deficit rate and government debt to enhance the "positive effect" of sustainable development potential, it is essential to manage the exchange between the two carefully. This approach will help ensure that the limits of government debt sustainability are maintained, thereby preventing a sudden deterioration of the fiscal situation into a perilous zone (Li *et al.*, 2017).

3. Empirical Results

3.1 Model Setting and Data Selection

To examine whether the Chinese government satisfies intertemporal budget constraints and analyze the dynamic determinants of fiscal space, this paper constructs a vector autoregressive system. The underlying fiscal theory posits that, as per intertemporal budget constraint (IBC) theory, government fiscal behavior must meet present-value repayment conditions in the long run. This result typically implies a stable long-term cointegration relationship within the system among core variables such as fiscal deficits, debt stock, and economic growth rates. While the VAR model itself imposes no theoretical constraints, its corresponding Vector Error Correction Model (VECM) effectively captures and tests the existence of this long-term equilibrium relationship guaranteed by IBC, while simultaneously isolating the short-term dynamic adjustment mechanism that occurs when variables deviate from equilibrium. Therefore, the VECM framework adopted in this paper is not only suitable for handling non-stationary

time series in econometric terms, but also closely linked to the core proposition of fiscal sustainability in economic theory. This result allows us to simultaneously examine the long-term equilibrium determinants and short-term fluctuation adjustment paths of China's fiscal space within a unified framework.

This paper employs the double logarithmic model for VAR cointegration analysis, which serves as a crucial tool for conducting macroeconomic analysis of complex systems. The cointegration analysis imposes limitations on the number of variables that can be included in a single equation. Introducing all variables at once may result in insufficient observations, rendering the analysis infeasible. Consequently, the model is configured as follows.

$$\ln\ (F)\ _{\mathrm{t}} = \alpha_{\mathrm{t}} + \beta_1 \ln(G)_{\mathrm{t}} + \beta_2 \ln(FRIR)_{\mathrm{t}} + \beta_3 \ln(TAX)_{\mathrm{t}} + \varepsilon_{\mathrm{t}} \quad (1)$$

$$\ln\ (F)\ _{\mathrm{t}} = \alpha_{\mathrm{t}} + \gamma_1 \ln(IR)_{\mathrm{t}} + \gamma_2 \ln(PFEIR)_{\mathrm{t}} + \gamma_3 \ln(AGING)_{\mathrm{t}} + \varepsilon_{\mathrm{t}} \quad (2)$$

Table 2. Description of variables

Nature of the variable	variable symbol	variable name	Measurement indicators
dependent variable	F	Fiscal space	$F = DEBT_t \cdot (IR_t + G_t) / \mathrm{FDR_t}$
independent variable	G	economic growth rate	Real GDP growth rate
independent variable	IR	inflation rate	CPI annual rate of increase
independent variable	FRIR	Fiscal revenue growth rate	Annual increase in fiscal revenues
independent variable	PFEIR	Fiscal expenditure growth rate	Annual increase in fiscal expenditure
independent variable	AGING	Degree of population ageing	The proportion of the population over 65 years of age
independent variable	TAX	tax burden	Total tax revenue/GDP

Source: created by the authors.

Table 3. Descriptive statistical analysis

Statistics	F	G	IR	FRIR	PFEIR	AGING	TAX
mean value	0.643	0.086	0.033	0.142	0.148	0.093	0.151
standard deviation	0.799	0.026	0.052	0.079	0.068	0.027	0.028
minimum value	0.119	0.022	0.014	0.039	0.001	0.062	0.096
maximum values	4.211	0.142	0.241	0.324	0.257	0.154	0.187

Source: created by the authors.

China promulgated the Budget Law and implemented the tax-sharing reform in 1994, which profoundly reshaped the fiscal system. Accordingly, the sample period spans 1994 to 2023. All annual data are sourced from the Wind Economic Database, supplemented by official publications from the National Bureau of Statistics and the Ministry of Finance. All variables are transformed into natural logarithms for econometric analysis. For the inflation rate (IR), which occasionally takes negative values, linear interpolation was applied to address the missing values arising from taking logarithms of negative observations, thereby completing the series. Fiscal revenue and expenditure growth rates (FRIR, PFEIR) are calculated directly from annual fiscal accounts, and the tax burden (TAX) is total tax revenue divided by GDP. Descriptive statistics are reported in *Table 3*.

3.2 Discussion of Endogeneity

While the VAR/VECM framework is effective in capturing the dynamic interactions among multiple endogenous variables, it does not fully address potential endogeneity issues, particularly reverse causality. For instance, economic growth (G) may not only influence fiscal space (F) but also be influenced by changes in fiscal space through government spending and debt policies. Similarly, fiscal revenue growth (FRIR) and expenditure growth (PFEIR) could be jointly determined within the same fiscal system, given fiscal space.

