ORIGINAL ARTICLE

Multilevel financing of sustainable infrastructure in China—Policy options for inclusive, resilient and green growth[†]

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ABSTRACT

COVID-19 has amplified existing imbalances, institutional and financing constraints associated with a development strategy that did not take sufficient account of challenges with emissions, environmental damage and health risks associated with climate change in a number of countries, including China. The recovery from the pandemic can be combined with appropriately designed investments that take into account human, social, natural and physical capital, as well as distributional objectives, that can also address commitments under the Paris agreement. An important criterion for sustainable development is that the tax regimes at the national and sub-national levels should reflect the same criteria as the investment strategy. Own-source revenues, are essential to be able to access private financing, including local government bonds and PPPs in a sustainable manner. Governance criteria are also important including information on the buildup of liabilities at all levels of government, to ensure transparent governance.

Despite differences in political systems, the Chinese experiences are relevant in a wide range of emerging market countries as the measures utilize institutions and policies reflecting international best practices, including modern tax administrations for the VAT, and income taxes, and benefit-linked property taxes, as well as utilization of balance sheets information consistent with the IMF's Government Financial Statistics Manual, 2014. The options have significant implications for policy advice and development cooperation for meeting global climate change goals while ensuring sustainable employment generation with transparency and accountability.

Keywords: investment; human capital; taxation and subsidies; intergovernmental fiscal relations; environmental policy

1. Sustainable infrastructure investments and financing in China

Generating employment in compact, clean and connected cities and regions in the interior is a central part of the "dual circulation" proposal in the 14th Five-Year Plan and Perspective Plan (State Council, 2020). But it was also a feature of "rebalancing" in the Western Development Strategy almost two decades ago. In determining the policy measures

needed to meet the goals of addressing goals of reducing inequalities and peaking net emissions by 2030 to achieve China's commitment of net-zero carbon emissions by 2060, it is important to focus on human, social and natural capitals along with financial returns, and use the same considerations in designing tax and financing mechanisms. This will influence incentives by local governments to provide essential public services and infrastructure to enable appropriate investment location decisions by firms, job search and migration choices by workers. Multilevel finance decisions play a critical role in determining the responsibilities, financing and governance needed to generate new sustainable "hubs" as part of the envisaged rebalancing.

Connectivity infrastructure is necessary but not sufficient to begin to create sustainable employment in the lagging regions of the country. In Italy, for example, the north–south high-speed train and motorway links have not succeeded in reducing the income gaps between regions. In Spain, private provision of badly designed infrastructure investments, with poor monitoring of liabilities, including those of public-private partnership (PPP) contracts, contributed to the economic crisis in 2008 (Ahmad et al., 2016). In China, attempts to create new sustainable hubs in the interior, in order to reduce the environmental damage and spatial inequalities caused by megacities that have emerged along the coast, have been constrained by the rapid rise in local debt and absence of effective own-source revenues, leading to increased risks and constraints on the provision of local services (Ahmad and Zhang, 2020). Workers continue to migrate to where the jobs are—to the coastal metropolitan areas (Luo and Zhu, 2020)—enhancing spatial inequalities.

Much depends on adequate levels of local public services and infrastructure to induce both sufficiently trained workers and firms to relocate to given jurisdictions. Growth is driven largely by the private sector, although governments at different levels have an important role to play through investments in human and physical capitals and improved quality of public services. The role of the local or regional tier is important for the effective provision of public services as well as the supplementary investment needed to fully utilize the potential of improved connectivity. Interior "sustainable" hubs are possible, provided they optimize sources of supply (including a skilled labor force), as well as potential demand and supply chains (domestic consumption as well as exports).

The modernization of the tax policy and administration systems initiated in 1993/4 has been largely accomplished. The local business tax was integrated into the VAT in 2015, and all taxes were subsequently brought under the aegis of the State Taxation Administration (STA) in 2018. The advantage of the completion of the VAT reforms was to

reduce the cost of doing business, but also to remove borders around special economic zones (SEZs), such as Shenzhen, permitting the full operation of domestic linkages (Ahmad, 2017). This has led to greater development of domestic value chains and also the shift from a reliance on exports to domestic consumption—a foundation for the move towards "dual circulation" in the 14th Five-Year Plan (FYP).

While the centralization of taxes has had important efficiency implications, and local governments have been more or less compensated by adjustments in revenue shares, it has left almost no tax bases over which the local governments can adjust rates at the margin. This poses a problem for local access to private financing of public investments and infrastructure, as at the margin, some control over tax rates is needed. Moreover, with national tax cuts in response to trade disruptions during the 2018/19 period, budgetary pressures forced local governments to revert to land sale financing, which the central government had been trying to eliminate to reduce tendencies for urban sprawl, as well as property speculation. Modernization of the fiscal, taxation and financial system, including at the sub-national level, is a key goal of the 14th Five-Year Plan (State Council, 2020). This includes a sub-national tax system.

Achieving the policy goals of the 14th FYP will require coordinated action to rationalize local spending responsibilities together with the development of own-source revenue tools. For the provinces, this could include piggy-backs on the national income tax or a carbon tax, accompanied by fine-tuning of the current fiscal equalization mechanism.

For cities, the proposal to implement beneficial property taxes on simple area- and location-based criteria could be a useful alternative to land sales. This would also form the basis for municipal/city access to borrowing without the risks that the current arrangements imply. Tighter recording of liabilities, with full balance sheets using international standards (e.g., the IMF's GFSM2014) would be very important to manage risks and also provide greater information for investors to co-finance the needed investments for sustainable growth.

## 2. Are connectivity investments sufficient for sustainable growth?

The typical argument for connectivity infrastructure is that it would reduce the costs of importing inputs and raw materials, reduce the distances between points of production and markets and also better facilitate the use of cheaper labor and land. A common pattern is shown in **Figure 1**. It shows that most growth is concentrated in the metropolitan areas and ports, represented as "A". With existing transport links (*f*), the furthest areas able to utilize the export and demand patterns generated by A are P. But the extreme peripheral areas, (P_N), are unable to connect either to the markets or domestic or external supply chains of A or P.

The mechanism assumed is that reduced time affects location decisions and costs, making use of lower wages and other inputs. Also, "dual circulation" would lead to production for domestic markets, hence reducing the distance to supply around N.

