



LOCAL GOVERNMENT DEBT DYNAMICS IN CHINA

An Exploration Through the Lens of Local Government
Debt and LGFV Debt

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LIST OF ABBREVIATIONS

CBRC	China Banking Regulatory Commission
CCP	Chinese Communist Party
LGB	Local Government Bond
LGFV	Local Government Financing Vehicle
PBOC	People's Bank of China
TIC	Trust and Investment Companies
WMP	Wealth Management Products

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1. INTRODUCTION

China's local debt has been a subject of concern for the central government and to international financial institutions, starting with the IMF. In the IMF's 2022 appraisal of China's economy, IMF staff warned that "A structural tax revenue deficit has incentivized local government to adopt opaque, off-budget financing mechanisms to cover expenditures, leading to high government debt" (IMF, 2022). We concur with the IMF's view that off-budget financing through local government financing vehicles (LGFVs) continued with only a moderate degree of slowing after the 2015 "front-door policy." This report adds to the growing literature on Chinese local debt by pointing out the growing risks that this rapidly rising debt poses to China's growth and financial stability (Reinhart & Rogoff, 2009). Specifically, we analyze local debt from the perspective of debt servicing growth and debt servicing relative to local fiscal resources over time.

Using a specially curated dataset of bonds issued since 1997, our research draws upon data from multiple sources to provide a deep understanding of the outstanding local debt, both official local government debt and debt issued by LGFVs. Although our analysis does not include LGFV bank loans and shadow financing, solely aggregating the debt tied to bond issuance reveals a dramatic rise in total local debt since 2010, reaching a staggering 50 trillion yuan in 2023, reflecting nearly a 20-fold increase over the past decade. If one were to include LGFV bank borrowing and shadow credit, total local government debt likely would be in the 90 to 110 trillion RMB range, or between 75 and 91% of China's GDP in 2022. Across China's provinces, 12 of them now have local government debt over 50% of provincial GDP as measured by bonds outstanding. In just 2017, only three provinces had such high levels of debt. Only two provincial units, Shanghai and Guangdong, had local debt below 25% of GDP by the end of 2022.

Because this debt requires constant servicing in the form of interest payments and repayment of principal, debt servicing likely has placed increasingly difficult constraints on the local and even the central budget. By the end of 2022, monthly debt servicing has surpassed 100% of monthly fiscal income for 12 of China's 31 provincial units. Repayment demand has further accelerated in 2023.

Our analysis of the dynamics of debt service reveals significant variation in repayment obligations faced by provinces, with challenging situations often necessitating measures such as expenditure cuts or new bond issuance. The debt service coverage ratio, a critical metric comparing debt service to provincial

revenue, indicates a concerning trend of skyrocketing growth rates to levels exceeding 100% since 2021. Achieving a coverage ratio below one would require either a dramatic rise in local revenue and/or a substantial increase in central transfers financed by central deficits. This report aims to provide a partial but dynamic analysis of China's local debt landscape, shedding light on the patterns, trends, and implications of local government bonds and LGFV debt. By delving into the data on outstanding debt, debt service, and its impact on provincial finances, we present a dynamic and geographically comprehensive picture of China's local debt situation and suggest measures the central government and provinces may need to consider to navigate this complex landscape.

2. THE HISTORY OF LOCAL DEBT IN CHINA

Throughout much of the history of the People's Republic of China, local governments did not have the authority to borrow money themselves. The Chinese Communist Party (CCP) was afraid of a repeat of the debt-fueled inflation in the late-Republican Era and strictly limited both domestic and international debt levels carefully (Shih, 2008). Into the late 1980s, however, the government experimented with more decentralized financing and flexible forms of financing in trust and investment companies. Unlike the centrally owned state banks, which took in deposits and lent money mainly to state-owned enterprises, trust and investment companies (TICs) owned by local governments or enterprises helped local governments and firms raise funds from both domestic and overseas investors. However, TIC leveraging rose rapidly as domestic investors looked for a way to obtain higher yields, causing a wave of defaults in the mid-1990s. After a brief pause, local revenue shortages and the incentives for local officials to promote investment caused the rebirth of these firms as LGFVs. As subsidiaries of the local authorities, LGFVs presented land owned by local authorities as collateral to banks and other investors. On the basis of the land collateral, at times valued in an arbitrary manner, LGFVs borrowed huge sums to finance municipal infrastructure. Panic in late 2008 over the severity of the export contraction led Beijing formally to endorse a surge in LGFV creation and borrowing (Shih, 2019).

The surge of borrowing by LGFVs since late 2008 led to the rapid accumulation of local debt to the tune of 11.4 trillion RMB by the end of 2009, roughly 33% of China's GDP at the time (Shih, 2010). Trillions more accumulated in subsequent years, even after the global financial crisis had ended.

By 2012, LGFV debt was estimated at 37% of China's GDP. To combat this issue, the Hu-Wen leadership explored solutions, but debt continued to grow. In 2012, the new administration ordered a comprehensive audit, revealing over 18 trillion RMB in local debt by mid-2013 (Shih, 2019).

Initially, the China Banking Regulatory Commission (CBRC) attempted to curb the issue, restricting LGFVs from leveraging through trust products and wealth management products (WMPs). These financial channels, rife with complexities and involving household creditors, significantly exacerbated risks in the financial system. However, the CBRC's efforts encountered a formidable challenge: the intense political pressure on local governments to invest and sustain economic growth. Faced with this dilemma, the Ministry of Finance devised a strategic maneuver: the concept of "opening the front door, closing the back door." Under this approach, high-yield trust and WMP debts were transformed into lower-yield municipal bonds, backed by the guarantee of the central government. This tactical shift represented a delicate balancing act, aiming to assuage financial risks while accommodating the demands of local political interests.

Despite lowering interest payments and cash flow pressure, this approach didn't reduce the overall debt size. To ensure buyers for the torrents of newly issued official local government bonds, the Ministry of Finance implemented a strategy of financial repression, compelling banks to purchase official local government bonds through "designated allotments" (Shih, 2019). In 2015, amid stock market turmoil, the government expanded the debt exchange program, and by 2016, municipal debt outstanding increased significantly. Although the program was successful, it coincided with declining reserve money due to foreign exchange outflows, compelling the People's Bank of China (PBOC) to ensure new liquidity by lending to banks and repeatedly lowering reserve requirement ratios. By 2018, a desperate central government required every province to submit an "implicit debt resolution plan" which outlined both an amount of debt reduction as well as specific mechanisms for reducing local governments' implicit debt (Chen, 2019). Although local cadres were held accountable for achieving the debt reduction targets, they also quickly found ways around them, such as using funds borrowed by newly formed LGFVs to repay maturing government or LGFV debt (Chen, 2019).

Somewhat surprisingly even to us, however, we find that the only impact of the "front door" policy and various debt reduction schemes has been the slow-down of the growth of LGFV debt. Overall local debt level, as expressed only by bonds outstanding, still grew at a rapid pace in subsequent years to 55 trillion RMB by the middle of 2023. In essence, the front door opened with the introduction of official local government bonds, but the side door of LGFV debt never closed.

3. DATA

Our comprehensive dataset consists of 70,912 bonds. Upon closer examination, we discover that 55,325 of these bonds are specifically issued by local governments. These bonds originate from 7,794 distinct issuing entities and span the period from 1997 to the present day. To curate this dataset, we combined LGFV bond data from WIND, a mainland-based data service provider, with official data from China's bond market, chinabonds.com. The data include the issuance and maturity dates, the coupon rates, the interest calculation methods, the interest payment cycle times, the codes, and the names of issuers.

Through human tagging and Natural Language Processing methods, we created two relevant classifications of bonds: official local government bonds (*zhengfu*) and LGFV bonds issued by state-owned corporate entities which engage in some form of infrastructure investment and land reclamation. One should note that infrastructure companies here include firms engaging in the construction and operation of industrial parks, science and technology parks and "cities," and ecological and tourism parks and areas. Our classification resulted in 43,277 LGFV bonds and 12,048 local government bonds. The data from the Chinabond website is comprehensive, and utilizing its granularity enables us to calculate precisely the amount of debt service and interest payments across time and provinces. We also can do so without resorting to assumptions about debt growth rates and ratios between LGFV and official government issuance. As granular as this database is, we do not have information on non-bond debt of LGFVs, which, by some estimates, had reached some 40 trillion RMB by 2014 (Bai et al., 2016).¹ Even assuming a very modest growth rate of 4%, bank and trust loans to LGFVs should have reached 60 trillion by 2023. Another research team in China based in Peking University estimates non-bond LGFV debt were around 40 trillion RMB at the end of 2022 (Xia & Ding, 2023).

Although this figure is slightly lower than the figures implied by Bai et al (2016), it still puts general government debt in China at close to 100% of GDP. In 2023, an IMF team also provided a figure of general government debt of roughly 80% of GDP in 2019 (Lam & Moreno Badia, 2023). General government debt according to this trajectory also likely has surpassed 100% of GDP by the end of 2023. The analysis below refers only to bond related debt servicing, but the real debt servicing burden

1. This 40 trillion figure takes the total estimate of LGFV debt by Bai et al, which is based on bank credit to LGFVs in the forms of loans and bonds, and subtracting from it the LGFV bonds outstanding at that time, which was roughly 8 trillion RMB.

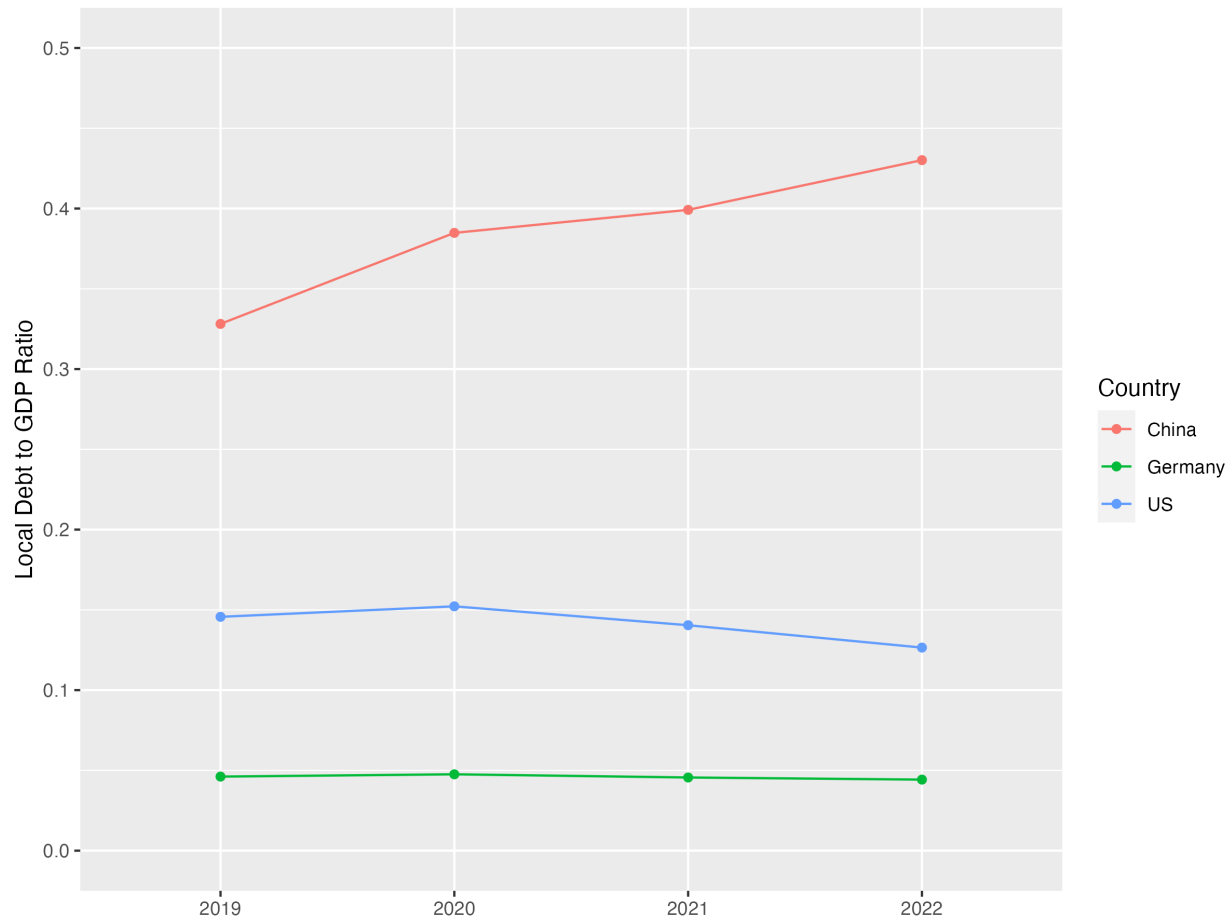


Figure 1: Local Debt to GDP Ratio by Country (2019-2022)

of local governments likely is twice as much as our estimates. Still, we believe that our analysis based only on bond data provides a good reflection of the direction of debt level and debt servicing. We obtain macro data such as provincial expenditure and revenue and central government transfers to the provinces from CEIC.