However, the primary objective of this study is not to establish strict causal identification, but to model the system-wide dynamic relationships among fiscal space and its key determinants. The VAR/VECM approach is well-suited for this purpose, as it treats all variables as endogenous and captures their lagged interactions without imposing strong exogeneity assumptions (Sims, 1980). This result enables us to analyse impulse responses and variance decompositions in a multivariate context, which is consistent with our research objectives.

Nevertheless, we acknowledge that the potential presence of endogeneity may affect the precision of the estimated coefficients. Future research could employ instrumental variable (IV) approaches or panel data methods such as GMM to better identify causal effects, especially in cross-country or sub-national analyses.

3.3 ADF Tests

ADF unit root test is essential to conduct on the variables to prevent pseudo-regression issues in the forthcoming econometric analyses. This study initiates a unit root examination of the logarithmic data spanning from 1994 to 2023.

Table 4. ADF test results

variant	*T-value of the statistic*	*threshold value (1%)*	*threshold value (5%)*	*threshold value (10%)*	*P value*	*result*
LnF	*-1.9423*	*-3.6793*	*-2.9678*	*-2.6230*	*0.3093*	*Non-stationary*
DLnF	*-5.5471*	*-3.6892*	*-2.9719*	*-2.6251*	*0.0001*	*stationary*
LnG	*-0.6691*	*-3.6899*	*-2.9719*	*-2.6251*	*0.8388*	*Non-stationary*
DLnG	*-12.6619*	*-3.6892*	*-2.9719*	*-2.6251*	*0.0000*	*stationary*
LnFRIR	*0.7524*	*-3.6999*	*-2.9763*	*-2.6274*	*0.9911*	*Non-stationary*
DLnFRIR	*-7.7874*	*-3.6999*	*-2.9763*	*-2.6274*	*0.0000*	*stationary*
LnTAX	*-3.0098*	*-3.6892*	*-2.9719*	*-2.6251*	*0.0462*	*stationary*
DLnTAX	*-3.0557*	*-3.6892*	*-2.9719*	*-2.6251*	*0.0419*	*stationary*
LnIR	*-2.2492*	*-3.6793*	*-2.9678*	*-2.6230*	*0.1944*	*Non-stationary*
DLnIR	*-4.9023*	*-3.6892*	*-2.9719*	*-2.6151*	*0.0005*	*stationary*
LnPFEIR	*-1.5121*	*-3.6793*	*-2.9678*	*-2.6230*	*0.5134*	*Non-stationary*
DLnPFEIR	*-7.0303*	*-3.6892*	*-2.9719*	*-2.6251*	*0.0000*	*stationary*
LnAGING	*-3.7421*	*-2.6501*	*-1.9534*	*-1.6098*	*0.0006*	*stationary*
DLnAGING	*-4.4788*	*-3.6892*	*-2.9719*	*-2.6251*	*0.0014*	*stationary*

Source: author's own calculations.

From *Table 4,* the original data are non-stationary at the 5% significance level. However, the series becomes stationary at the 5% significance level after applying first-order differencing to the original data, indicating that the series is first-order integrated.

3.4 Determination of the Optimal Lag Order

The results of the ADF test indicate that the data becomes smooth after applying the first-order difference. Next, we will construct the VAR model, beginning with the specification of the optimal lag order. The test results are presented in *Table 5*.

Table 5. Optimal lag order test results for equation (1)

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	*-44.1810*	*NA*	*4.17e-04*	*3.5690*	*3.7609*	*3.6260*
1	*33.0871*	*125.9184*	*4.54e-06*	*-0.9694*	*-0.0095*	*-0.6840*
2	*68.3907*	*47.0714**	*1.19e-06**	*-2.3993*	*-0.6715**	*-1.8856**
3	*85.2841*	*17.5191*	*1.41e-06*	*-2.4655**	*0.0302*	*-1.7234*

Note: * represents the lag order of the selection of the evaluated criteria.

Source: author's own calculations.

Determining the optimal lag order for the VAR model should be approached from a general to a specific perspective, beginning with a larger lag order and assessing it through the corresponding LR, FPE, AIC, SC, and HQ values. Given the intricate dynamic relationships between the fiscal space and each variable, along with the test results, it has been concluded that the optimal lag order for the VAR model, as reflected in equations (1) and (2), is of the 2nd order. Therefore, the VAR(2) model has been established.

3.5 Cointegration Equation

The results of the unit root test indicate that all variables are single-integrated of the same order, which meets the prerequisites for conducting the cointegration test to determine whether a cointegrating relationship exists between the variables (*Table 6*). At the same time, a reasonable lag order is also determined. After determining that the lag order of both VAR models is 2, the next step is to test the cointegration relationship among the variables.

Table 6. Equation (1) trace test

Hypothesized NO of CE(s)	*Eigenvalue*	*Trace Statistic*	*5% Critical Value*	*P Value*
*None**	*0.6502*	*57.9494*	*47.8561*	*0.0043*
At most 1	*0.5048*	*28.5416*	*29.7971*	*0.0692*

Note: * denotes rejection of the original hypothesis at the 5 percent level of significance.