In China, a number of cases may be distinguished:

a) The main coastal export hubs are represented by A (such as Guangzhou, Shenzhen or Shanghai). These have become mega-metropolises, with considerable urban sprawl and

Hubs (*N*) and periphery (*P*)
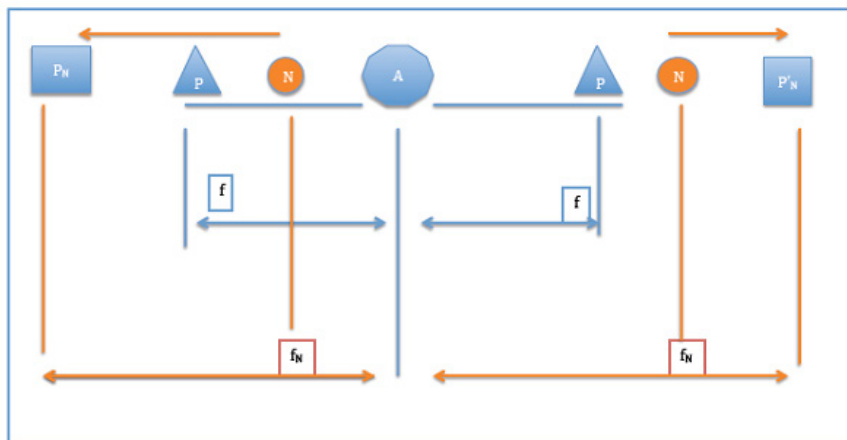
Figure 1. Sustainable hubs and "rebalancing" to the interior and the periphery.

Note: The blue figures represent the existing market structure, with A as the metropolitan areas (mainly along the coast), for production and export. P is the maximum reach with pre-reform connectivity. Infrastructure connectivity investments may create new hubs, N, that bring the excluded periphery P_N into play.

congestion and yet still attract migrants.

b) N's are the new hubs in the interior. The Western Development Strategy assumed that these could lie close to the peripheral areas, P'$_N$—however, that has not been particularly successful.

c) When N is closer to the existing export hubs or is at the center of the domestic market, e.g., Wuhan, the connectivity infrastructure, together with investments in flood control, sponge city, ergonomic buildings and multiple metro systems, make it an attractive destination. However, budgetary problems caused local officials to prioritize major projects and urgent responses to the trade disruptions in 2018/19 to the neglect of basic preventive health care (Ahmad, 2020).

d) Smaller, but connected, cities within the richer provinces that should be employment "hubs", e.g., in Jiangsu, Guangdong and Zhejiang, have also not done too well. This might change in response to the pandemic and new e-commerce and teleworking possibilities. But a major constraint lies in insidious build-up of debt and inadequate public infrastructure and services.

e) The 14th FYP announced an intention to link a number of cities as an innovation "hub" leading to the development of an entire zone. This interesting policy experiment is being undertaken in both the Greater Bay Area (GBA), with nine coastal cities in Guangdong, Hong Kong and Macau, and the Yangtze River Delta that spans four provinces: Shanghai, Jiangsu, Anhui and parts of Zhejiang (State Council, 2020).

The innovation zone has no parallel elsewhere and will require additional work in defining both the governance and financing arrangements. In the GBA, this will involve R&D in several top-class universities and research centers in nearby cities (Guangzhou and Shenzhen), product development and startups, financing services in specialized areas (again, in Guangzhou and Shenzhen and

partly in Hong Kong), IPOs and legal assurance (Shenzhen and Hong Kong). With the high-tech expansion, lower value-added industries should in principle move to the interior of Guangdong (see Luo and Zhu, 2018). Of course, rebalancing could include the interior of China, bringing migrants closer to home, as well as markets connected through the Belt and Road Initiative (BRI) and global supply chains.

Public policy and multilevel finance are critical in establishing new hubs that are both environmentally and financially sustainable. Responsibilities for the needed infrastructure and public services might cut across traditional jurisdictions and require some redrawing of boundaries. This must ensure adequate own-source financing and sustainable access to credit at each responsible level to avoid repeating some of the problems highlighted since the 2008 Euro Crisis. Appropriate design of tax handles, with some control over rate structure at the margin, say, piggy-backs on income tax, or on a carbon tax, which directly influences environmental outcomes, are important for accountability. Similarly, full information on the balance sheets of the relevant jurisdictions is important, including for any access to direct borrowing or PPPs.

In addressing alternative own-source revenue and financing options, Ahmad et al. (2020) focused on six cities (see **Table 1**), using data on housing conditions from the China Urban Labor Survey (CULS) 2016. This is juxtaposed with fiscal and social indicators for the same year from relevant

Table 1. Summary of key statistics for six cities from the CULS survey and annual city profiles

	Guangzhou	Shanghai	Shenyang	Wuhan	Xian	Fuzhou
Key variables from the CULS (sample size)	3097	3046	2257	2710	2358	2642
Housing condition						
Living space per capita (sq. meter)	25.71	26.89	29.88	29.07	31.32	33.31
Median self-reported property value (10,000 yuan)	120.00	300.00	42.00	75.00	38.00	150.00
Socio-economic indicators						
Population in 2016 (million)	14.0	24.2	8.3	10.8	8.8	7.6
Share of migrants in 2016 (%)	38.0	40.1	11.4	22.5	6.6	9.2
Migrant growth rate during 2010–2015 (%)	6.7	9.2	8.5	63.2	-15.1	9.2
GDP per capita in 2016	139192	116,562	66,893	111,469	71,647	82,251
Data from Public Finance Yearbook (2016)						
Revenue (hundred million yuan)	2218	6406	621	1322	641	599
Expenditure (hundred million yuan)	2845	6919	825	1525	943	830
Financing gap (10,000 yuan)	-7204	-3537	-2784	-2429	-3654	-3362
Public services						
No. of student enrolment (primary) /10,000	1113	326	509	603	641	754
No. of hospitals/10,000	0.3	0.2	0.4	0.4	0.4	0.2
No. of doctors/10,000	53.8	45.2	26.6	41.6	33.8	15.6
Share of pension covered (%)	55.2	69.3	29.9	25.5	37.4	22.3
Share of medical care (%)	45.3	69.8	40.8	36.4	49.3	20.5
Share of unemployment insurance (%)	35.8	66.7	16.9	17.9	17.3	15.8
Land use						
Ratio of investment in real estate (2016 to 2000)	7.1	6.6	11.1	24.9	37.7	22.1

Note: As Shanghai is a metropolitan area with provincial status, it receives also shared revenues as a province—distinguishing it from other capital cities in the sample that do not have the same status.
*Source: Ahmad et al. (2020)*

Statistical Yearbooks and provides a snapshot of population movements and public services. We focus in this paper on Wuhan as representative of a new interior hub (N).

Guangzhou represents the traditional export hub, A, and is China's richest city with the highest migrant population. Both had significant "official" debt, even before the effects of the 2018 trade disruptions and 2020 pandemic were factored in, raising the level of risk with investments.

2.1. Are people migrating to new interior hubs?

Where people go and what they do, as well as public services and environmental considerations, were examined by Lou and Zhu (2020) using data on migration patterns from surveys conducted in 2010 and 2014 that gathered information on the characteristics of migrants, including skill levels. The surveys found that migration decisions over the last decade[1] have been primarily driven by employment and income opportunities or level of services. The availability of health care services, in particular, proved a hugely important motivation for migration, while environmental considerations have not played a significant role in migration decisions over the last decade. However, for higher-skilled workers, the quality of life, including a clean environment, has recently proven increasingly important (Lu et al., 2018).