4. OUTSTANDING DEBT

We begin our analysis with an examination of accumulated debt at the local government level as reflected by bonds outstanding. Total debt outstanding is defined by the sum of all official local government bonds (LGBs) and LGFV bonds not yet matured at a given point in time. As depicted in Figure 2, total local debt has experienced a significant surge since 2010. Until 2015, the majority of the debt was issued by LGFVs. After the beginning of the 2015 “front door” policy, local governments began to issue debt directly, taking advantage of lower costs due to reduced risks for investors. By 2016, the outstanding LGBs surpassed that of LGFV bonds, and while LGFV bond issuance remained relatively stable, the issuance of local government bonds accelerated. It is important to note that the graph

beyond May 2023 displays estimated debt that includes only bonds that have already been issued, not accounting for possible future debt issuance. As of 2023, the outstanding debt has exceeded 50 trillion yuan, marking a nearly 20-fold increase over the past decade and reaching 41% of China's 2022 GDP.

Figure 2 shows clearly that despite the “front door” policy, LGFV debt continued to grow after 2015,

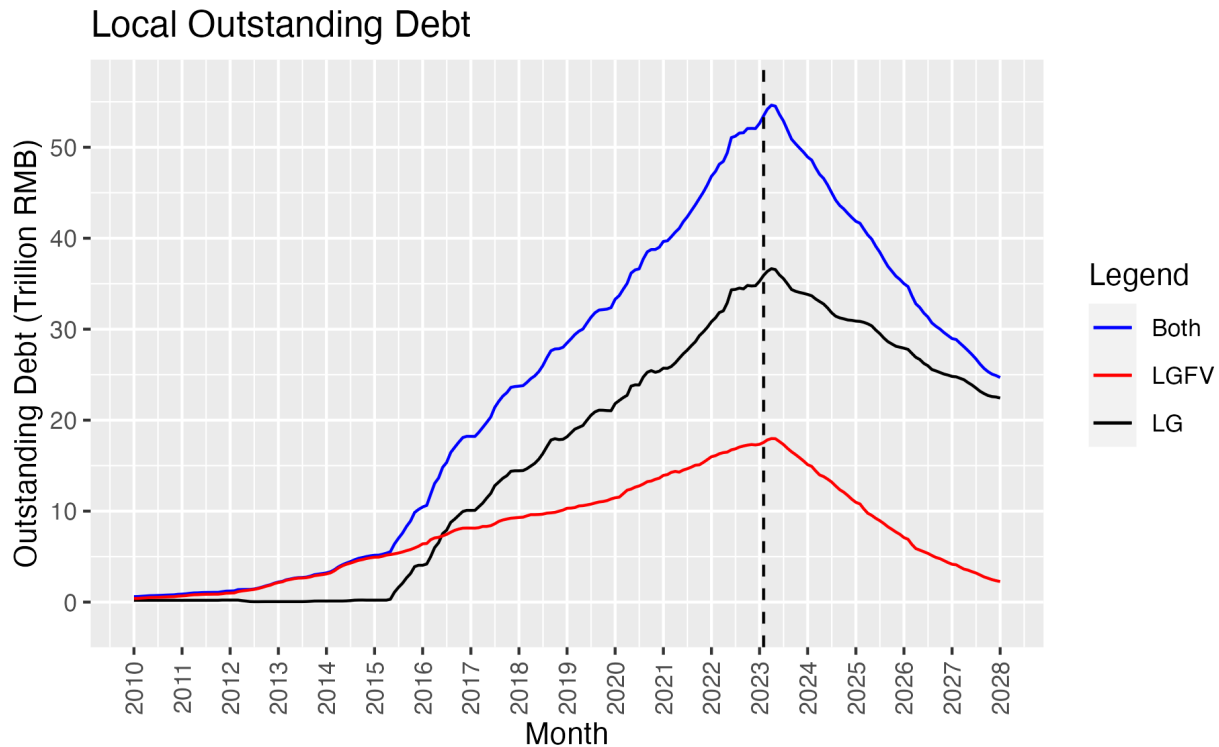


Figure 2: Aggregate Local Outstanding Debt

albeit at a slower pace than the growth of LGBs outstanding. In a sense, the “front door” policy has not worked as designed. This pattern suggests that future policy to “replace” (*huanzhi*) LGFV debt with LGBs likely will have limited effectiveness. Weak revenue sources and escalating expenditure needs from both central and local policy initiatives likely produced this outcome. Unless these parameters change, LGFV debt likely will continue to increase.

Comparatively, Chinese local debt is much higher than local/municipal debt in both the U.S. and Germany, which had local debt equivalent to 15% and 5% of GDP, respectively, in 2022 (see Figure 1). To be sure, central debt in China still compares favorably with most advanced and developing countries. Yet, combined with Bai et al’s (Bai et al., 2016) estimates of non-bond local debt in 2015, total local debt in China likely is around 80% of GDP or more, which combined with over 20% in central government

debt, puts Chinese general government debt over 100% of GDP (Bai et al., 2016). As one can see in Figure 1, the growth rate of Chinese local government debt as a share of GDP also is much faster than that of the US or Germany since 2019. As a recent IMF paper shows, such rapid growth in local debt erodes the overall financial balance sheet of the entire Chinese government. According to estimates by Lam et al, escalating local government debt had already eroded the net financial assets of the entire Chinese government to less than 10% of GDP by 2019 (Lam & Moreno Badia, 2023). The rapid growth in local debt we document in this paper, in combination with stagnant valuation in land and financial assets in recent years, likely brought net financial assets much closer to zero between 2019 and 2023.

Table 1: Outstanding Debt by Province

Description of Colors: Green represents a level of outstanding debt to GDP ratio below 25%, Blue represents a level of outstanding debt to GDP ratio between 25% and 50%, and Purple represents a level of outstanding debt to GDP ratio above 50%.

Province	2017		2022	
	Outstanding Debt Billion RMB	Outstanding Debt to GDP	Outstanding Debt Billion RMB	Outstanding Debt to GDP
Qinghai	153	62.04%	316	87.59%
Guizhou	1064	78.21%	1665	82.55%
Tianjin	727	58.43%	1329	81.49%
Jilin	372	34.11%	804	61.48%
Gansu	271	36.88%	681	60.81%
Chongqing	868	43.23%	1751	60.11%
Jiangxi	653	32.31%	1873	58.39%
Zhejiang	1603	30.58%	4370	56.23%
Hunan	1420	41.96%	2709	55.66%
Xinjiang	451	40.40%	955	53.82%
Sichuan	1210	31.91%	2992	52.72%
Hainan	145	32.23%	355	52.08%
Heilongjiang	402	32.66%	780	49.06%
Yunnan	685	37.06%	1364	47.10%
Guangxi	551	30.96%	1215	46.19%
Anhui	889	29.95%	2063	45.80%
Jiangsu	2856	33.26%	5527	44.98%
Hubei	935	25.12%	2285	42.53%
Ningxia	123	38.52%	212	41.83%
Hebei	679	22.16%	1766	41.69%
Shandong	1400	22.21%	3620	41.40%
Inner Mongolia	655	43.99%	956	41.27%
Shaanxi	674	31.38%	1342	40.93%
Liaoning	1000	46.11%	1169	40.36%
Tibet	8	6.06%	79	36.85%
Henan	793	17.68%	1973	32.16%
Fujian	737	21.78%	1693	31.88%
Beijing	483	16.17%	1264	30.39%
Shanxi	318	21.97%	751	29.30%
Shanghai	567	17.23%	1111	24.88%
Guangdong	1000	10.91%	3087	23.91%

Looking at changes in local debt at the provincial level, the picture is equally alarming. In Table 1, we compare absolute debt level and debt level as a share of provincial GDP at the end of 2017 and the end of 2022. In 2017, only three provincial units (Qinghai, Guizhou and Tianjin) had debt levels, as calculated in LG and LGFV bonds outstanding, above 50% of provincial GDP. By the end of 2022, 12 provinces had debt level above 50% of provincial GDP. For these provinces, which include some economic heavyweights like Zhejiang, Tianjin, and Sichuan, it would be difficult for the combination of local revenue, central transfers, and net land sales to make a meaningful dent in debt reduction. Concurrently, the number of provinces with manageable debt level of less than 25% of GDP reduced from 10 to just three. This was a dramatic deterioration in the space of just five years. As the analysis below suggests, however, even for these low debt and high income regions — regions like Beijing, Shanghai, and Guangdong — debt burdens and debt servicing also affect their economies in important ways.

The pace of debt increase in a significant number of provinces is astonishing. In both lower income provinces like Jilin and high income provinces like Zhejiang, their LG and LGFV debt level doubled or more than doubled in five years. In fact, for the vast majority of provinces, debt level doubled in the space of five years. To be sure, the COVID pandemic led to higher government debt level across much of the world, but in the U.S., for example, federal debt increased by roughly 50% in the same period. Only two provinces managed to reduce their local debt as a share of GDP between 2017 and 2022: Inner Mongolia and Liaoning. In the former case, this was due to fiscal windfalls from elevated commodities prices which presumably boosted local revenue. Liaoning, however, was able to control the growth of expenditures and debt for reasons we can only speculate at this point. In contrast, Zhejiang, which had a dynamic, technology-driven economy, saw its debt double in absolute terms and increase from 31% to 61% of provincial GDP in the space of 5 years. This pace of increase is puzzling for a place like Zhejiang which presumably did not need infrastructure investment to generate growth.