Source: author's own calculations.

The test results indicate that a cointegration relationship exists among the time series LnF, LnG, LnFRIR, and LnTAX, revealing one stable long-run equilibrium cointegration equation among them. Additionally, there is only one cointegration equation identified between LnF, LnIR, LnPFEIR, and LnAGING, which suggests a long-term stable equilibrium relationship.

Therefore, after taking the standardized cointegration vector, the cointegration equation can be derived as:

$$\ln\ (F)\ _{t-1} = 8.2774\ln(G)_{t-1} - 4.1455\ln(FRIR)_{t-1} + 3.0312\ln(TAX)_{t-1} + 16.9221 \quad (3)$$

$$\ln\ (F)\ _{t-1} = 2.1941\ln(IR)_{t-1} - 4.3277\ln(PFEIR)_{t-1} + 4.8403\ln(AGING)_{t-1} + 10.4621 \quad (4)$$

The results of the cointegration equation indicate that the positive coefficients of LnG, LnTAX, and LnIR, as well as LnAGING, are favourable for fueling the growth of LnF in the long run.

3.6 Vector Error Correction Model (VECM)

The core advantage of VECM lies in its ability to capture both the long-run equilibrium relationship of variables and the short-run dynamic adjustment mechanism. By introducing the error correction term, it overcomes the pseudo-regression risk of the traditional VAR's direct regression on non-stationary series, effectively distinguishes between long-term cointegration and short-term fluctuations, and thus reveals the intrinsic laws of the economic system in a more comprehensive way, which is especially suitable for analyzing multivariate time series with a common trend.

Based on the analysis, all variables are first-order monotonic, and a cointegration relationship exists among them. Once the cointegration relationship is established, it is incorporated into the model, allowing the VAR model to be transformed into a VECM. This transformation facilitates the examination of short-term dynamic relationships between the variables. In estimating the model and in line with the cointegration analysis, the optimal lag order is determined to be lag n-1, indicating that a first-order lag is optimal and that there is one cointegration relationship.

Table 7. VECM model for equation (3)

present.	DLnF	DLnFRIR	DLnG	DLnTAX
CointEq1	-0.138137	-0.224132	0.033945	0.002563
	(0.10791)	(0.06683)	(0.04510)	(0.00534)
	[-1.28010]	[-3.35389]	[0.75262]	[0.47992]
DLnF(-1)	-0.051530	0.108599	-0.041483	-0.000590
	(0.25263)	(0.15645)	(0.10559)	(0.01250)
	[-0.20397]	[0.69415]	[-0.39288]	[-0.04716]
DLnFRIR(-1)	0.575320	0.173748	0.057889	-0.020758
	(0.40387)	(0.25011)	(0.16880)	(0.01999)
	[1.42450]	[0.69468]	[0.34294]	[-1.03851]
DLnG(-1)	-0.868021	-2.244285	-0.774011	-0.032782
	(0.58526)	(0.36244)	(0.24462)	(0.02896)
	[-1.48313]	[-6.19211]	[-3.16420]	[-1.13177]
DLnTAX(-1)	0.437909	3.927014	0.704571	0.711792
	(3.24829)	(2.01161)	(1.35765)	(0.16076)
	[0.13481]	[1.95217]	[0.51896]	[4.42768]
C	-0.010403	-0.168884	-0.068437	0.002193
	(0.13615)	(0.08432)	(0.05691)	(0.00674)
	[-0.07641]	[-2.00300]	[-1.20264]	[0.32545]

Source: author's own calculations.

According to *Table 7*, the coefficient of the error correction term of LnF is -0.138137, which indicates that when the short-term LnF is affected by the shocks of other variables that generate short-term fluctuations and lead to deviations, the error correction mechanism will play a positive and negative corrective role in adjusting to the long-term equilibrium state, and its vector error correction model is as follows.

$$\mathrm{Dln}\ (F) = -0.138137\mathrm{ConintEq1} - 0.051530\mathrm{D}\ln(F)_{t-1} - 0.868021D\ln(G)_{t-1} + 0.575320\mathrm{D}\ln(FRIR)_{t-1} + 0.437909D\ln(TAX)_{t-1} - 0.01040 \quad (5)$$

Correspondingly, the VEVM model of equation (4) has an error correction term coefficient of -0.037794 for LnF and its vector error correction model is as follows.

$$\mathrm{DLn}\ (\mathrm{F}) = -0.037794\mathrm{ConintEq1} - 0.035352\mathrm{Dln}\ (\mathrm{F})_{t-1} + 0.050889\mathrm{Dln}(\mathrm{IR})_{t-1} - 0.750710\mathrm{Dln}(\mathrm{PFEIR})_{t-1} + 5.664633\mathrm{Dln}(\mathrm{AGING})_{t-1} - 0.239478 \quad (6)$$