Lou and Zhu (2020) found that the coastal megacities still draw large numbers of migrants from eastern and central China (see **Figure 2**), including skilled migrants. However, while the shares of manufacturing jobs in cities such as Beijing and Shanghai have declined, the service economy has boomed, including high-tech sectors. This has expanded the demand for higher-skilled workers.
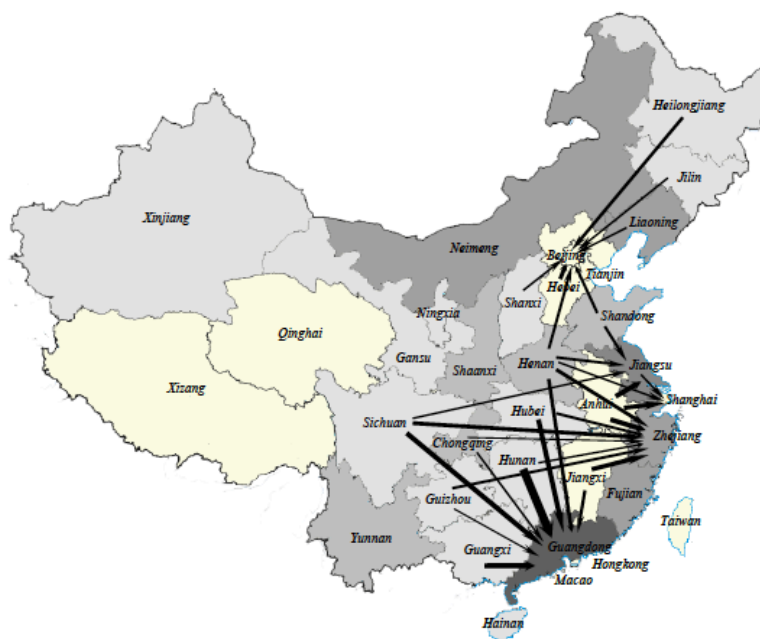
Figure 2. Inter- and intra-provincial migratory flows, 2014.
Note: The thickness of arrows indicates approximately the intensity of corresponding interprovincial migratory flow, and the gray level indicates approximately the intensity of migrations within a province.
Source: Luo and Zhu (2020)

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1. Note that these surveys do not reflect the impacts of recent policies intended to offset the impacts of trade shocks on economic activity and employment. These policies have had significant impacts on the spatial distribution of job creation and the quality of local services.

These cities also offer significant advantages to hukou residents (including high-quality education and social protection benefits). These factors have helped sustain population growth, particularly attracting migrants with higher education levels.

The spatial diversification of manufacturing activities has created a wider range of economic opportunities within provinces, particularly eastern provinces. This meant that unskilled and semi-skilled workers were more likely to migrate within their provinces in 2014 than in 2010, including to small- and medium-sized cities. Fostering higher population densities in smaller and denser urban areas could reduce the costs of providing infrastructure and services for the 255 million additional urban residents expected to swell Chinese cities by 2050 and to meet China's net-zero carbon emissions commitments for 2060. The Perspective Plan commits all cities to renewable energy, electric vehicles and green building materials and further consolidates China's adoption of low-carbon technologies (State Council, 2020).

Despite efforts to rebalance the economy towards the interior, it will continue to be difficult to persuade firms and skilled workers to relocate to less well-developed areas, even though connectivity is now less of a problem in China. Workers are seeking more economic opportunity and better service provision than is currently available in western and central provinces, while firms need decent infrastructure and an adequate labor supply. It is clear that rebalancing China's economy to bring prosperity to a wider range of cities—not just the coastal mega-hubs—will depend on making those other cities attractive to investors and workers alike.

Looking forward, China's cities are expected to swell by 255 million people in the next thirty years. Coastal megacities such as Guangzhou are still expanding but cannot absorb all of this projected urban population growth. Affordable service delivery, poverty alleviation and healthier local environments all demand that some of this population growth should be absorbed by smaller cities in the interior. This depends on creating thriving provincial capitals with diversified urban economies, such as Wuhan, as well as a network of smaller urban areas, such as Jieshou, to become employment hubs that can provide economic opportunities. But to succeed, cities such as Jieshou need to provide adequate public services and infrastructure to attract sufficiently skilled workers and private investment.

The central government has attempted to rein in land sales, borrowing and PPPs, which it rightly recognizes are unsustainable and risky sources of local finance. However, these efforts have been undermined by other fiscal measures. National taxes have been cut to meet trade shocks and then the pandemic, affecting shared revenues accruing to lower levels. At the same time, local governments have to meet basic spending requirements on education, health care and certain capital investments. In the absence of own-source revenues to meet the funding gap and in light of weak monitoring of liabilities, local governments have had strong incentives to generate debt through opaque financing vehicles or PPPs. Official balance sheets significantly understate the true extent of their liabilities. Such an evaluation is not an easy task even for the Ministry of Finance to conduct on a regular basis. The Audit Bureau's assessments take time to carry out, and the last ones published were for 2013.

2.2.   Wuhan in the context of post-Covid urban transformation

Wuhan is one of the best examples of the "rebalancing" to the interior, as well as transformation

to an ecologically friendly city. Since 2004, it has been the focal point of the "Rise of the Central China Plan". It is located at the center of the central province in China, at the confluence of the Yangtze and Han rivers, and has perhaps the best connectivity possible in the interior of China—being at the central point of China's impressive high-speed trains and motorways networks, river traffic, as well as airports. It is interesting that Wuhan initially grew through the amalgamation of three towns—Wuchang, Hankou and Hanyang—in 1927. Following the 2008/9 economic crisis, there was a huge investment in infrastructure in Wuhan, resulting in a 30% increase in population since 2010. Resembling Chicago, it now has a modern and diversified economy, with an agricultural base and steel and automobile manufacturing, among a range of industrial products, as well as high-quality universities and research labs, leading to high-tech innovation, IT and finance. During much of the past decade, it has had a higher rate of migrant inflows than either Shanghai or Guangzhou (see Table 1). The expansion of Wuhan, like other metropolitan areas, has been driven by land sales in contiguous areas, largely leading to an expanding built-up area, and satellite towns becoming effectively part of the metropolitan area.

The expansion of Wuhan has largely followed the recommended ecological playbook. It has a huge metro network of nine lines over 300 km, carrying 1.22bn passengers annually (2019), with a number of additional lines under construction (but frozen since January 2020). It had one of the largest bike-sharing programs in China, which has run into difficulties, as in Beijing and Shanghai. Many of the modern buildings, including some of the tallest skyscrapers in China, are constructed taking ecological considerations (e.g., in the Wuhan Greenland Center). Traditional flooding in Wuhan has been largely controlled. The celebrated (CNY20.7bn, or $3bn) Sponge City Program "has shown that green and blue infrastructure can be employed both quickly and cost-effectively to increase the resilience of urban areas to climate change … [with] reduced carbon emissions, improved public health, enhanced natural cooling and improved biodiversity" (Oates et al., 2020, p. 1). Combined with green spaces and huge expenses on hospitals (with more beds per capita than has Shanghai or Guangzhou), Wuhan met all the desired characteristics of a model clean, connected, but not particularly compact, city.