Given that LGFV issuance continued to expand after 2015, we examine the composition of LGFV issuance amount over time to understand the types of LGFVs driving debt increase in recent years. We first hand label 500 LGFV issuance based on the names of issuing entities into general municipal and utilities entities, industrial and technology zones/parks, land bank or housing corporations, tourism or ecology related parks/ zones, transportation related investment, and other. We employed a transformer-based classifier, specifically the “Chinese RoBERTa-Base Models for Text Classification” (Zhao et al., 2023), which underwent training on a Chinese newspaper corpus. Employing the conventional 80/20 partitioning for training and testing datasets, we proceeded to train the model on

the residual LGFV names. The resultant classification yielded an F1 score of 0.8525, attesting to its commendable accuracy. It is noteworthy, however, that a significant proportion of misclassifications were categorization of many LGFV instances as “other.” To solve this issue, a manual review of the “other” labels was conducted, leading to subsequent reclassification. To be sure, this is not a perfect categorization, since most LGFVs have some land collateral held on their balance sheets, but spot checking the full issuance documents of some entities with “land” or “housing” in their names reveals that they constitute a separate category which primarily engages in land banking or the construction of social or commercial housing. Figure 3 shows that general municipal and utilities LGFVs have been the biggest driver of LGFV debt rise in recent years, followed by technology and industrial zones and transportation LGFVs. This is not surprising. In 2012, the vast majority of issuance was conducted by general LGFVs, and much of their debt needed to be rolled over by new issuance in subsequent years. Thus, their debt would naturally grow from the initial baseline, and new municipal projects that needed to be financed by LGFV debt issuance only added to the natural increase from rollovers. As industrial parks and transportation issuance become significant, these entities will also need to roll over maturing debt in the future, thus accelerating the growth of LGFV debt in these categories.

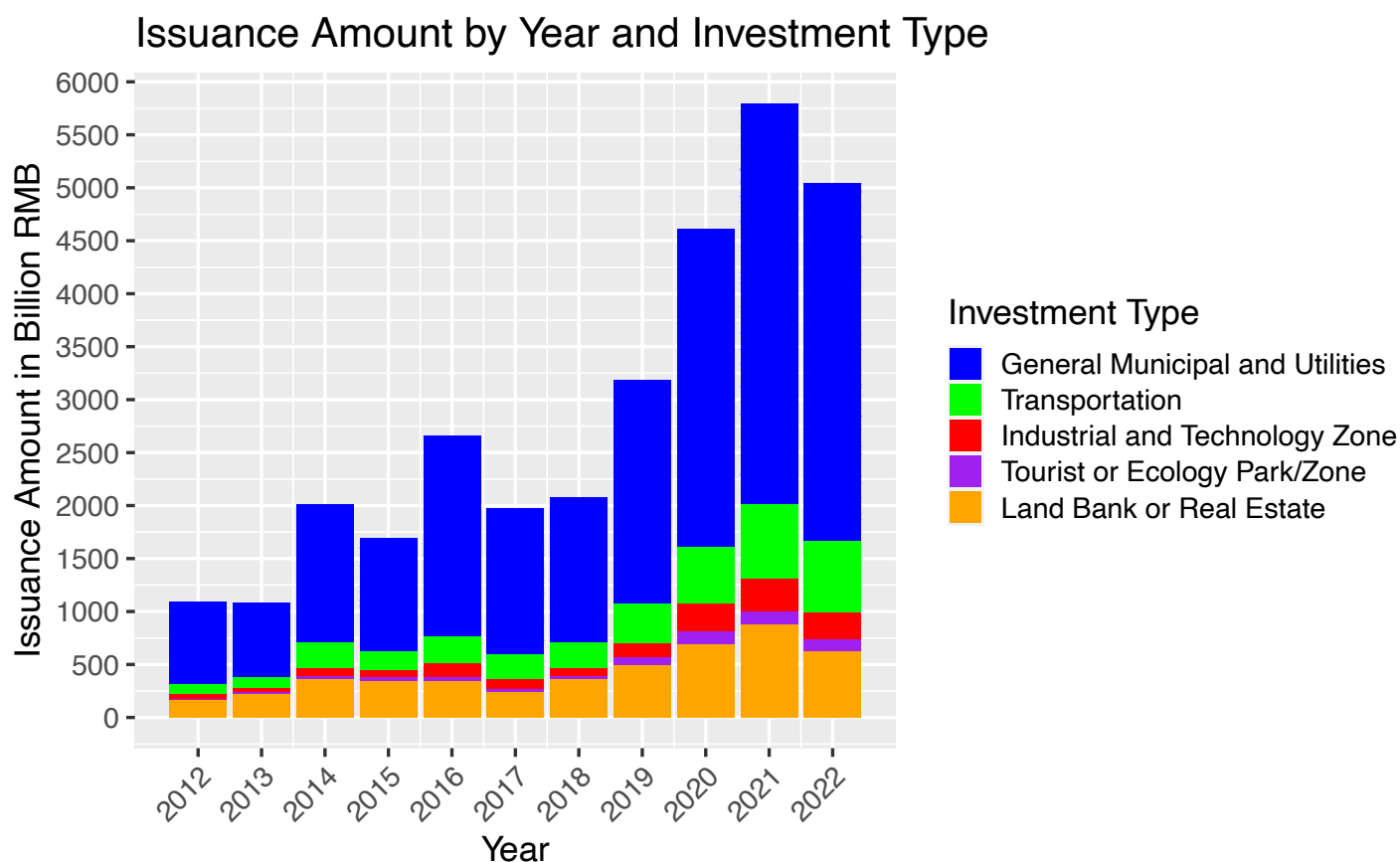


Figure 3: Issuance Amount by Year and Investment Type

5. DEBT SERVICE

In order to assess how debt translates to fiscal pressure for local governments, we calculate debt servicing for each province by combining the coupon payments and bond maturity each month from all the bonds in our database. As shown in Figure 4, which aggregates monthly debt servicing across provinces, monthly debt servicing varies significantly. This is due to factors such as lower issuance during certain periods, such as the month of the Spring Festival in China, and fiscal cycles. Consequently, provinces at times must generate a substantial amount of cash to repay bonds that mature in busy months. In 2023, for example, localities will need to pay over 1 trillion RMB per month for several months, surpassing their monthly revenue. Also, Figure 4 shows that, over time, the monthly debt servicing burden has become heavy even during trough months. In 2018, for example, the Lunar New Year month required only 150 billion RMB in debt servicing for all local governments and LGFVs in China. However, by the Spring Festival of 2023, monthly debt servicing had reached nearly 400 billion RMB. Many economists in China also note that payments during trough months, which mainly represent interest payments on outstanding debt, have become a major strain to the overall budget (Xia & Ding, 2023). Thus, even over the holiday season, central and local officials must stay vigilant to ensure that new debt is issued to repay maturing debt and to service interest payments.

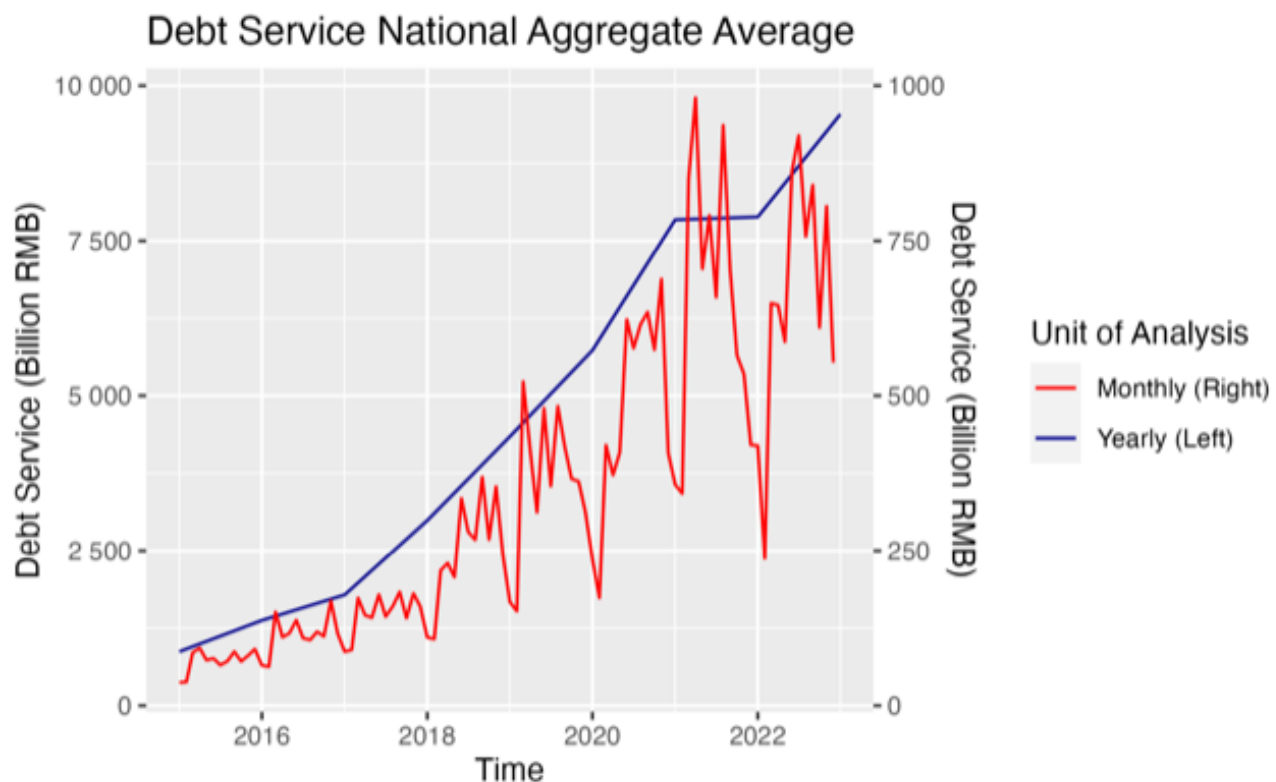


Figure 4: Aggregate Debt Service

To gain a deeper understanding of debt servicing dynamics, we also examine debt servicing at the provincial level. Figure 5 illustrates the debt service of three of the wealthiest provinces in China – Zhejiang, Guangdong, and Shanghai – compared to the national average. The graph demonstrates significant variations in debt service even among these provinces. While Shanghai demonstrates modest level of debt servicing, consistently below the national average, Guangdong and especially Zhejiang exhibit extremely high debt servicing levels. Both provinces will have to pay approximately 100 billion RMB in a single month in 2023, roughly three times the national average. Even in 2019, monthly debt servicing in Zhejiang hovered around 30 billion, even in the peak months. By 2023, the peak month payments for Zhejiang reached close to 100 billion RMB, an over threefold increase in the space of four years. Similarly for Guangdong, monthly debt servicing rose from around 15 billion during peak months in 2019 to a peak debt servicing of 90 billion in late 2023. Even with the shock of COVID and economic downturns related to the lockdown policy, such spectacular increases in debt and debt servicing are difficult to explain.