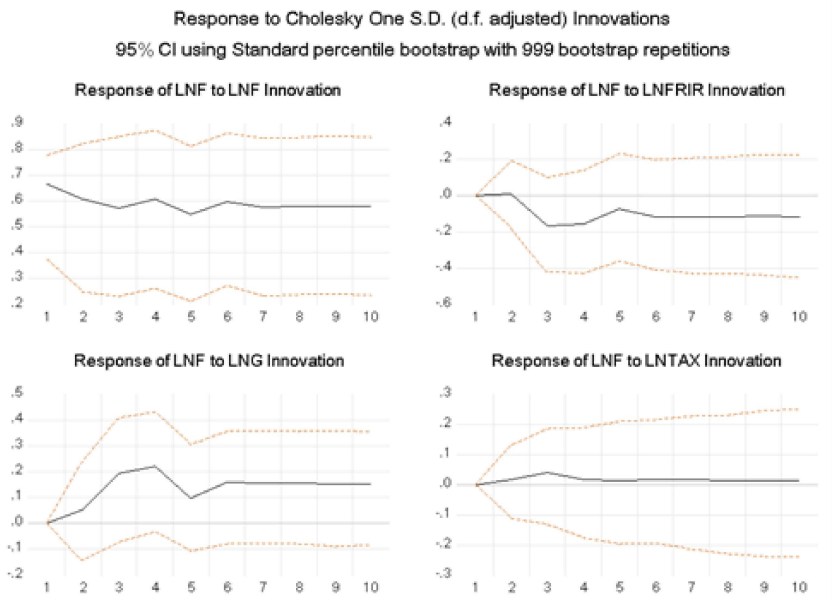
DLnFRIR and DLnTAX have a positive lagged effect on the adjustment of DLnF in the short run; similarly, DLnIR and DLnAGING can be found to have a positive lagged effect on the adjustment of DLnF in the short run.

3.7 Unit Root Tests)

If the Vector Error Correction Model (VECM) is unstable, it can result in inaccurate impulse response functions and variance decomposition in subsequent analyses. Therefore, stability testing of the model is essential. Equations (5) and (6) have undergone unit root tests, with all eigenvalues falling within the unit root interval and satisfying the smoothness criterion.

3.8 Impulse Response

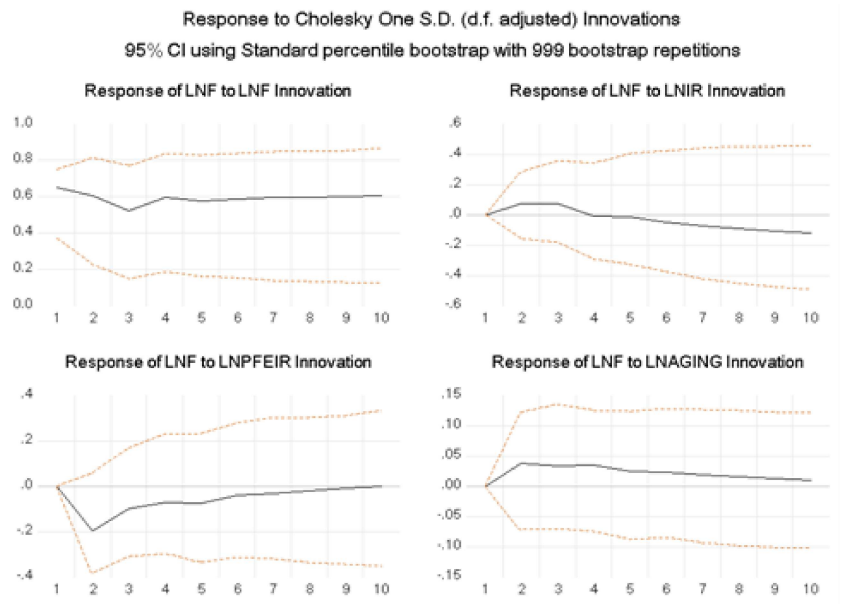
The impulse response function curves of the fiscal space subjected to the shocks of the influencing factors allow for observing the path of the shocks on the fiscal space.



Source: created by the authors.

Figure 4. **Impulse response plot of equation (5)**

As illustrated in *Figure 4*, a shock to fiscal expenditure growth (PFEIR) sharply contracts fiscal space, reaching -0.1977 in the second period, reflecting China's transmission mechanism of expansionary fiscal policy and rising debt pressure. Economic growth (G) yields a rapid and sustained positive effect, peaking at 0.2220 in the fourth period, confirming it as the most fundamental driver of fiscal space. Fiscal revenue growth (FRIR) initially elicits a marginal positive response but turns negative by the third period (-0.1659), reflecting procyclical fiscal behavior: revenue growth during booms encourages even faster expenditure expansion, while rigidity persists during slowdowns. The tax burden (TAX) has a positive but marginal peak effect (0.0387), suggesting limited long-term benefits.



Source: created by the authors.