But the process was not fiscally sustainable and buckled with the Covid-19 onset. The influx of migrants (also at the high end of the income scale), particularly lower-income floating workers, left the overall working population with a relatively low coverage for unemployment insurance (18% versus 67% in Shanghai or 55% in Guangzhou), and only 30% were eligible for medical coverage (versus 70% in Shanghai or 45% in Guangzhou). Increasing deficits and buildup of contingent liabilities have left the Metropolitan Government prioritizing "high-profile" projects, such as curative hospitals, as well as supporting industries and workers affected by the trade disruptions during much of 2018/19, to the detriment of mundane preventive care and support.

The potential diversion of scarce resources to virus prevention was not welcomed by the city government in December 2019 (Ahmad, 2020). Despite a relatively high level of curative care, the weakness in preventive care meant that the hospitals were quickly overwhelmed by the epidemic (as in Italy), although the coordinated response by the central government, together with the enhanced monitoring and support at the local levels, eliminated the disease after the lock-down period on April 8, 2020 (when no new cases were reported in Hubei Province, although testing, tracking and tracing are being maintained at a high level to prevent recurrence).

An assessment of the pattern of morbidity and mortality in Wuhan during the Covid-19 pandemic has implications concerning the patterns of urbanization and public policy interventions during the recovery period. You, Wu and Guo (2020) found that increasing density and use of mass transport is associated with worse health outcomes. Interestingly, contiguous built-up areas (as opposed to small towns, but separated by agricultural fields, that also qualify as resilient and environmentally attractive compact, clean and connected cities (CCCs)) are also more susceptible to disease. While green areas within metropolitan zones are often recommended, these apparently increased the probability of disease, as social distancing is hard to achieve in these desirable spaces.

Wuhan shows that while ecological enhancements in metropolitan areas are needed, neither incentives for in-migration nor overall fiscal constraints can be avoided. In a situation where local governments are struggling to meet challenges faced by an economic/trade shock, declining shared revenues and limited or no own-source revenues, some essential but not very visible assignments might be neglected—such as basic preventive care. Although Wuhan showed exemplary attention to the environment (Oates et al., 2020), ignoring social capital and spatial dynamics of urban transformation can have negative ramifications, highlighted as a consequence of the pandemic.

2.3.   Sprawling Guangzhou needs even more expensive infrastructure

Guangzhou is a mega-metropolis with an urban population of over 13 million people and a greater metropolitan area's population of 25 million. The urban population has increased fourfold since 1990. It is an integral part of the Greater Bay Area's initiative, which aims to turn the region's nine largest coastal cities, plus Hong Kong and Macau, into a global hub for innovation and technology.

Guangzhou has long been a major coastal city and has benefitted from extensive investments in connectivity infrastructure. It is the southern hub for a vast network of high-speed trains and currently houses one of the largest and busiest airports in Asia, and a second, larger one is due to open soon. The economic and intellectual dynamism of the city has benefited from these strong linkages, enabling specialization and partnerships with neighboring cities such as Shenzhen and Zhuhai, forming the core of the GBA proposal.

Connectivity within the metropolitan area has also improved, with a world-class Bus Rapid Transit (BRT) system that many other megacities look to emulate. However, a planned extension to the BRT has been stopped as a result of a citizens' audit (Yuan, 2018). Instead, the extensive new metro system is accompanied by more cost-effective dedicated bus lanes. Recent transport investments may have helped to address the city's dangerous air pollution, although, in 2016, Guangzhou was choking with annual mean ambient air quality of PM_{10} of 56 ug/m^3 and $PM_{2.5}$ of 36 ug/m^3 in 2016 (World Health Organization (WHO), 2018a). For reference, the safe limits recommended by WHO are PM_{10} of 20 ug/m^3 and $PM_{2.5}$ of 10 ug/m^3 (WHO, 2018b).

Guangzhou has seen high migration since the early 1990s and continues to grow in both population and land area. It now has one of the highest proportions of migrant workers in China—mostly domestic migrants, but also temporary foreign residents. Its population growth and in-migration have been accompanied by rising incomes, and today Guangzhou has one of the highest per capita GDP levels in China (CNY162,950 per capita or around US$24,000 per capita in 2018). There are no signs that there is a rebalancing towards the interior, including within Guangdong

Province (see Xiao, 2018).

The ancient city is being modernized as a center for finance and innovation, with a number of prestigious research centers, and already has 93 of the 111 biotechnology R&D parks in the country. With among the highest per capita income of any Chinese city, it remains a magnet for migrants with all levels of skills. This has contributed to improved quality of life, with very good public services and a rich cultural scene. However, as a delta city in the western Pacific, it is prone to flooding and typhoons.

The counter-cyclical cuts in national taxes to respond to trade and health shocks have resulted in reduced shared revenues that have increased the pressure on the budget of Guangzhou, making it difficult to maintain spending levels on critical services, such as education. Guangzhou also has one of the highest levels of official debt among cities in China, severely constraining policy options. In 2018, its "official" debt stock was 592% of government revenues, second only to Zhuhai in Guangdong (which had debt approaching 800% of government revenues). Disparities across counties in Guangzhou also are a matter of concern. The reforms to combine VAT and local business taxes have meant that local governments are increasingly reliant on revenue sharing, which fluctuates, and on minor fees and charges. This increases the incentives to use land sales (**Figure 3**), which can only exacerbate costly urban sprawl. Guangzhou's limited own-source revenues and extraordinarily high levels of debt mean that it has not issued any general municipal bonds in the past few years. It has instead focused on project-related bonds, PPPs or "special debt" to finance infrastructure, in the expectation that this will be less risky than general indebtedness. In practice, this merely obscures the extent of local liabilities. In the medium term, shadow debt will make it difficult for the city government to share the costs of common infrastructure in the Greater Bay Area with less indebted cities, such as Shenzhen.