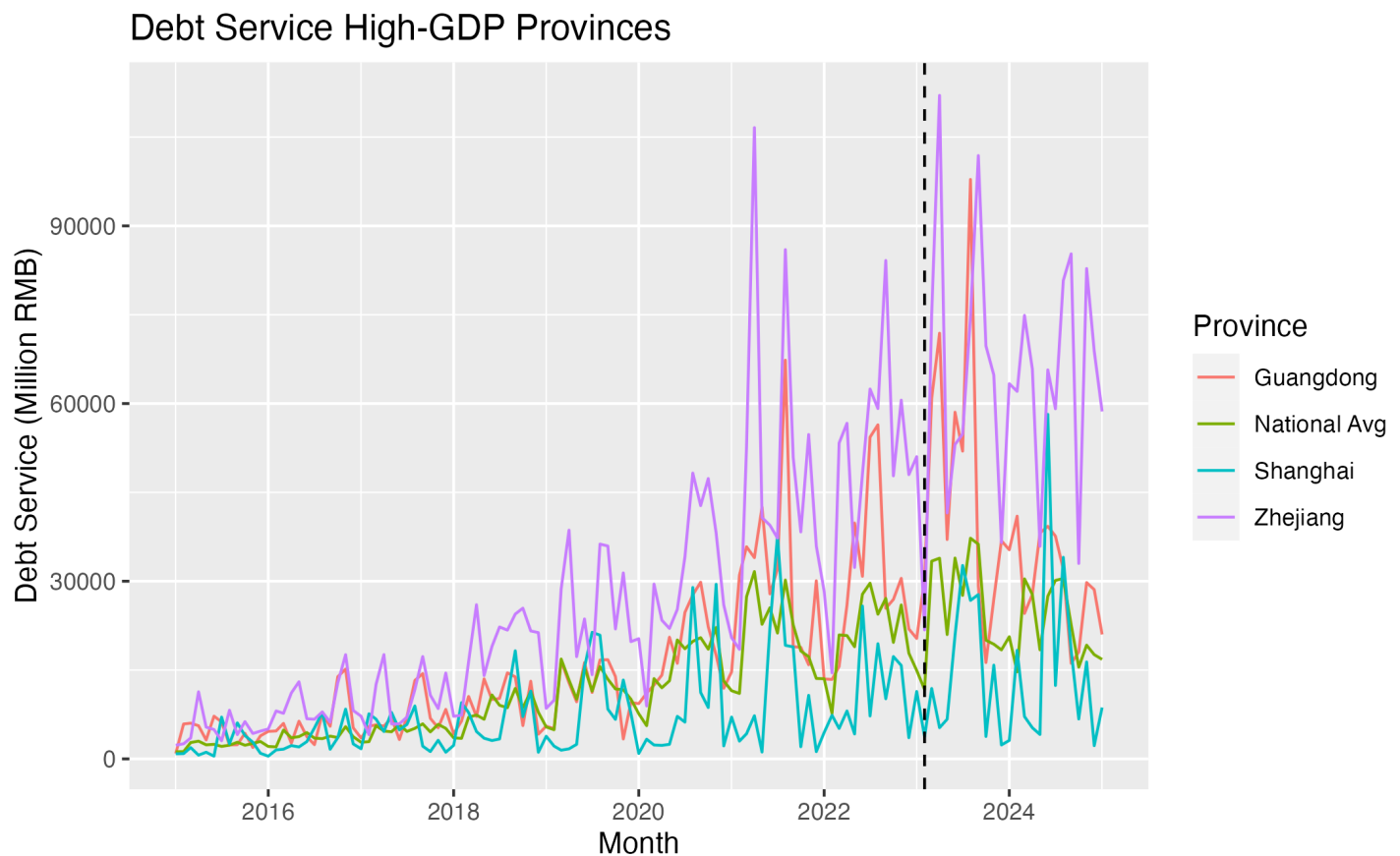


Figure 5: Debt Service High-GDP Provinces

As expected, the situation is also dire in some poorer provinces, as depicted in Figure 6. While Ningxia and Qinghai, with their smaller economies, had lower debt servicing in absolute terms, Guizhou province has accumulated a substantial debt burden, resulting in a debt service payment of 60 billion RMB in one month – twice the national average. As we will see in subsequent analysis, this 60 billion RMB monthly payment is severalfold that of Guizhou’s own tax revenue.

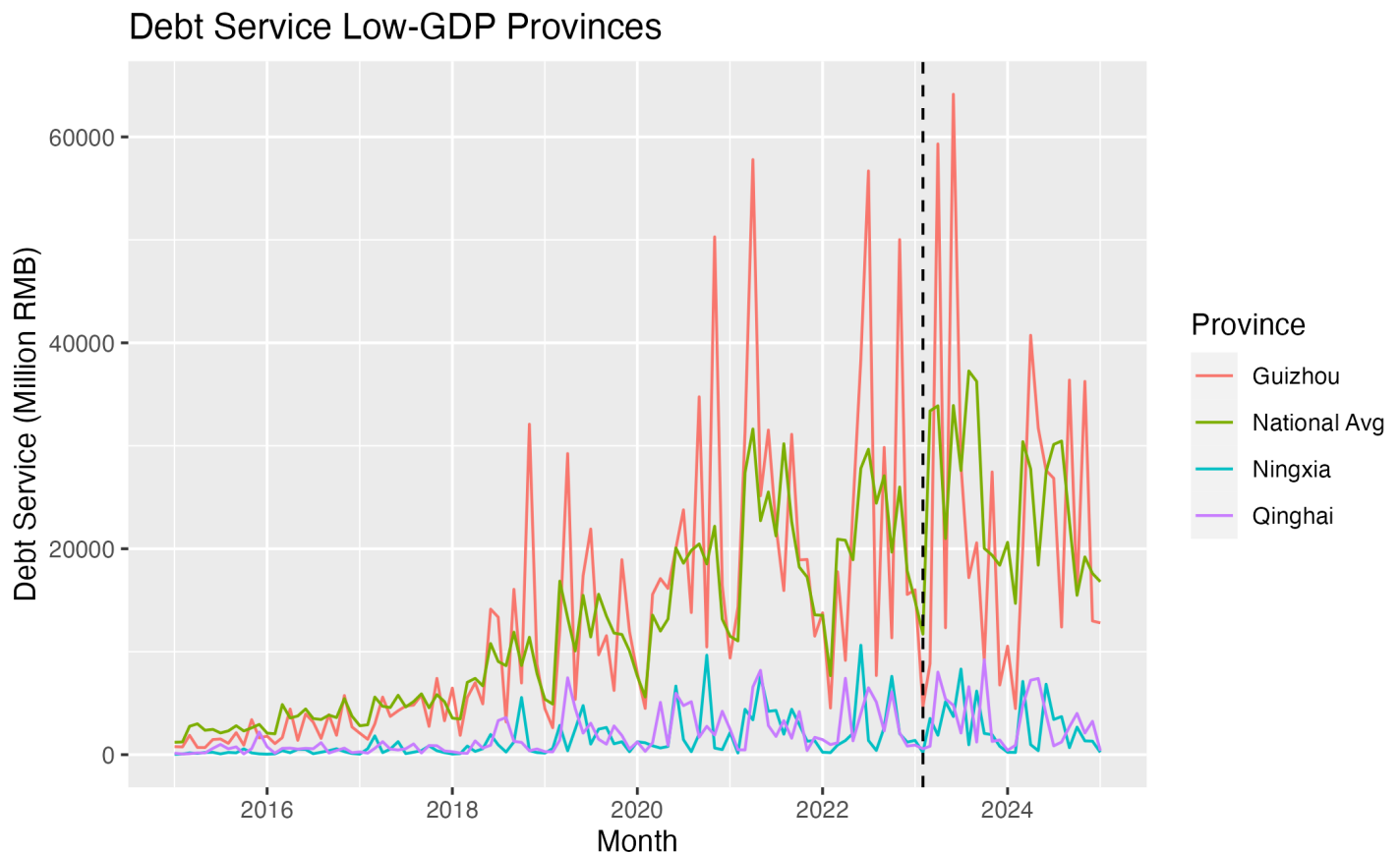


Figure 6: Debt Service Low-GDP Provinces

Table 2 presents two static pictures for all provincial units in 2017 and 2022. For both time periods, we calculate the average monthly debt servicing for that year across all provinces. We then compare that average to the average monthly fiscal income of the province. Table 2 shows that some provinces saw spectacular increase in average monthly debt servicing between 2017 and 2022. Tianjin, for example, saw a 367% increase in debt servicing in this period, while Jilin saw a 648% increase in average monthly debt servicing. Even in provinces with relatively low debt such as Inner Mongolia and Guangdong, average monthly debt servicing still grew by at least 300% between 2017 and 2022. Shanghai alone saw average monthly debt servicing grew by a little over 100% between 2017 and 2022.

Table 2: Debt Service and Debt Coverage Ratio by Province: 2017 and 2022

Description of Colors: Green represents a level of Debt Coverage Ratio below 50%, Blue represents a level of Debt Coverage Ratio between 50% and 100%, and Purple represents a level of Debt Coverage Ratio above 100%.

Province	2017		2022	
	Debt Service Monthly Average Million RMB	Debt Service Coverage Ratio Monthly Average	Debt Service Monthly Average Million RMB	Debt Service Coverage Ratio Monthly Average
Tianjin	7730	40.15%	28430	199.53%
Jilin	1566	15.57%	10160	187.73%
Guizhou	4076	31.95%	23238	175.63%
Qinghai	601	29.56%	3279	167.18%
Jiangsu	26140	41.07%	111005	165.27%
Hunan	8689	40.19%	35755	146.50%
Chongqing	6409	35.07%	22769	144.22%
Guangxi	3474	25.31%	15137	128.33%
Yunnan	3311	22.14%	20728	127.60%
Jiangxi	4644	26.19%	25511	111.91%
Gansu	2212	34.01%	7771	106.68%
Hubei	5712	21.43%	25247	106.01%
Sichuan	7723	27.06%	36238	99.72%
Tibet	21	1.45%	998	96.67%
Zhejiang	10256	22.95%	49613	95.83%
Anhui	6369	27.75%	26015	90.54%
Liaoning	4284	22.12%	16533	87.68%
Heilongjiang	2001	20.32%	7983	84.58%
Fujian	5025	22.67%	19280	77.39%
Xinjiang	2441	20.09%	11971	76.65%
Shandong	6685	13.81%	38915	73.86%
Henan	4208	14.71%	24324	72.70%
Ningxia	554	14.91%	2563	67.47%
Shaanxi	4834	32.78%	16482	65.79%
Hainan	432	9.02%	3388	64.16%
Inner Mongolia	3213	27.42%	12358	57.90%
Hebei	3127	11.30%	17149	57.06%
Beijing	3766	10.22%	16840	39.33%
Shanxi	2257	14.47%	8396	29.67%
Guangdong	7142	8.37%	29554	29.36%
Shanghai	4647	9.00%	10712	20.39%

6. FISCAL RESOURCES RELATIVE TO DEBT SERVICING

To gauge the strain that debt servicing might be placing on the provincial budget, we examine the debt service coverage ratio, which compares monthly debt servicing to provincial revenue. The higher debt servicing is compared to a province's own fiscal resources, the more it will need central aid or new bond issuance to roll over the maturing debt and interest payments. This implies less "coverage" of the debt repayments. To be sure, a province's own revenue is almost never the totality of a province's fiscal resources — this has been the case since the centralization of the fiscal system in 1994 (Wong,

1997). Unlike other works, we calculate debt coverage ratio in this way due both to our data limitations – we lack monthly land sales and transfer data at the provincial level – and also because provincial revenue is the only category of income that is not otherwise encumbered by debt increase or expenses. Increasingly, Chinese sources consider provincial debt issuance as a “fiscal resource,” but debt issuance obviously increases repayment pressure down the road. Central transfers are partly paid for by central debt issuance and thus are no longer unencumbered. The other source of provincial fiscal resource, “fund” income from land sales, is often zero or even negative after netting out “fund expenditures” (*zhengfu jijin zhichu*) associated with the costs of preparing land banks.