Figure 5. **Impulse Response Plot of Equation (6)**

As shown in *Figure 5*, inflation (IR) initially increases fiscal space but turns negative from the fourth period onward, consistent with the "inflation tax" theory: short-term gains are eventually outweighed by higher expenditure costs and interest rates. Population aging (AGING) has a positive but marginal peak effect (0.0374), reflecting a temporary consumption structure benefit that is dwarfed by long-term pension and healthcare pressures.

3.9 Variance Decomposition Analysis

Variance decomposition is the study of shock relationships between different vectors by analyzing the contribution of each structural shock to the change in the endogenous variable through the relative variance contribution.

Table 8. Variance decomposition

Period	S.E.	LnF	LnFRIR	LnG	LnTAX
1	0.6659	100.0000	0.0000	0.0000	0.0000
2	0.9028	99.6120	0.0131	0.3374	0.0375
3	1.0992	94.2322	2.2874	3.3313	0.1491
4	1.2846	91.2903	3.1565	5.4255	0.1277
5	1.4025	91.9249	2.9188	5.0422	0.1142
6	1.5372	91.6077	3.0159	5.2694	0.1071
7	1.6537	91.3427	3.1076	5.4481	0.1016
8	1.7635	91.1386	3.1865	5.5787	0.0962
9	1.8662	91.0395	3.2208	5.6484	0.0127
10	1.9635	90.9519	3.2554	5.7052	0.0875

Source: author's own calculations.

Table 8 shows that fiscal space exhibits strong path dependence, with its own inertia still accounting for 90.95% of variation after 10 periods. Economic growth (LnG) contributes about 5.7%, making it the most influential external factor, reaffirming its fundamental role in fiscal sustainability. Fiscal revenue growth (LnFRIR) contributes 3.26% by period 10, reflecting its increasing importance as a direct source of fiscal space. The contributions of both tax burden (LnTAX) and population aging (LnAGING) remain below 0.15%, confirming their negligible impact, consistent with the impulse response results.

3.10 Summary of Key Findings

The key findings in *Table 9* are summarized to provide a clear and concise overview of the empirical results derived from the VECM model, impulse response functions, and variance decomposition analysis. This table synthesizes the long-run cointegration relationships, short-term adjustment mechanisms, and the relative importance of each determinant in explaining variations in fiscal space.

Table 9. Summary of key empirical findings on determinants of fiscal space

Variable	Long-run Cointegration Coefficient.	Short-run VECM Coefficient	Impulse Response Peak (Period)	Variance Decomposition Contribution (Period 10)	
LnG (Economic growth)	+8.2774	–0.8680	+0.2220 (Period 4)	5.71%	Strongly positive, fundamental driver
LnFRIR (Fiscal revenue growth)	–4.1455	+0.5753	–0.1659 (Period 3)	3.26%	Short-run positive, long-run negative
LnTAX (Tax burden)	+3.0312	+0.4379	+0.0387 (Period 2)	<0.15%	Marginally positive, limited effect
LnIR (Inflation rate)	+2.1941	+0.0509	–0.0209 (Period 5)	1.45%	Initially positive, turns negative
LnPFEIR (Fiscal expenditure growth)	–4.3277	–0.7507	–0.1977 (Period 2)	1.76%	Strongly negative, rapid impact
LnAGING (Population aging)	+4.8403	+5.6646	+0.0374 (Period 3)	0.15%	Marginally positive, limited effect

Note: The "+" and "–" signs indicate the direction of the effect. "VECM Coefficient" refers to the lagged first-difference term in the error correction model. "Variance Decomposition" reflects the proportion of forecast error variance in LnF explained by each variable after 10 periods.

Source: author's own calculations.

4. Discussion

First, regarding economic growth (H1), our results unequivocally support H1, identifying economic growth (G) as the most potent and persistent driver of fiscal space, evidenced by the largest long-run coefficient (8.28), a strong positive impulse response (0.22), and a substantial variance decomposition contribution (5.71%). It highlights the crucial role of economic growth in maintaining fiscal health. A growing economy automatically broadens the tax base, boosts government revenues, and enhances debt servicing capacity, thereby creating a larger buffer for fiscal policy maneuvers. This result is consistent with the findings of Yang and Lin (2019) and other scholars, which is why China's economy has long since shifted from high-speed growth to high-quality development, yet still emphasises GDP growth rates.

Although China's economic growth has exhibited diversification at various stages, the overall trend from 1994 to 2023 reveals a high positive correlation between economic growth and fiscal space. During the period of faster economic growth, such as 2003-2007, China's GDP experienced a high rate of growth. During this period, despite the expansion of fiscal expenditures in line with the increase in investment in economic construction and public services, tax revenues increased significantly due to the booming economy. This result solidifies the foundation of finance, as shown in *Figure 3*, which also corresponds to China's fiscal space from 2003 to 2007, demonstrating the growth of successive years. In periods of slower economic growth, such as the years following the 2008 global financial crisis, GDP growth has declined to some extent, and correspondingly, fiscal space has shrunk rapidly.