2.4.   Jieshou: A potential compact, clean and connected "hub"?

Jieshou is a potential compact and well-connected hub with an urban population of around
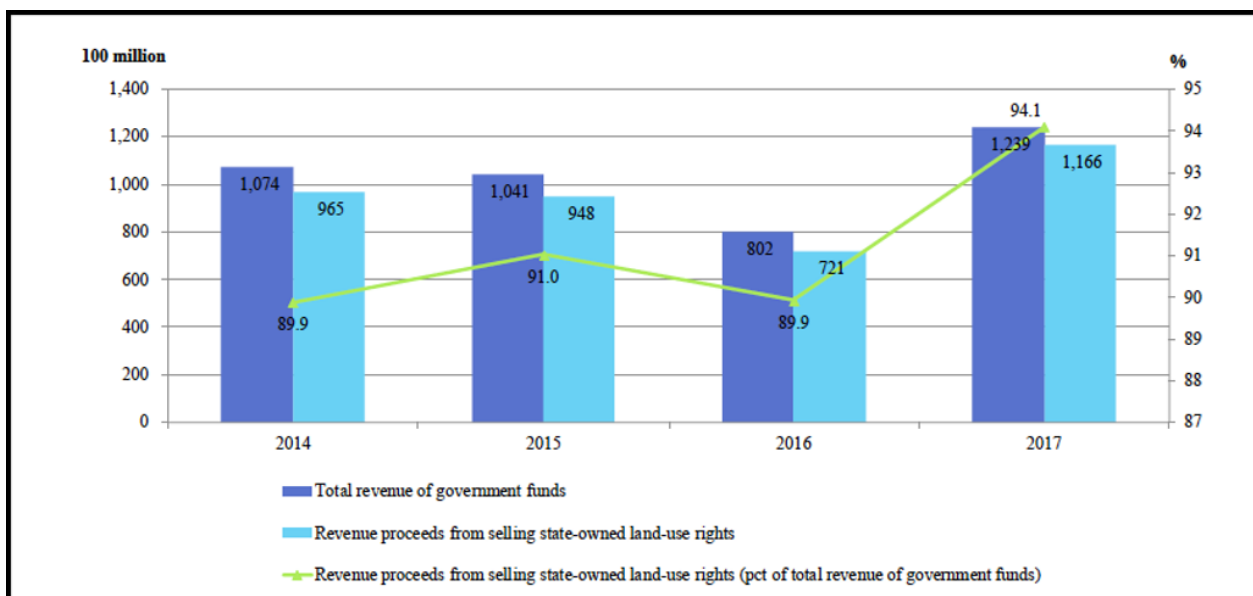
Figure 3.   Guangzhou's increasing reliance on land sales, 2014–2017 (CNY '000 million).
Source: Guangzhou Municipal Government (2018)

140,000 people. It has recently graduated from "poverty level" status and is the ideal city for "rebalancing" activities. While Jieshou's per capita incomes rose to CNY31,000/capita ($4600/capita) in 2017, this is still half the national average. Consequently, it has steadily lost population, as it is not able to provide sufficiently attractive public services and draw sufficient private investment for higher-income employment opportunities.

As of 2020, 23% of China's urban population live in cities of five million people or more. This equates to 202 million people. By comparison, around half the population lives in cities of less than a million people and fully 32% of all China's urban dwellers live in cities, like Jieshou, of less than 300,000 people. These smaller settlements are therefore home to 282 million people (United Nations Department of Economic and Social Affairs, 2018), and the numbers are growing. Although domestic and international attention has often focused on powerhouses such as Shanghai, Chongqing, Shenzhen and Guangzhou (Lamb et al., 2019), the "dual-circuit strategy" of the 14th FYP depends on creating jobs, attracting investment and providing a decent quality of life in much smaller cities, such as Jieshou. However, the Jieshou experience shows that it is not enough to provide connectivity and designate the city as a tech hub.

Fiscal pressures in Jieshou are beginning to mount, although shared revenues from the combined VAT/business tax accruing to the local government have actually increased over the two separate taxes, unlike in Guangzhou. There is less demand for land sales than in the metropolitan areas and, thus, smaller cities such as Jieshou rely much more heavily on fiscal transfers from higher levels of government. Central cuts to tax rates and reduced shared revenues have contributed to widening spending shortfalls, while ad hoc deficit financing fiscal transfers are deployed to meet budget deficit gaps. The consequence is that the Jieshou government has no effective hard budget constraint.

Jieshou is engaging in a flurry of contracts through urban development investment corporations (UDICs) and local government financing vehicles (LGFVs), accumulating liabilities that the local government is not likely to be able to cover in the future. Jieshou's stock of official debts approached 1000% of government revenues (Ahmad and Colenbrander, 2020). This limits the city's ability to provide adequate services and infrastructure as an alternate hub as activities are moved out of the larger metropolitan areas. However, it is hard to see Jieshou competing with the more dynamic high-tech hubs in the Shanghai-Wenzhou-Hangzhou corridor, which depend on research and innovation and strong agglomeration economies, and more labor-intensive activities might have to be developed if Jieshou is to become an "employment hub".

3.   Financing public investments, incentives and management of risks

Local governments' dependence on land sales to generate funds has fueled significant urban sprawl. Much of this urban expansion has been at the expense of productive agricultural land or fragile ecosystems such as deltas, increasing exposure to natural hazards (Wang et al., 2018). Nearly 130 million urban residents in China live in low-lying coastal zones less than 10 meters above sea level, where they are at particular risk of flooding, storm surge and (in the longer term) sea-level rise (Coalition for Urban Transitions, 2019). More important is the increase in fiscal risks, given the rise of off-budget borrowing through the UDICs leveraging land sales.

Local governments were prohibited from borrowing to meet current spending before 2015.

Table 2. A comparison of local governments' debt limits and debt outstanding, 2018 (CNY '000 million)

Provinces and cities	General debt			Special debt		
	Debt limit	Debt Outstanding	Debt completion	Debt limit	Debt Outstanding	
Beijing	2284.3	1860.41	81.4%	5452.1	2016.47	37.0%
Tianjin	1363.2	1333.33	97.8%	2099.3	2090.65	99.6%
Hebei	4931.6	4153.79	84.2%	2270.4	1997.18	88.0%
Shanxi	1890.72	1811.52	95.8%	837.08	767.04	91.6%
Inner Mogolian	5281.27	5219.55	98.8%	1076.23	997.82	92.7%
Liaoning	6684.5	6111.7	91.4%	2716.2	2343.54	86.3%
Liaoning (without Dalian)	5312.2	4835.53	91.0%	1944.4	1680.6	86.4%
Dalian	1372.3	1276.17	93.0%	771.8	662.94	85.9%
Jilin	2664.78	2353.13	88.3%	1020.92	840.14	82.3%
Heilongjiang	3046.2	2713.52	89.1%	755.8	741.05	98.0%
Shanghai	3664.9	2523.48	68.9%	3446.6	2170.7	63.0%
Jiangsu	7146.2	6668.48	93.3%	5957.1	5357.8	89.9%
Zhejiang	5769.5	5159.55	89.4%	4718.9	4079.54	86.5%
Zhejiang (without Ningbo)	4558.4	4178.46	91.7%	3983	3517.08	88.3%
Ningbo	1211.1	981.09	81.0%	735.9	562.46	76.4%
Anhui	3884.29	3415.27	87.9%	2737.81	2408.09	88.0%
Fujian	2997.4	2779.86	92.7%	3057.9	2682.9	87.7%
Fujian (without Xiamen)	2701	2525.55	93.5%	2719.3	2376.82	87.4%
Xiamen	296.4	254.31	85.8%	338.6	306.08	90.4%
Jiangxi	3108.61	2827.39	91.0%	1675.59	1441.69	86.0%
Shandong	6775.86	6189.75	91.4%	4440.94	4007.1	90.2%
Shandong (without Qingdao	5948.86	5558.23	93.4%	3913.34	3576.7	91.4%
Qingdao	827	631.52	76.4%	527.6	430.4	81.6%
Henan	4948.7	3648.68	73.7%	2316.8	1899.79	82.0%
Hubei	3604.3	3402.56	94.4%	2392.2	2312.97	96.7%
Hunan	5168.53	5092.13	98.5%	2718.77	2575.36	94.7%
Guangdong	6476.74	5297.35	81.8%	4253.86	3726.02	87.6%
Guangdong (without Shenzhen)	6176.14	5200.11	84.2%	4222.36	3706.02	87.8%
Shenzhen	300.6	97.24	32.3%	31.5	20	63.5%
Guangxi	3329.68	3049.76	91.6%	1983.12	1787.04	90.1%
Hannan	1212	1162.38	95.9%	622.3	556.88	89.5%
Chongqing	2441.6	2235.8	91.6%	1941.8	1782.7	91.8%
Sichuan	5489.9	5173.35	94.2%	3719.1	3323.57	89.4%
Guizhou	5528.47	5113.68	92.5%	3748.03	3493.48	93.2%
Yunnan	5383.22	4760.92	88.4%	2138.88	1963.6	91.8%
Tibet	145.3	77.46	53.3%	23	21.18	92.1%
Shaanxi	3471.29	3155.17	90.9%	2394.51	2240.26	93.6%
Gansu	1469.3	1397.3	95.1%	830.2	671.3	80.9%
Qinghai	1389.1	1253.21	90.2%	287.8	259.36	90.1%
Ningxia	1096.4	984.67	89.8%	279.5	241.59	86.4%
Xinjiang	2841.36	2706.64	95.3%	772.34	671.2	86.9%
Total	115489.2	103631.79	89.7%	72685.08	61468.01	84.6%