As shown in Figure 7, local debt service in China has surged from less than 10% of income to over 100% in some months after 2021. For some months in 2023, monthly debt repayment across all provinces reached 125% of total monthly revenue. While accurate calculation requires precise income data for previous periods, we also created a projection based on a moving average of aggregate revenue increase. This projection reveals that even if Chinese localities were to cease issuing bonds at

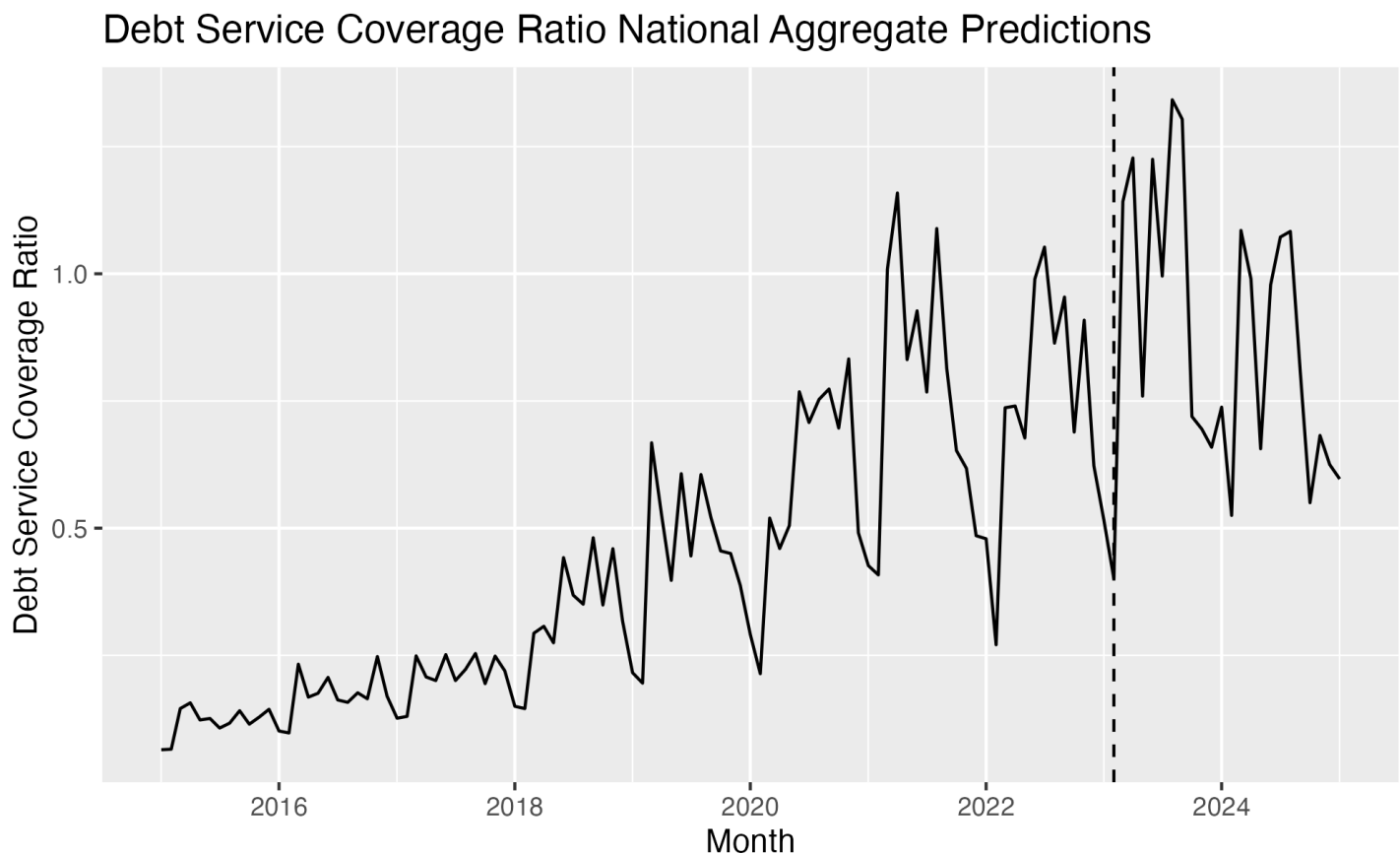


Figure 7: Aggregate Debt Service Coverage Ratio

present, it would take years for the coverage ratio to fall below 100% due to the continuing need to service outstanding papers. More likely, new local debt would see monthly debt repayment rise toward 150% or even 200% of monthly local revenue. In other words, the refinancing needs of local debt are becoming increasingly acute given slow growth in local revenue, central transfers, and land sales.

Revisiting Table 2, which reports average debt coverage ratio of provinces in 2017 and 2022, a dire picture also emerges. First, every province in China had coverage ratio of less than 50% in 2017, i.e. average monthly debt servicing was less than 50% of average revenue. Although not ideal, especially for places like Tianjin, Hunan, and Jiangsu, provinces generally could pay for their own expenses and repay maturing debt with their own revenue, the typical amount of central transfers, and perhaps just a modest amount of new debt issuance. By 2022, however, 12 provinces had average debt repayment greater than 100% of average monthly revenue, which meant that, beyond central transfers, a healthy amount of debt issuance or borrowing is likely needed to repay maturing debt and interest payments. This likely is also true for the 15 provinces which had average debt repayment between 50 and 100% of monthly revenue in 2022. Only Beijing, Shanghai, Guangdong, and resource-rich Shanxi still had debt repayment below 50% of provincial revenue by 2022.

For some of the most heavily indebted provincial units, their debt coverage ratios also deteriorated very rapidly between 2017 and 2022. Tianjin, for example, saw its coverage ratio worsen from 40% to close to 200% in five years, a fivefold increase. Jilin saw its repayment to revenue ratio rise from just 15% to 187%, a 12-and-a-half-fold increase. Guizhou saw a close to sixfold increase in its repayment to revenue ratio. Tibet, which hardly had any debt repayments in 2017 because of its historical reliance on central budgetary transfers, suddenly increased its debt tenfold to close to 80 billion RMB by 2022, which required a 47-fold increase in average monthly debt repayment. This in turn required the issuance of even more debt to prevent defaults. This pattern more or less repeats itself in a less extreme fashion across many of China's provinces. In addition to provinces borrowing more, the worsening coverage ratio also reflects the fact that the central government had not increased fiscal transfers to keep pace with increase in local fiscal needs, including both expenditures and debt repayments. Instead, the central government allowed localities to issue more debt, both official debt and LGFV debt, to pay for ordinary expenditures and debt servicing.

Examining some individual provinces with lower income levels in Figure 8, Qinghai, Guizhou, and Ningxia all experienced debt servicing equivalent to 200-450% of their revenue in certain months. In 2022, both Guizhou and Ningxia had a debt service requirement that was four times their revenue.

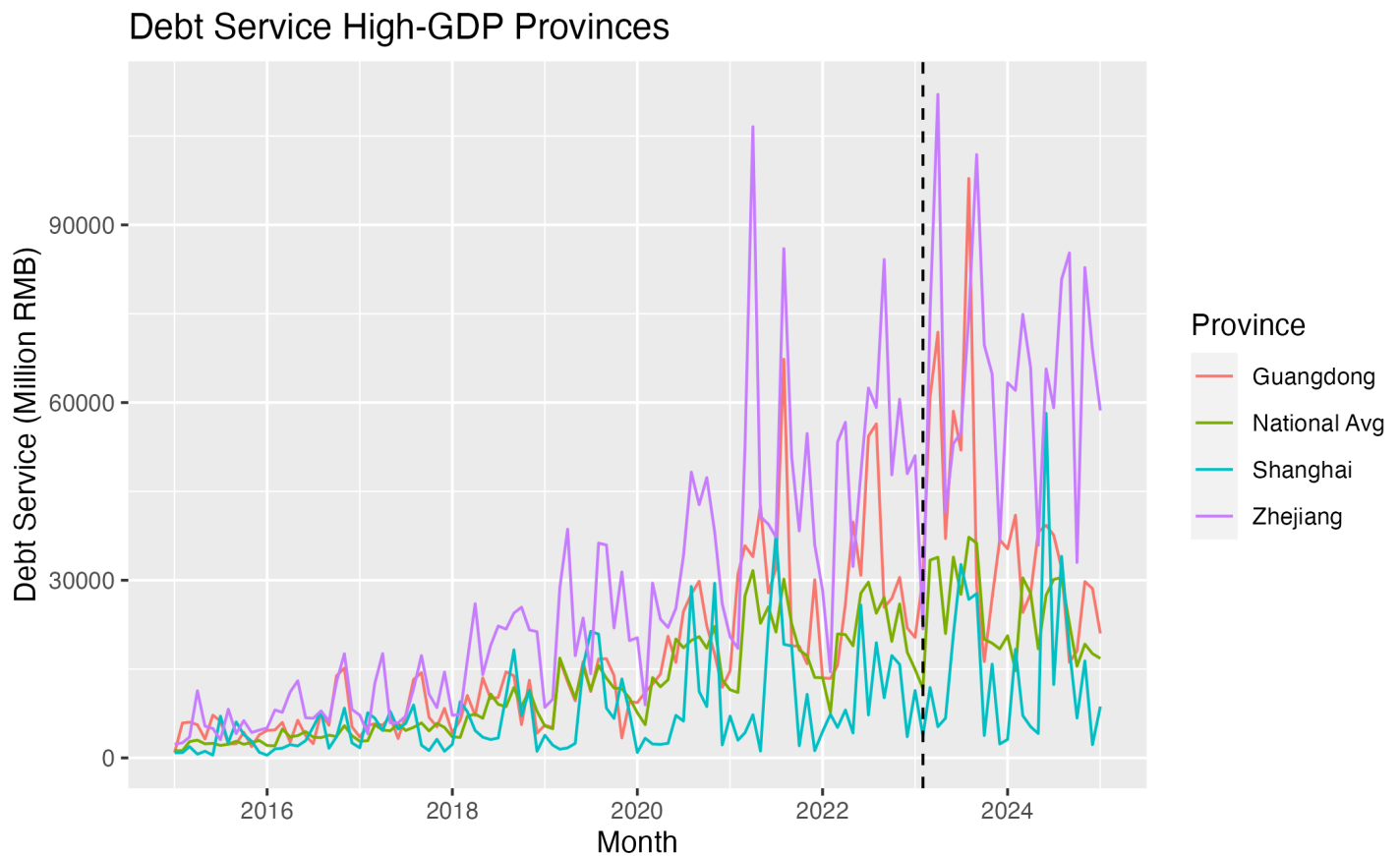


Figure 8: Debt Service Coverage Ratio Low-GDP Provinces

In contrast, the situation is relatively better among high income provinces, as illustrated in Figure 9. Shanghai and Guangdong display slightly lower coverage ratios due to their substantial revenues. However, they still face months where over half of their revenue would be needed to service maturing debt and interest payments. Meanwhile, Zhejiang is also in dire straits, with a high coverage ratio that exceeded 230% in one month of 2022, meaning it had to allocate more than twice its revenue to debt servicing. Clearly, more bond issuance was needed to roll over debt repayments.