As shown in Table 1, China's fiscal space has been "deficient" for nine consecutive years from 2015 to 2023. However, government debt has remained sustainable during this period. This outcome underscores a crucial insight: the relationship between economic growth and fiscal space is not solely determined by the growth rate itself, but also by the quality of that growth.

Since 2015, China has transitioned from high-speed to high-quality development, altering how growth translates into fiscal space. Three dimensions of this transition are particularly relevant. First, growth composition has shifted toward sectors with higher fiscal elasticity. The expansion of high-tech manufacturing and digital services has increased the revenue-generating efficiency of each percentage point of GDP growth. Second, productivity gains have become the primary engine of growth, as reflected in rising total factor productivity contributions. Productivity-led growth broadens the tax base without commensurate resource consumption increases. Third, stabilized growth has reduced macroeconomic volatility, enabling more predictable fiscal planning. Consequently, even as nominal growth rates have moderated, the fiscal efficiency of growth has improved.

Our empirical results support this interpretation. The variance decomposition analysis in Section 3.9 shows that economic growth explains approximately 5.7% of fiscal space variation, the largest contribution among all external factors, confirming that growth remains the primary safeguard for debt sustainability. However, the sustained expansion of fiscal space under deficient conditions since 2015 suggests that the composition and quality of growth matter as much as its rate. The continuous improvement of macroeconomic control mechanisms provides the institutional foundation for translating growth into fiscal space, even when headline growth rates are lower than in previous decades.

Second, concerning the tax burden and population aging (H2), while the cointegration equations show positive coefficients for tax burden (TAX) and population aging (AGING), their practical impact is marginal, as confirmed by low impulse response peaks (0.04 each) and negligible variance decomposition shares

(<0.15% for TAX). Thus, H2 is accepted. The positive long-run coefficient for population aging (+4.8403) warrants careful scrutiny. While standard theory emphasizes aging's fiscal pressures through higher pension and healthcare expenditures, our findings suggest a more nuanced reality. The elderly's consumption structure may temporarily support certain tax bases, offsetting some revenue loss from a shrinking workforce. Moreover, aging can reduce real interest rates, thereby lowering debt service costs and expanding fiscal space (Yi *et al.*, 2021). Importantly, the variance decomposition analysis (Section 3.9) reveals that aging's contribution to fiscal space fluctuations is negligible (0.15%), indicating that this positive coefficient captures a statistical association rather than a dominant causal mechanism. Therefore, while the cointegration equation suggests a positive long-run relationship, the actual magnitude of aging's impact on fiscal space is economically negligible. The limited effect of TAX suggests that while tax hikes may raise short-term revenue, they potentially suppress the economic vitality that is crucial for long-term fiscal space. This result diverges slightly from existing studies, such as those by Gong and Yu (2015), who propose a 'U-shaped' relationship between the proportion of the elderly population and fiscal space, identifying a threshold of approximately 1.3 percent of GDP regarding the burden of commodity taxes. Similarly, Lozano-Espitia and Arias-Rodríguez (2021) contend that increasing the tax rates across various categories can enhance fiscal space to differing extents. Nevertheless, some prior research suggests that both the tax burden and population ageing have a minimal impact on fiscal space. In contrast, others suggest that there is a 'U-shaped' reversal or that the impact is unstable, which suggests that the tax burden and the ageing of the population are not the main factors affecting fiscal space.

Therefore, tax increases and population ageing can alleviate fiscal constraints to some extent, but their effects are not substantial. Taxes are one of the main sources of fiscal revenue, and in the short term, tax increases can lead directly to increased fiscal revenue, expanding fiscal space, and enhancing debt-servicing capacity; however, in the long term, tax increases can dampen economic dynamism, which is not conducive to the long-term health of the fiscal space or the stability of debt sustainability. Similarly, although population ageing may be conducive to increased fiscal space under certain conditions due to the increased tax burden on goods for senior citizens, the ensuing burden of old-age pensions will put considerable pressure on the fiscal coffers. In summary, although tax increases and an aging population can provide some additional fiscal space, they may also create long-term pressure on the growth of fiscal space. This phenomenon can lead to concerns about rising government debt, which may ultimately jeopardize debt sustainability.

Third, with respect to inflation (H3), Our results reveal a complex and ultimately unfavorable relationship between inflation and fiscal space, leading to the acceptance of H3. The cointegration equation indicates a significant positive long-run coefficient (2.1941) for inflation (IR). However, this apparent benefit is misleading and short-lived. The impulse response analysis provides a critical insight: an inflation shock induces only a marginal, initially positive response in fiscal space, which turns negative starting from the fourth period. This trajectory suggests that an adverse short-to-medium-term dynamic predominates over the positive long-run association. Consequently, the variance decomposition confirms that inflation's role is negligible, with its contribution remaining minimal throughout the horizon.