Note: General debt refers to the authorized limits for on-budget debt, mainly municipal bonds and borrowing, while special debt related to project-related bonds and borrowings
Source: Ahmad and Colenbrander (2020)

However, their UDICs could borrow using local government financing vehicles for capital investments—the so-called "golden rule". This policy was not always followed in reality, and the

UDICs provided convenient off-budget funding for all sorts of spending. In response to the global financial crisis in 2008–10, the central government used the UDICs and LGFVs to finance the CNY4-trillion stimulus. The consequent spiraling of subnational liabilities (see **Table 2**) is of urgent concern for the central government.

In 2015, there were two major fiscal reform initiatives: (1) local business taxes were incorporated into the VAT, completing its coverage in order to reduce the cost of doing business, given increasing wages and incipient trade tensions, and (2) local governments were permitted to issue bonds, in a bid to stem spiraling off-budget debt.

The integration of the local business taxes with the nationally administered but shared VAT has left no significant own source of revenues for local governments. Instead, they are expected to rely almost exclusively on shared revenues and transfers from the central government, as well as limited access to credit that has now been permitted under the 2015 Budget Law.

This reform has not reduced the risks inherent in sub-national operations, as access to credit requires that additional liabilities (e.g., both bonds and PPPs) should be financed by a jurisdiction's own-source revenues. Shared revenues, while important in closing vertical fiscal gaps, do not count, as they are not under the control of the recipient jurisdiction. As seen in **Box 1,** a sustainable level of debt in most Chinese local governments is zero.

Box 1. Why sustainable subnational debt issuance requires own-source revenues

The issue of subnational debt sustainability has been subject to a great deal of debate, including in Europe. Fiscal rules and debt break imposed a zero-borrowing limit on Germany's Länder states, as they have no own-source revenues (Ahmad et al., 2018). The fiscal rules have been suspended because of the pandemic, and there is some discussion as to what should follow so as not to discourage investment. Some argue that a "golden rule" might be more appropriate—this would be the equivalent of the special bond issuance for investment purposes in China. But the golden rule is hard to define precisely, and it is unlikely that project-related bonds or PPPs will avert budget recourse. This was seen in Spain in 2008 and the Mexican road financing disaster during the Tequila Crisis of the 1990s when local project liabilities contributed to a banking crisis that needed a bailout by the central government. The problem is magnified exponentially with weak subnational public financial management (PFM) and incomplete information that generate soft budget constraints. And in China, the post-1993–1994 LGFVs were meant to follow a "golden rule" but also became a major source of risk. The argument can be summarized as follows:

Start with the "Simonsen rule" for debt sustainability. For national governments, this links changes in liabilities, ∂L, to changes in revenue-raising potential, ∂R:

$$\partial L = f\left(\partial R\right)$$

where,

$$\partial R = \partial t . \partial B$$

Box 1. (continued)

where *t* is the set of tax instruments and *B* is the base. The Simonsen rule then translates into the famous relationship between the interest rate and the growth rate of the economy driving the revenue base in the medium term. For subnational governments, *s*, the subnational R_s can be decomposed into:

$$t_s B_s + \rho B_n$$

where t_s is own-source taxes in relation to a subnational tax base, B_s, and ρB_n is the share of national taxes meant to cover assigned spending, E_s. In the Chinese intergovernmental settlement post-1993/4, the revenue shares were meant to cover a set of agreed expenditures given the effective centralization of revenue bases and to close the resulting vertical gap. Thus, there is not much flexibility in reality.

Thus, in the Chinese provinces, $t_s = 0$ and $\rho b_n - E_s = 0$, even if the share of national revenues is untied, and so the first difference of available revenues is zero. Consequently, without own-source revenues, the sustainable level, ∂L_s, of subnational debt in China is zero (regardless of the type of the local bond issuance).

The even greater earmarking that has emerged from the current "decentralization" effort further reduces the ability of the local governments to meet debt liabilities and finance basic public services. Consequently, the incentives for local government are to continue to incur debt, especially through special instruments and PPPs that are not so easy to monitor, significantly adding to overall risk. While these pressures are seen in the metropolitan regions (Guangzhou) and capital city clusters (Nanchang), the most severe effects are on the Tier 3/4 cities (such as Jieshou) that could prevent them from becoming clean, compact and connected "sustainable hubs".

Source: Ahmad and Zhang (2020)

The revenue shares were adjusted in 2015 to ensure that provinces did not lose as a result of the integration of the VAT and local taxes on services. However, when overall tax rates were cut in 2019/20 to stimulate demand, subnational shares also fell as a consequence. Local budgets have been squeezed, affecting the ability of cities to provide basic services or invest in infrastructure.

While the aggregate public debt level for all levels of government is well within prudential limits given the resources of the central government, a telescoping downwards of spending responsibilities with limited resources generates deficits and liabilities that are hard to detect. This process poses heightened fiscal risks (Ahmad et al., 2018). As a result of concerns about growing subnational debt, the National Development and Reform Commission (NDRC) in 2018 frozen or canceled a large number of infrastructure investment proposals, such as metro systems, that would have been mainly financed by PPPs and borrowing.

In order to have an accurate picture of local assets and liabilities, a balance sheet is needed for each responsible level of government (as China has five levels of local government, very small jurisdictions carrying out functions for higher levels could be subsumed under a "responsible" level that also has the technical expertise to maintain balance sheets). Although China has adopted the

IMF's GFSM2014 format, balance sheet data even in the most advanced counties are incomplete, with significant problems in the coverage of liabilities in PPPs and public utilities (Ahmad and Zhang (2018) reported on an advanced county in Jiangsu province). This implies that the official figures underestimate the extent and severity of liabilities and the potential debt spirals at the local levels.