Although we do not have provincial level central transfers data, we are able to obtain national aggregates of central transfers to the provinces by year. When we combine annual local revenue with annual central transfers, the coverage ratio looks more sustainable, but the growth rate still looks alarming, as seen in Figure 10. In 2017, local debt repayments, both maturing debt and interest payments, were equivalent to only a little more than 10% of local revenue plus central transfers. By 2022, that ratio has gone up to over 40%. A dramatic increase in central transfers in 2022 prevented this ratio from rising further for one year. It is unclear whether the growth of central transfers can

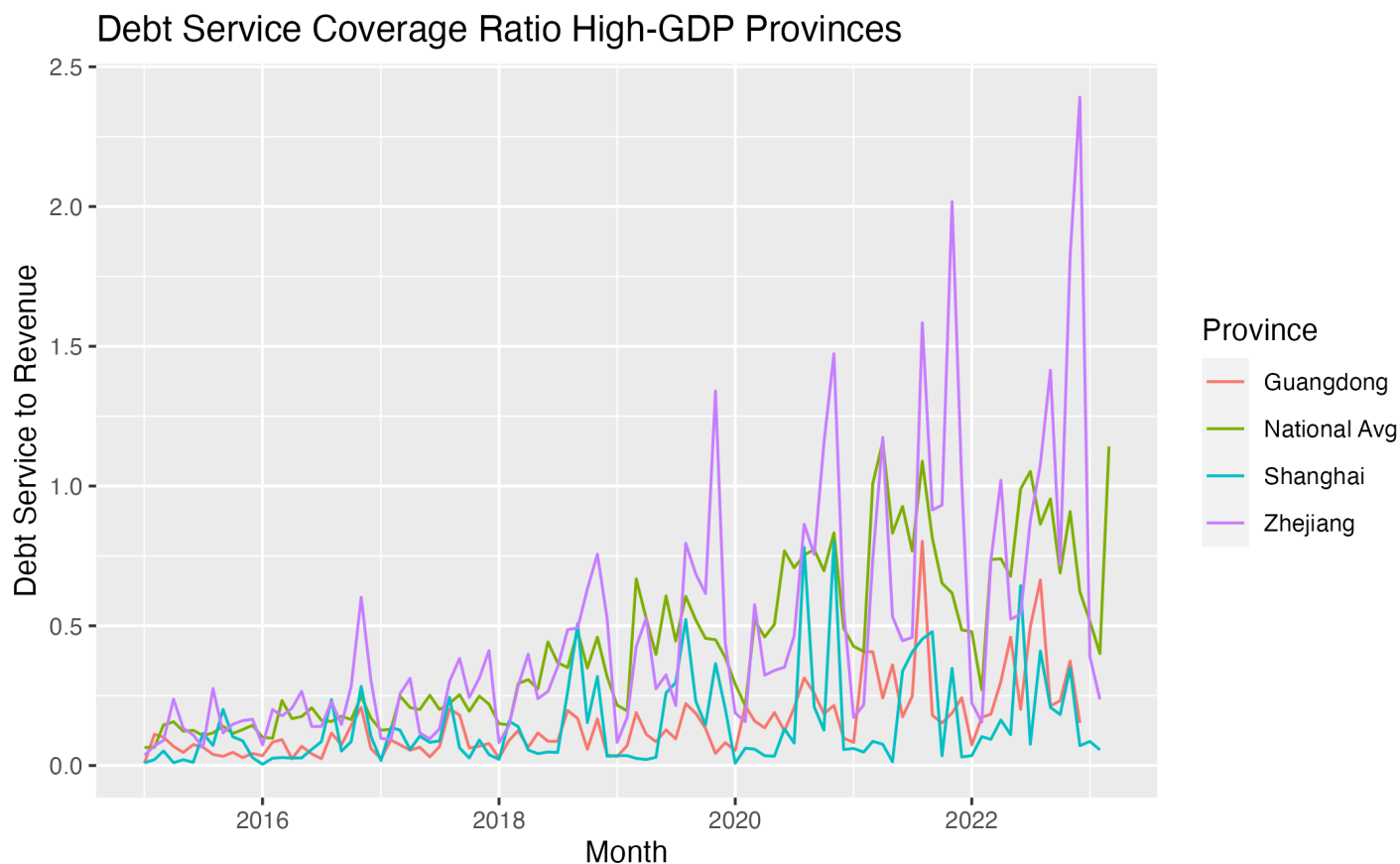


Figure 9: Debt Service Coverage Ratio High-GDP Provinces

persist through 2023. This picture still tells an alarming story. In 2017, local governments across China only needed to devote a little over 10% of revenue plus transfers to debt repayment, while the remaining 90% could be spent on public goods provision. Today, local governments could only spend 60% of revenue plus transfers on public goods, and if more funding is needed, more debt has to be issued. Again, the one encouraging sign from Figure 10 is that a substantial increase in central transfers, financed by central debt issuance, potentially can arrest this process of self-enforcing local debt increase.

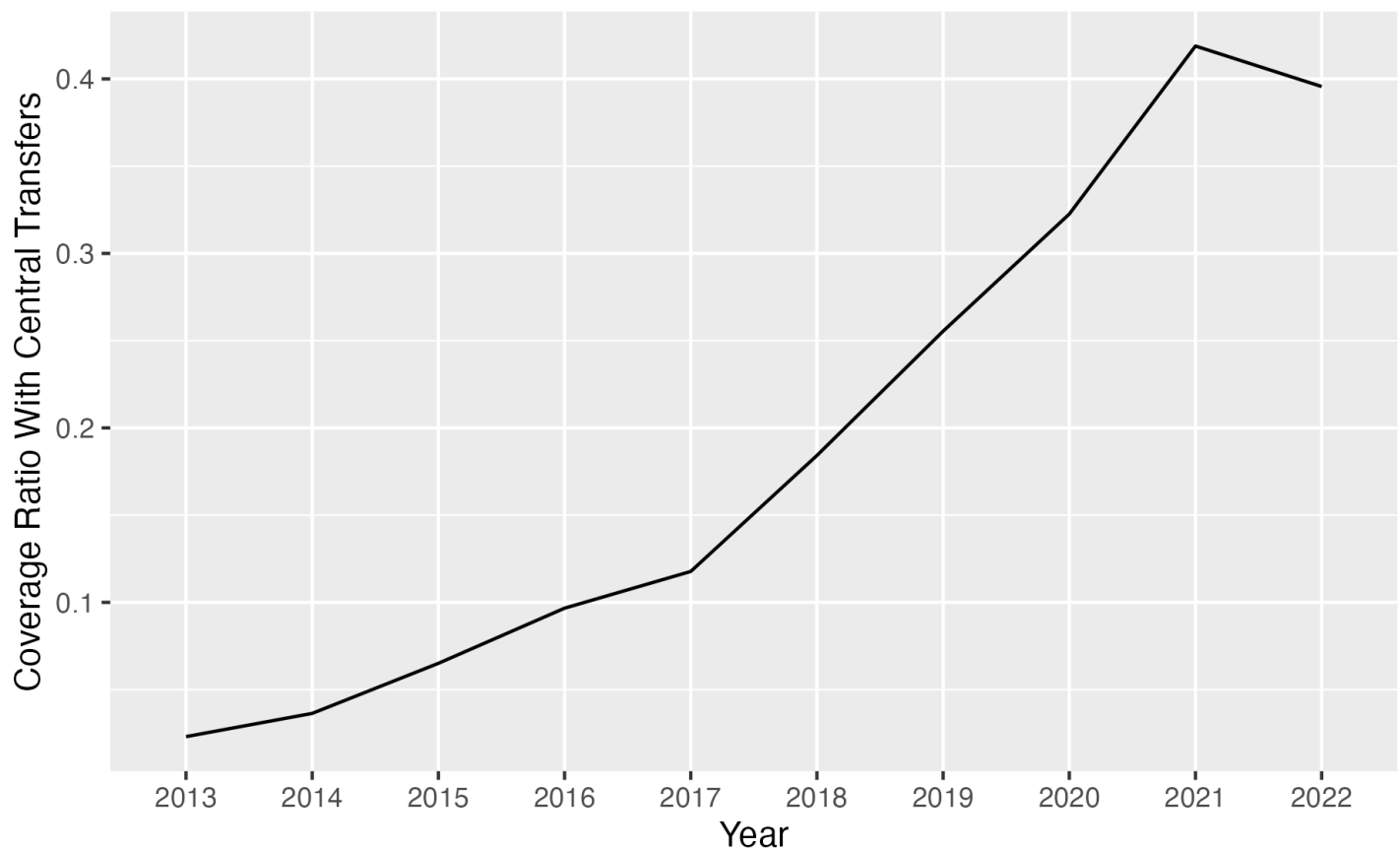


Figure 10: Coverage Ratio With Central Transfers by Year

7. THE IMPLICATION OF DEBT SERVICING ON EXPENDITURES

Despite escalating repayment demands on provincial budgets, the Chinese government can, in theory, mitigate potential consequences by ensuring new debt is issued to fund both interest payments and principal repayments. However, if new debt is not issued in a timely manner, provincial governments may resort to expenditure cuts or asset sales in order to avoid defaults. For the people of China, expenditure cuts in the official local budget would directly impact the public goods and wages they receive. If the sequential increase in debt servicing is too sharp, the reduction in public services and increase in public service wage arrears may directly translate to less household spending. To examine the dynamics, we first divide provinces into three groups based on their overall GDP. We then use four-way fixed effects (province, year, month, and season) regressions to see whether spikes in repayments (logged) affected contemporaneous fiscal expenditures, controlling for new debt issuance. We further

obtain quarterly household expenditure (per capita) data and examine whether the sharp rise in sequential debt servicing impacts household level expenditures. Before conducting our analysis, we anticipated that higher GDP provinces would be the least affected by debt repayment spikes since they have more fiscal resources with which to both meet payments and to keep up with public expenses. In addition, banks are much more willing to roll over the official and LGFV debt of high income provinces since fiscal income and land value are higher in wealthy provinces like Zhejiang and Guangdong. At the household level, residents in wealthy provinces also rely less on government services and wages. Thus, even if wealthy provinces had to reduce government spending somewhat due to debt repayment, it may not have much of a negative impact on household expenditures. In contrast, heavy reliance on central fiscal transfers and relatively low land value should constrain poor provinces' ability to roll over their debt. Thus, spikes in repayment may well translate to lower government expenditures, all else being equal. For households, this reduction in government expenditures may translate into meaningful reduction in household income, which in turn results in reduction in household expenditures. We would note that a sharp rise in debt repayment may not translate to reduced household spending directly through less government expenditures. It also may feed through other channels, such as fewer off-budget construction projects, which reduce employment prospects.

In Table 3, we display the impact of debt service on expenditure, where our unit of observation is the monthly fiscal expenditure for each province. First, we categorized provinces into three groups based on GDP levels: the top eight provinces as high GDP, the bottom eight as low GDP, and the rest as medium GDP. Second, we examine the correlation between the ratio of debt service to expenditure and the interaction between debt service and the economic level of the province, while controlling for new debt issuance. Finally, the model controls for year, month, season, and province fixed effects.

The findings of this model are eye-opening. They indicate that in other words, low and medium GDP provinces tend to increase their expenditure as their debt service rises, while wealthy provinces tend to decrease expenditure. These results are supported by Figure 11, which depicts the coefficients of the model, which are all significant at the 0.1 level of confidence and suggest significance even at the 0.05 level of confidence. In other words, low and medium GDP provinces rely on revenue from debt issuance to increase their expenditure. In recent years, the central government has tried to avoid defaults by poorer localities by targeting transfer payments and official local debt issuance to spikes in repayments (Ministry of Finance, 2016). We show that one impact of this default avoidance strategy is the creation of opportunism among poor and even middle income provinces to spend more when central aid is plentiful. This is consistent with Xi et al.'s (2018) finding of opportunistic pumping of local economies

Table 3: Debt Service Effect on Provincial Expenditure Regression

Dependent Variable: Model:	log(Expenditure+1)	
	(1)	(2)
<i>Variables</i>		
log(Debt Service +1)	-0.0129** (0.0060)	-0.0120* (0.0060)
Low GDP \times log(Debt Service +1)	0.0182* (0.0091)	0.0181* (0.0091)
Medium GDP \times log(Debt Service +1)	0.0190** (0.0080)	0.0190** (0.0080)
log(Bond Issuance Amount+1)		-0.0009 (0.0015)
<i>Fixed-effects</i>		
Province	Yes	Yes
Month_Year	Yes	Yes
Year	Yes	Yes
Month Seasonality	Yes	Yes
<i>Fit statistics</i>		
Observations	6,701	6,701
R ²	0.98974	0.98974
Within R ²	0.03924	0.03950
<i>Clustered (Province) standard-errors in parentheses</i>		
<i>Signif. Codes: ***: 0.01, **: 0.05, *: 0.1</i>		

by local cadres. In the meantime, because the central government assumes that high GDP provinces can use their own resources to repay debt, they have to show greater discipline and reduce expenditure when debt servicing is high. Because we already control for new debt issuance, this opportunistic behavior by poorer provinces likely is driven by an unobserved variable — central transfers to provinces targeting debt repayment needs. Absolute financial stability, which has been a high policy priority of the central leadership, is not without costs.