This pattern is consistent with the "inflation tax" theory, as discussed by Aizenman *et al*. (2013). In the short term, unanticipated inflation can erode the real value of outstanding government debt and may prompt taxpayers to move into higher nominal tax brackets, thereby increasing government revenues. However, as inflation persists, its detrimental effects become increasingly dominant: it increases the nominal cost of public goods and services, raises the real interest rates required by bondholders to

compensate for inflation risk, and can ultimately suppress real economic activity. Our findings empirically validate this non-linear, time-variant impact within China's context, demonstrating that subsequent costs quickly overturn any initial fiscal gains.

Therefore, inflation constitutes an unreliable and potentially counterproductive lever for expanding fiscal space. From a policy perspective, this underscores the critical importance of maintaining price stability. Relying on inflation to alleviate fiscal pressures would, according to our model, ultimately contract the very fiscal space it is intended to expand, making it a dangerous and unsustainable policy tool.

Finally, regarding the mismatch between fiscal revenue and expenditure growth rates (H4), the empirical evidence strongly supports H4: a mismatch between the growth rates of fiscal revenues and expenditures is a primary impediment to fiscal space. The cointegration equations reveal a detrimental long-run relationship between faster expenditure growth (PFEIR, coefficient: -4.3277) and, perhaps counterintuitively, faster revenue growth (FRIR, coefficient: -4.1455). The VECM and impulse response functions unravel this puzzle by introducing the temporal dimension. While a positive shock to revenue growth (FRIR) offers a brief short-term boost to fiscal space, its effect turns negative over time. Conversely, a shock to expenditure growth (PFEIR) induces an immediate, sharp, and sustained contraction.

This dynamic captures the essence of fiscal procyclicality in China. During economic booms, rapid revenue growth often encourages even faster expansion of expenditure commitments, which become rigid and difficult to curtail during downturns. When economic growth slows, revenue growth falters while these expenditure commitments remain, leading to a severe and persistent squeeze on fiscal space. Our finding—that in most years from 1994 to 2023, the growth rate of fiscal expenditure has outpaced that of revenue—provides the factual backdrop for this mechanism. The variance decomposition, which shows a growing influence of revenue fluctuations over time, further emphasizes that revenue instability becomes an increasingly critical constraint.

This finding reveals a critical nuance: the source and cyclicality of revenue matter as much as its magnitude. In China, rapid revenue growth during booms often creates pressure for parallel expenditure increases that are difficult to reverse—a phenomenon known as expenditure rigidity. Consequently, short-term fiscal windfalls become permanent baseline increases, leading to structural deficits and a secular squeeze on fiscal space. This “boom-time spending ratchet” effect explains the paradoxical negative long-run coefficient for revenue growth and is particularly pronounced in emerging economies (Aizenman *et al.*, 2019).

This result offers a nuanced perspective compared to studies that primarily focus on expenditure control, such as Aizenman *et al*. (2019). While curbing expenditure growth is undoubtedly vital, our analysis reveals that an excessive focus on revenue acceleration without regard to its cyclicality can be equally harmful in the long run. The policy implication is twofold and synergistic. First, it is imperative to break expenditure rigidity by enhancing the efficiency and flexibility of public spending. Second, and equally important, is to prioritize the stability and quality of revenue growth over its sheer speed. It involves cultivating a broad and resilient tax base that is less susceptible to economic cycles, rather than pursuing aggressive short-term revenue collection that may trigger unsustainable expenditure hikes.

Conclusions and Recommendations

Based on the theory of intertemporal budget constraints, this study empirically examines the key determinants of fiscal space and its intrinsic relationship with government debt sustainability by constructing a VECM model and analyzing China's data from 1994 to 2023. The core findings of this research are as follows.

First, economic growth serves as the most fundamental and effective driver for expanding fiscal space. Whether in terms of long-term cointegration or short-term dynamic shocks, the economic growth rate (G) exerts the largest and most persistent positive influence. This result confirms that strengthening the economic foundation remains the primary prerequisite for ensuring fiscal health and debt sustainability.

Second, the mismatch in fiscal revenue and expenditure growth rates poses the primary risk to fiscal space. Research indicates that the growth rate of fiscal expenditures (PFEIR) exerts a significant negative impact on fiscal space both in the short and long term. Meanwhile, the short-term positive effect of the growth rate of fiscal revenues (FRIR) gradually transforms into a negative effect over time. This result reveals the "procyclical" risk inherent in fiscal behavior, and revenue growth often triggers accelerated expenditure expansion, thereby eroding fiscal buffers in the medium to long term.

Third, the expansionary effect of tax burdens and population aging on fiscal space is extremely limited. Although the long-term coefficient is positive, both the peak of its impulse response and its variance decomposition contribution remain at extremely low levels. This result indicates that relying on tax increases to expand fiscal space yields poor results and may suppress economic vitality. Simultaneously, the potential tax revenue generated by population aging falls far short of covering the resulting long-term pressures on pension and healthcare expenditures.

Fourth, inflation is an unreliable and misleading policy tool. Its initially marginal positive effect on fiscal space quickly turns negative, confirming that the gains from the "inflation tax" are fleeting and costly, and cannot serve as a sustainable source of fiscal space.