More recent investigations on the balance sheet in City T, a potential CCC in a very well-integrated part of the country, show that the true magnitude of liabilities is a multiple of the official reported figures. This is a major constraint on the full potential of City T to become an effective CCC. **Table 3** shows the official balance sheet of City T. **Table 4** reveals that explicit debt alone is double the amount shown in the official balance sheet, but that implicit liabilities are four times higher. These estimates do not include potential liabilities hidden in PPPs, which proved difficult to estimate accurately for City T and for which there is not sufficient provisioning in the local budget.

The bottom line is that City T is unlikely to be able to repay its rapidly accumulating debts, and indeed the full scale of its liabilities is not even clear. Without its own sources of local revenues and with the current design of fiscal transfers, the local government is incentivized to continue

Table 3. Local government balance sheet in country-level City T (CNY '000 million)

Assets (in 100 million RMB)		Liability and Net Equity	
Current Assets	**29.00**	**Current Liabilities**	**8.87**
Cash	19.64	Account Payables	7.78
Account Receivables	9.36	Note Payables	1.09
Non-fixed Assets	**19.92**	**Long-term Debt**	**28.00**
Net Plant	6.61	A.P. Transferred	26.48
In-constructions	12.00	Others	1.52
		Net Assets	**12.15**
Total Assets	**48.92**	**Liability and Equity**	**48.92**

Source: Ahmad and Zhang (2020)

Table 4. Estimated actual liabilities of City T government, 2018 (CNY, '000 million)

in 100 million RMB		**2018**
Explicit Debt	**55.76**	
Bonds	55.44	
New Issuance (2015-5018)		44.46
New Issuance 2015		1.24
New Issuance 2016		2.82
New Issuance 2017		12.07
New Issuance 2018		28.33
Repalcing (bonds issued before 2015		10.98
Others (can not be replaced)	0.32	
Implicit Liablity through LGFVs (approximately)	**80.00**	
Implicit Liablity including Government Procurement (approximately)	**147.00**	
PPP (approximately)	**98.00**	

Source: Ahmad and Zhang (2020)

increasing its deficits rather than strengthen its fiscal fundamentals. Many towns across China face the same constraints and perverse incentives as City T. The weakness in these local balance sheets should be a matter of concern for national agencies responsible for overall risk management.

Accurate and timely information on subnational liabilities is of tremendous national importance, but data are difficult to generate accurately. Thus, additional fiscal reforms, especially at the subnational level, are now needed to meet the 14th Five-Year Plan's objectives for improved quality of life and balanced economic development, while minimizing the impacts of trade shocks, environmental hazards and other risks.

4. Managing subnational fiscal risks for sustainable investments

A sustainable economic development strategy in China depends on tackling urban sprawl, congestion and pollution associated with the country's coastal megacities. This involves changing the direction of internal migration to compact, connected and clean cities in the interior. The strategy depends on location decisions of firms, creating employment opportunities, without which ghost towns can and do appear.

Both connectivity investments and local public services are needed to shift some of the lower value-added activities to the western and southern provinces, as well as encouraging less-polluting technologies and more efficient urban design. The BRI can help in changing relative costs and value chains. But delivering high quality of life and safeguarding local environments around these cities will depend on firms choosing cleaner technologies and processes. Rural development is of course essential, but successful rural development will also release surplus labor to urban areas. If all of these workers and their families continue to move primarily to the east coast, the pressure on public services and local infrastructure, as well as the cost of living and stress on local urban environments, will continue to mount.

Effective service delivery (particularly health care and education) is clearly needed to encourage the private sector to invest in less well-developed cities, such as Jieshou, and qualified workers to migrate there. The 14th FYP envisages a reassignment of spending responsibilities across levels of government, and together with the strengthening of local own-source revenues, there can be a reduction of pressure on local budgets, more sustainable access to private finance and better accountability for local spending.

Both national and subnational actions will be required to strengthen own-source revenue collection in Chinese provinces and cities. Tax legislation is solely under the National People's Congress (NPC), as China is a unitary state, while all tax administration is currently centralized into the State Taxation Administration (STA). Introducing subnational tax handles therefore depends on the NPC legislating bands for specific taxes (as it already does for a number of taxes on property transactions) and permitting provinces and cities from choosing their own rates within this band structure (Ahmad et al., 2020). A local tax administration is not needed.

There are two promising options for China to strengthen subnational governments' own-source revenue collection: (1) a surcharge or piggy-back on the national personal income tax (to replace the current sharing arrangement) and on a national carbon tax, and (2) the creation of a "beneficial" property tax on a recurrent basis to replace land sales. With a piggy-back model, the National

People's Congress typically sets legislation defining the tax base, while STA takes responsibility for administration; the local government then sets a rate at the margin within the band prescribed by national legislation. This model is already being used for a variety of taxes on property transactions (Ahmad et al., 2020), and so there is precedent within China.

A piggy-back offers multiple advantages, including greater local accountability and more sustainable access to private finance. This would also protect subnational budgets from national tax cuts, as the piggy-back, if denominated in a band rather than a surcharge, does not change as the national rate is adjusted. This is especially important in China today to ensure that the recent tax cuts by the national government successfully stimulate rather than contract demand, which may be the case if they drive local governments to slash spending on infrastructure and services such as health care.

4.1.   Tackling inequality: Piggy-back on income tax

The personal income tax has significant revenue potential given rapidly rising income levels in China. It is also the main instrument for achieving a more equitable interpersonal distribution of personal income (although not for redressing spatial imbalances). Currently, revenues from the personal income tax are shared between national and subnational jurisdictions, with the amount accruing to local governments determined on the basis of amounts collected in each province or city. A piggy-back on the personal income tax could easily replace this sharing arrangement, generating all the advantages outlined above: greater local accountability, more predictable local budgets and improved access to private finance with greater incentives for local fiscal responsibility.

A surcharge on personal income tax would have two additional advantages. First, it would allow provincial governments to more aggressively tackle interpersonal inequality by adopting a rate in the upper ranges of the prescribed bracket. Second, it generates incentives for the local government to share information on the lifestyles of taxpayers with the STA that can be used to diversify the tax base and prevent tax avoidance.

The current personal income tax in China draws largely on withholdings from formal sector wages and is regressive, as in other emerging market countries, such as Mexico. Since non-wage incomes (such as profits and rent) typically accrue to higher-income households and are hard to tax, the potential progressivity of personal income tax becomes difficult to achieve. The Ministry of Finance in 2019 increased the exemption limit for personal income tax in order to reduce burdens on poorer, fixed-income families, but this has had the perverse effect of further reducing the narrow personal income tax base. The improved information can further help to address interpersonal inequality if it provides information on low-income households that can be used for support in times of the pandemic. In short, reforming the current sharing arrangement for personal income tax could ultimately improve the efficacy of the central tax administration, improving the fiscal position of provinces, while helping to achieve distributional goals.