For household level analysis, we hone in on whether a quarterly sequential increase in provincial debt repayment impacted quarterly provincial household expenditures per capita. Again, we had expected that in low and even medium income provinces, a sharp sequential increase in provincial debt repayment would lead to a decrease in household expenditures. However, given the provincial

opportunistic behavior witnessed in the previous analysis, perhaps households in low and middle income provinces would benefit from sharp increases in repayment, which elicit greater central transfers and greater overall provincial expenditures.

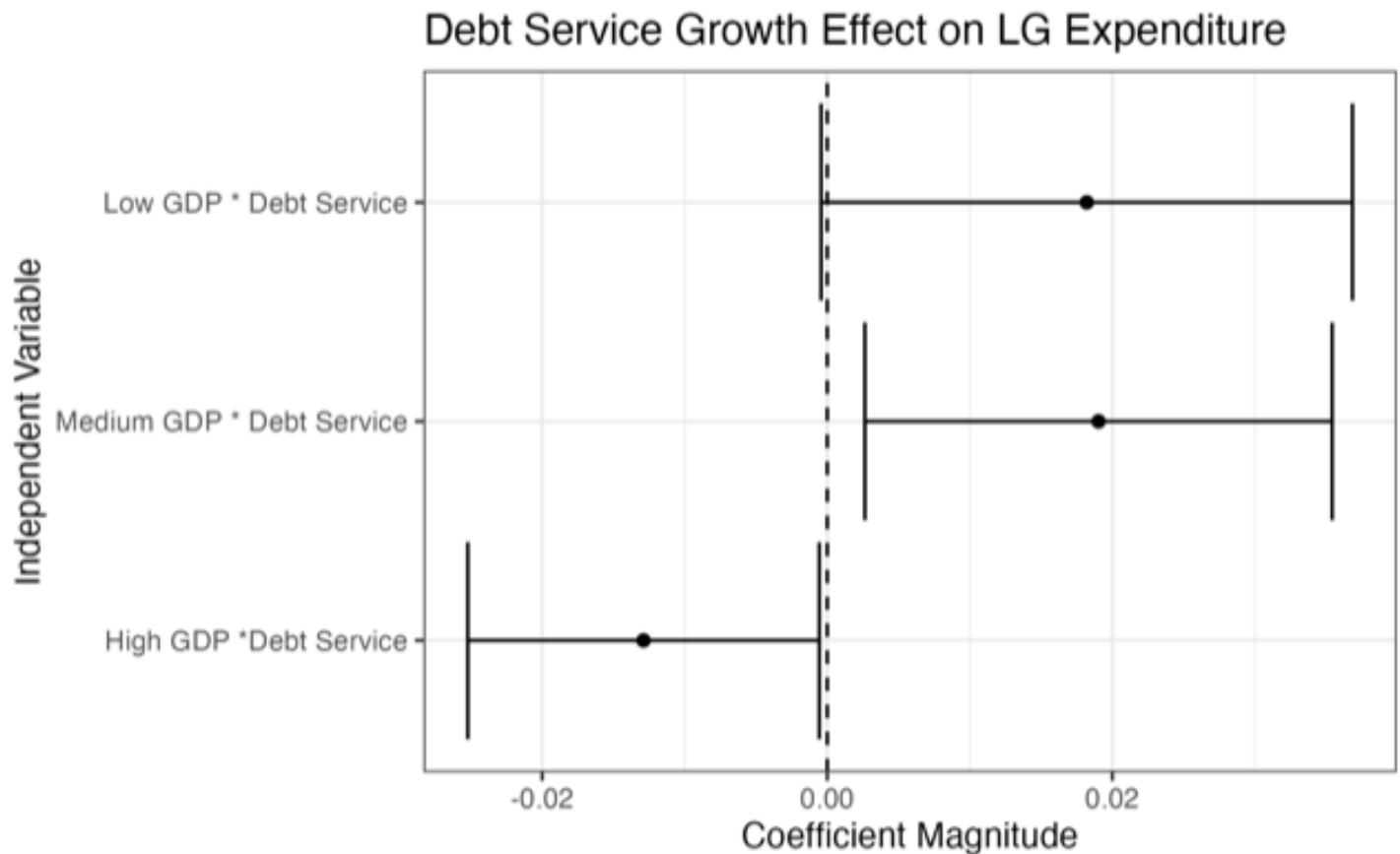


Figure 11: Coefficients of Different GDP Levels of Model - Debt Service Effect on Expenditure

However, our analysis reveals that the impact of sharp sequential increase in debt repayment fits more with our initial expectations. That is, whereas households in high GDP provinces did not suffer any reduction in expenditures from a high sequential increase in repayments, households in low and middle income provinces did suffer from lower expenditures when the province faced sharp increases in debt repayment from quarter to quarter. In fact, as seen in Figure 12, households in low GDP provinces seem to experience an even greater reduction in expenditures than even medium income provinces when the provincial government had a greater sequential increase in debt repayment. This result seems to contrast sharply with our previous finding that high (monthly) debt repayment led to greater expenditures by the governments of low income provinces.

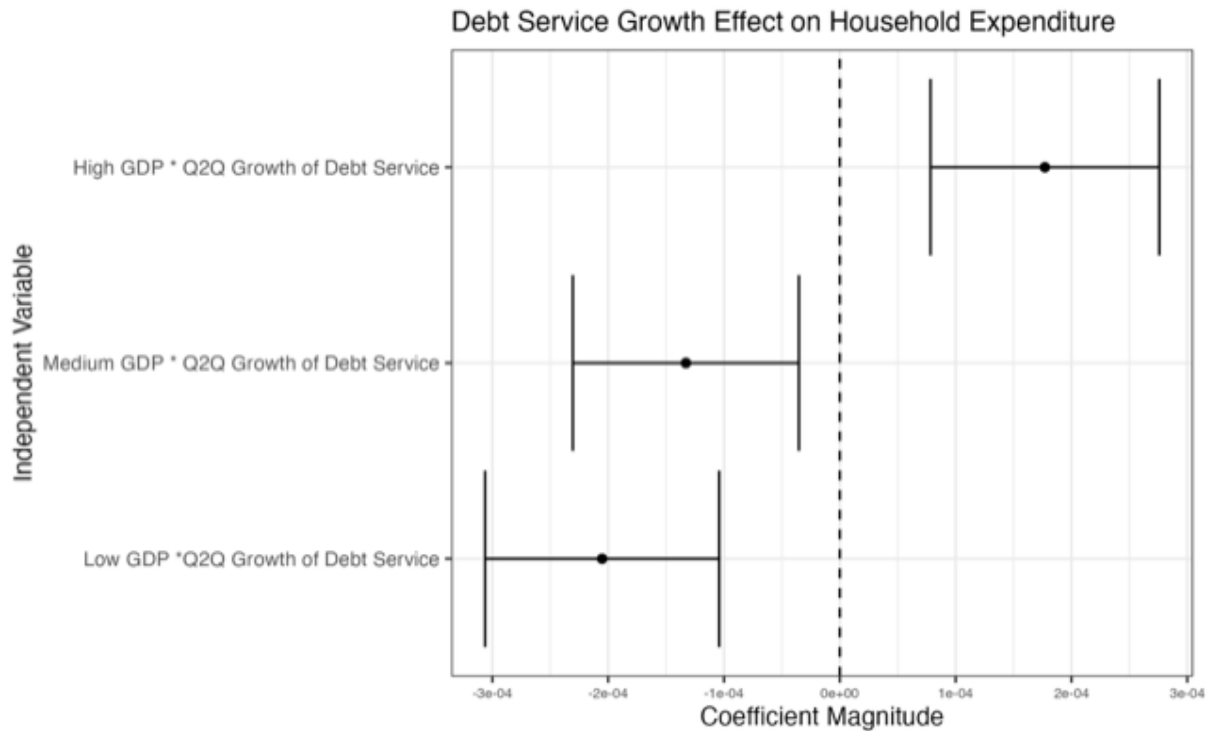


Figure 12: Debt Service Growth Effect on Household Expenditure

Our speculation is that although central transfer payments increased when poor provinces had to meet high debt repayments, provincial spending net debt repayment still contracted, thus affecting households. A senior cadre in the Hubei Province Department of Finance writes that when implicit debt (LGFV debt) of the province came due, the province had to “adjust expenditures so as to ensure sufficient repayment funds,” which suggests that expenditures net of debt repayment contracted when the repayment burden expanded (Chen, 2019). Because we do not have monthly or quarterly (or any) data on the share of provincial budget expenditures that went to debt servicing, we cannot assess whether this speculation is supported. Still, our analysis suggests that when debt repayments rise sharply on a sequential basis, the provision of public goods and civil service salaries may suffer to some extent in low and medium income provinces. If our analysis is correct, as monthly debt repayment continues to rise relative to provincial revenue and even central revenue, its impact on government expenditures and even the economy overall will intensify. Moreover, since low and middle income provinces have high debt levels, their debt repayments will rise more sharply over time, exerting a greater negative pull on their growth compared to wealthy provinces, which tend to have lower levels of debt. This would constitute yet another force increasing regional inequality. Thus, even if high local debt never causes a crisis in China, rising debt is and will be a drag on China’s economy and exacerbate regional inequality.

8. POSSIBLE POLICY REMEDIES

Given both the high level of and the accelerating growth rate of local debt, the current trajectory will soon give China some of the world's highest levels of government debt. To arrest the current trend, the Chinese government would need to somehow arrest or slow down the issuance of new local debt as well as weaken local governments' incentives to finance infrastructure projects through extra budgetary entities such as LGFVs. Below, we review several policy options and assess their level of feasibility given the political economy of China.

Table 4: Debt Service Growth Regression on Household Expenditure

Dependent Variable: Model:	log(Household Expenditure)				
	(1)	(2)	(3)	(4)	(5)
<i>Variables</i>					
Constant	8.428*** (0.0107)	8.826*** (0.0161)			
Debt Service Growth	-0.0002*** (6.33×10^{-5})	3.64×10^{-5} (0.0002)	-2.34×10^{-6} (1.31×10^{-5})	0.0002*** (4.43×10^{-5})	0.0006*** (0.0001)
Low GDP		-0.6104*** (0.0228)			-0.6121*** (0.0064)
Medium GDP		-0.5117*** (0.0198)			-0.5037*** (0.0097)
Debt Service Growth \times Low GDP		-0.0002 (0.0002)		-0.0002*** (4.54×10^{-5})	-0.0007*** (0.0001)
Debt Service Growth \times Medium GDP		-0.0002 (0.0002)		-0.0001** (4.38×10^{-5})	-0.0006*** (0.0001)
<i>Fixed-effects</i>					
Year			Yes	Yes	Yes
Quarter			Yes	Yes	Yes
Province			Yes	Yes	
<i>Fit statistics</i>					
Observations	1,224	1,224	1,224	1,224	1,224
R ²	0.01222	0.45337	0.96048	0.96099	0.79422
Within R ²			2.46×10^{-5}	0.01278	0.69177

Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

To slow the creation of new debt, the central government could issue a draconian decree limiting the issuance of new local debt, forcing local authorities to enact stringent reductions in spending. To enforce this austerity, the central government could make debt reduction and expenditure reduction major items in local leaders' annual cadre evaluations. This of course follows all the traditional prescriptions by the IMF for high debt economies (Reinhart & Rogoff, 2009). Yet, as we show, even if draconian fiscal policies dramatically reduced the growth rate of new local debt issuance, debt servicing would continue to be high relative to local fiscal resources for years to come, as shown on Figure 4. In addition, the economic recession stemming from reduced spending would further weaken local governments' ability to service debt for a few years.