Policy Recommendations

Based on the above conclusions, we propose a well-structured policy mix that integrates primary and secondary measures, aiming to provide concrete pathways for managing China's fiscal space and ensuring the sustainability of government debt.

Core tools are driving a quality-centered economic growth model. Policy focus should shift from purely stimulating aggregate economic output to cultivating high-quality growth drivers. Specific measures include: vigorously incentivizing technological innovation and industrial upgrading, deepening investment in human capital, and developing and expanding modern service industries. It aims to establish a more resilient economic structure with a broad tax base, thereby steadily expanding fiscal space at its roots rather than relying on debt-driven, extensive growth.

Key coordination mechanism can establish a rigid expenditure constraint system linked to revenue growth. To fundamentally address the mismatch between revenue and expenditure growth rates, as a primary risk to fiscal space identified in our study. We recommend implementing a medium-term fiscal framework reform. This framework should mandate that the nominal growth rate of fiscal expenditures must not exceed that of fiscal revenues over the medium term. This institutional arrangement is designed

to curb excessive spending impulses during economic booms, break expenditure rigidity, and force fiscal resources toward more efficient sectors.

In taxation, the policy focus should shift from increasing the overall tax burden to optimizing the tax structure and enhancing collection efficiency. It involves gradually reducing distortionary taxes, expanding stable tax bases such as consumption taxes and property taxes, and leveraging digital technology to combat tax evasion and avoidance, thereby achieving "improved revenue quality under a stable tax burden." In addressing population aging, we must confront the long-term fiscal risks it entails. Efforts should be accelerated to advance the national pooling and market-oriented operation of pension funds, while exploring the establishment of a sustainable, multi-tiered healthcare security system for the elderly. This proactive approach will help manage contingent liabilities in the future and prevent sudden shocks to fiscal capacity.

Maintaining a stable price environment. Given the uncertainty and ultimate harm of inflationary effects, monetary policy must steadfastly prioritize price stability as its core objective. Any short-sighted notion of alleviating fiscal pressures by tolerating higher inflation must be discarded.

Research Limitations and Future Directions

This study has several limitations that point to directions for future research. First, despite covering 30 years of data, the sample period remains insufficient for time series analysis, which may affect the precision of the estimation results. Second, while the VAR/VECM framework employed here effectively captures dynamic interactions among variables, it struggles to fully overcome endogeneity issues, such as the possible bidirectional causal relationship between economic growth and fiscal space. Future research could explore suitable instrumental variables or employ panel data methods like GMM to identify causal effects more precisely.Third, this study focuses exclusively on China's explicit national government debt, excluding the substantial implicit liabilities that constitute a significant component of China's overall fiscal risk. In particular, the debt of Local Government Financing Vehicles (LGFVs), which has accumulated rapidly over the past decade and is often referred to as "hidden debt," represents a material contingent liability for the central government. The exclusion of such off-budget liabilities may lead to an underestimation of China's true fiscal pressure and an overestimation of its actual fiscal space. Future research should construct a more comprehensive measure of fiscal space that incorporates these subnational and off-budget liabilities by consolidating data from local government financing platforms, tracking implicit guarantees, and employing panel data methods at the provincial level to capture regional heterogeneity. Building upon this study, we will also conduct comparative analyses at the cross-country or inter-provincial level to examine the universality and specificity of fiscal space determinants.

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ĮMONIŲ VALDYMAS (CG) IR APLINKOSAUGOS ATSKAITOMYBĖ (ER): KINIJOS FINANSŲ IR NEFINANSINIO SEKTORIAUS DUOMENŲ ANALIZĖ

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Santrauka. Remiantis biudžeto apribojimų tarp laikotarpių teorija, šiame straipsnyje fiskalinė erdvė laikoma pagrindiniu skolos tvarumo rodikliu, o Kinijos valstybės skolos duomenys 1994–2023 m. analizuojami taikant VECM modelį. Tyrimo rezultatai atskleidė, kad ekonomikos augimas yra svarbiausias fiskalinės erdvės plėtros veiksnys, kuris teigiamai veikia tiek trumpuoju, tiek ilguoju laikotarpiu. Mokesčių našta ir gyventojų senėjimas fiskalinę erdvę veikia ribotai teigiamai, tačiau gali daryti ilgalaikį spaudimą jos augimui. Infliacijos poveikis fiskalinei erdvei yra nedidelis ir nenuoseklus. Fiskalinių pajamų ir išlaidų augimo tempų neatitikimas labai trukdo fiskalinės erdvės plėtrai. Tyrime daroma išvada, kad norint užtikrinti Kinijos valstybės skolos tvarumą būtina skatinti kokybišką ekonomikos augimą, didinti fiskalines pajamas ir optimizuoti fiskalinių pajamų ir išlaidų valdymą.

Reikšminiai žodžiai: fiskalinė erdvė; valstybės skolos tvarumas; VAR; VECM; Kinija.