The deeper problem with this approach is that the central authorities have repeatedly emphasized the importance of maintaining financial and political stability at the regional level. Knowing that, local governments can use the threat of instability to extract greater transfers and bond issuance quotas from the center. We show that low and middle income provinces have been especially prone to this behavior. In addition, we show that even after the enactment of the "front door" policy in 2015, local governments still had the option of borrowing more through LGFVs, which has added to the total debt and debt servicing loads. Harsh cuts in the official budget would only force local governments to borrow more through LGFVs. As an example, the Anhui Provincial Finance Department admitted in 2014 that it already evaluated leading cadres by debt increase and set up a responsibility system to track the status of debt even after a leading cadre had moved to another position (Department, 2014). Yet, we show that local debt in Anhui still more than doubled between 2017 and 2022. Debt quotas, however harshly worded, have not worked.

Another more immediate policy response to escalating debt and repayment involves lengthening the maturities of issued debt. Contrary to our expectation, we find that the proportion of newly issued local government and LGFV debt with one-year duration or less has risen from close to 10% in 2017 to close to 25% by the end of 2022, as shown in Figure 13. As Ministry of Finance expert Jia Kang pointed out more than twenty years ago, short-term local government debt arose out of underestimation of project costs, which necessitated the issuance of short-term debt to complete financing of unfinished projects (Jia, 2000). The piling up of short-maturity debt would only exacerbate repayment peaks since short-duration papers constantly need rollovers. Instead, the Chinese government, through the financial regulators, could give priority to the issuance of long-duration papers of over 10 years which mature during months when the expected repayments are in troughs. Regulatory preference for longer duration papers should create a slower-growing and smoother repayment schedules than

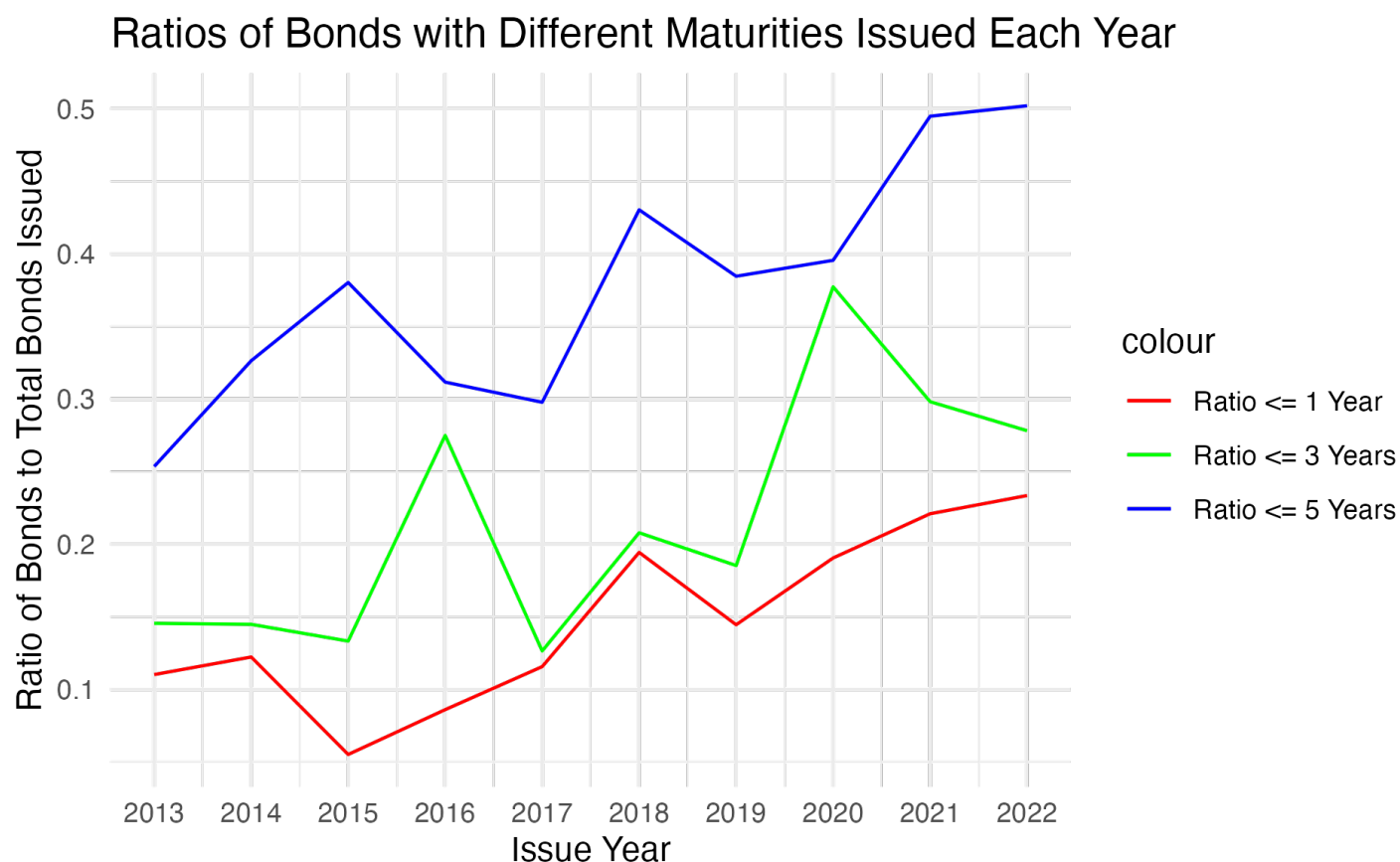


Figure 13: Ratio of Bonds with Different Maturities Issued Each Year

the one on Figure 4. At the same time, the central government could require local authorities to state contingencies for greater debt issuance in case of cost-overrun in order to make future debt increase and debt servicing explicit.

Although enacting this policy alone would still lead to rising local debt over time, necessitating constant monetary easing, a smoother repayment schedule should reduce the need of panic bond issuance to ensure repayment of maturing debt, thus potentially lessening the room for local opportunism. A more realistic assessment of the costs of major investment projects would also reduce the room for opportunism. A smoother repayment schedule additionally allows for better planning and coordination on debt repayments between the central and local authorities. Of course, this policy only would work if the “side door” of LGFV debt can be closed much more effectively than is the case today. Otherwise, aggressive debt issuance by LGFVs will still create sharp repayment peaks, causing a panicky repayment response and potential opportunism.

Instead of ordering austerity at the local level the central government could also use its own budgetary resources to take over financing of the majority of public goods provided at the local level as well as debt servicing. In a sense, the central government has done so already for the majority of provinces, which now face debt servicing over 50% of fiscal income (Table 2). For these provinces, a mix of central transfers and new bonds issued with central guarantees already finance the bulk of monthly outlays. The central government could make their budgetary responsibilities explicit by using central treasuries to pay for local public services, and in the process also obtain greater budgetary discipline for spending on these public goods (Xia & Ding, 2023). As one can see on Figure 14, the growth of central debt has been slower than that of local debt, except for the first year of COVID in 2020. As a result, central debt as a share of GDP remains relatively manageable at roughly 25% of GDP. Even relatively high growth of central debt will still keep it well below 100% of GDP for some time to come if centralization can instill some degree of fiscal discipline on local expenditures. Once again, this would only work if local authorities no longer have the discretion to seek budgetary flexibility through LGFV debt issuance. One potential method of strictly limiting LGFV issuance is a stricter system of allowing LGFVs to form in the first place, followed by strict quotas on LGFV debt issuance and borrowing. For example, the central State Asset Supervision and Administration Commission can obtain the authority to approve the formation of a limited number of LGFVs per year while existing LGFVs are compelled to merge, thus simplifying monitoring.

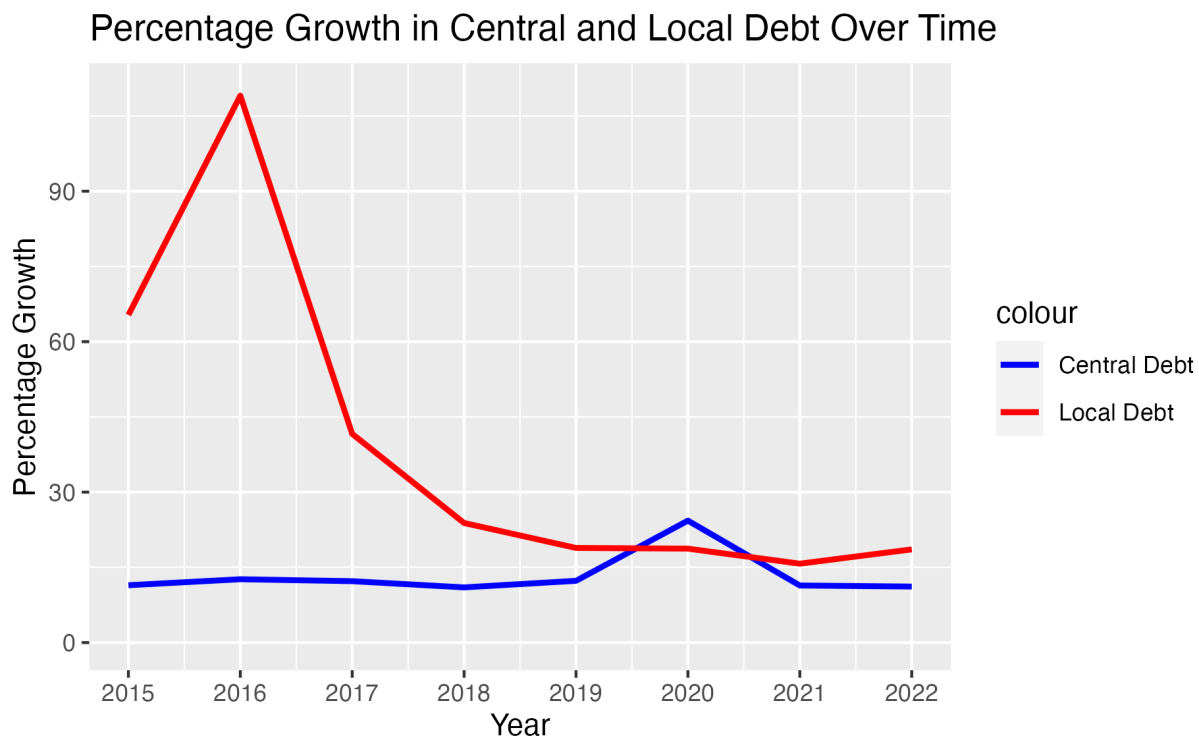


Figure 14: Debt Percentage Growth

CONCLUSION

The current incentives embedded in the inter-government fiscal system in China have allowed local debt to accumulate rapidly and for repayment pressure to escalate. Future policies need both to address the existing debt amount and repayment pressure as well as to create incentives to slow down the creation of new debt. On dealing with existing debt, the most obvious policy is to smooth out the repayment schedule of local debt. To create incentives to slow down the pace of debt creation, China already relies on the cadre responsibility system to exert political pressure on local leaders (Ministry of Finance, 2016). Yet, local debt continues to accumulate at an alarming rate. The reason is that central policy demands in other areas continue to multiply, which require greater budgetary outlays at the local level. This in turn creates room for opportunistic spending at the local level. The centralization of budgetary outlays would not only take discretion out of the hands of local officials, but also immediately make central deficit spending apparent, thus potentially imposing some degree of fiscal discipline at the central level. Currently, the central government can enact unfunded mandates without thinking much of the budgetary consequences, implicitly pressuring local authorities to borrow to provide for these mandates. Because of the scale of the problem, any fundamental resolution of the current debt dynamic will be difficult both economically and politically.

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