4.2.   Tackling air pollution and climate change: Piggy-back on a national carbon tax

Carbon pricing is widely recognized to be the most efficient way to drive down greenhouse gas emissions, enabling the market to identify the most cost-effective mitigation options. This is an important tool for China to peak emissions by 2030 (State Council, 2020) to meet the net-zero carbon emissions commitment by 2060. China has been experimenting with pilot emission trading

schemes in Beijing, Chongqing, Fujian, Guangdong, Hubei, Shanghai, Shenzhen and Tianjin. While not particularly successful so far, the Ministry of Ecology and Environment proposed to roll out a nationwide scheme in the 14th Five-Year Plan, initially including electricity generation and gradually expanding to other sectors. Once established, this would be the world's largest emission trading scheme.

A carbon tax could be adopted in tandem with this cap-and-trade arrangement (Ahmad et al., 2013), sending more powerful signals regarding the production of greenhouse gas emissions. It could easily be implemented in excise mode. A carbon tax would establish a critical base rate to reduce demand for carbon-intensive activities or consumption and improve the economics of cleaner technologies, practices and processes.

Moreover, a carbon tax would also permit a local surcharge or "piggy-back" to aggressively tackle severe pollution and congestion in the metropolitan areas that generate most of China's greenhouse gas emissions. A piggy-back would permit polluted provinces and metropolitan areas to impose higher marginal rates, creating a stronger incentive for firms and households to choose cleaner technologies. This would likely yield quick improvements in air quality and cut the carbon intensity of economic activity. Meanwhile, cleaner cities could impose rates towards the lower end of the band, thereby enjoying a new source of competitive advantage. The national base rate would prevent a "race to the bottom".

4.3. Making the equalization system work better

China had introduced a modern fiscal equalization framework in 1994 as part of the revenue-sharing reforms. This was designed to ensure that all provinces had the ability to provide similar levels of public services at similar levels of tax effort. However, local own-source revenues are needed in order for the system to work efficiently and not generate local incentives to exaggerate spending needs. It should be kept in mind that an equalization system creates the basis, or level playing field, for firms and workers to move to the most advantageous locations. In this regard, it offsets the advantage that richer regions would have, say, with a piggy-back, given the more advantageous tax bases, and prevents a further imbalance in service delivery that might enhance incentives to move to the richer areas.

A fiscal equalization system operates on current spending and while it is necessary to close the gaps in infrastructure that are at the heart of regional imbalances, it is not sufficient. A consistent investment strategy is needed to close the structural gaps in income-generation capabilities.

4.4. Tackling urban sprawl and environmental vulnerability: A beneficial property tax

A recurrent property tax[2] in China should not only provide an alternative to land sales but also provide own-source revenues that lay the basis for access to private finance on a fiscally sustainable

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2. It might be helpful to distinguish between recurrent and non-recurrent taxation of properties. A non-recurrent tax may take place when ownership of a property is transferred (e.g., a capital gains tax upon the sale of a property) or sees a significant increase in value as a result of public investment (e.g., a betterment levy upon local investment in mass transit). China uses a range of instruments to tax commercial and residential properties when they are transferred (see Ahmad et al. (2020)). However, these tax handles do not raise much revenue and the uncertain timing of transactions means that this is not an appropriate revenue stream for raising private capital. By comparison, a recurrent tax generates revenue on a regular basis and therefore is a more reliable revenue source for local budgets. There are typically two broad options for recurrent taxation of residential properties: (1) a US-style model that requires accurate information on the value of a property from up-to-date cadastres, and (2) simpler but more robust mechanisms that approximate valuation changes, such as the size and location of the property.

basis. Ahmad et al. (2020) examined the effects of "beneficial property tax" on revenues and income distribution in a sample of China's cities. This analysis drew on a survey of households and living conditions conducted in 2016 by the Chinese Academy of Social Sciences (CASS). The survey covered six capital cities: Guangzhou, Shanghai, Shenyang, Fuzhou, Wuhan and Xi'an. These are all megacities with over three million inhabitants. Shanghai, with a population of 27 million, is a metropolitan area with the status of a province. The smallest of the cities is Fuzhou with 3.7 million people. Guangzhou has the highest per capita GDP (CNY141,933) in the sample, followed by Shanghai (CNY113,500) and Fuzhou (CNY102,569), and are also the three coastal "hubs". Shenyang and Xi'an have roughly similar per capita GDPs around CNY70,000.

Ahmad et al. (2020) modeled the effects of raising 2% of city-level GDP through a beneficial property tax. This could be achieved with a relatively modest-sized and location-based tax on occupancy (and not ownership) in CNY/m^2 (see **Table 5**). Although the tax should be varied by locality and cost of services within cities, for simulation purposes Ahmad et al. (2020) linked the tax with city-level GDP. This was designed so that richer metropolitan areas are taxed at higher rates than poorer jurisdictions and was also roughly in line with the levels and costs of service delivery. For example, Table 5 shows that Guangzhou would generate the highest tax per square meter ($CNY121/m^2$) among the cities in the sample. This is due to its higher per capita GDP. By comparison, the tax in Xi'an is much lower, at around $CNY49/m^2$. This variation in property tax rates across cities would provide an important signal to firms and workers, incentivizing efficient use of land in richer cities, as well as investment in and migration to lower-income cities. In practice, the tax can be differentiated further by neighborhood within cities, but this is a subject for further works.

On its own, the property tax is progressive, using additional weights on the poorest groups (the Atkinson index) in Shanghai, Shenyang and Wuhan, but not in Fuzhou, Guangzhou and Xi'an. There is not much variation with the Gini coefficient, which focuses on the middle of the size distribution of income. To redress any regressive impacts, the revenues could be directly linked to local benefits, such as education or social housing, including for migrants. The benefit linkage makes the tax progressive in all cases. Achieving their education spending mandates is a major

Table 5. Projected impacts of a property tax to raise 2% of city-level GDP

Distributional impacts Atkinson index Aj, and Gini Coefficient Gj

City	Property tax 2% GDP (Y bn)	Current Education Spending (Y bn)	Property Tax (Y)/ m^2	Initial A_1	Tax Only A_2	Tax/ Benefit Education A_3	Initial G_1	Tax Only G_2	Tax/Benefit Education G_3
Guangzhou	39.2	32.12	121.4	.60	.76	.75	**.39**	**.40**	**.39**
Shanghai	54.9	84.10	90.81	.71	.51	.50	**.40**	**.41**	**.40**
Shenyang	10.9	11.51	52.68	.63	.49	.47	**.33**	**.34**	**.33**
Wuhan	23.8	23.11	85.11	.52	.47	.46	**.33**	**.35**	**.33**
Xian	12.5	11.96	48.8	.47	.57	.49	**.35**	**.36**	**.34**
Fuzhou	12.4	15.31	54.6	.51	.89	.55	**.36**	**.37**	**.36**

Note: Gini coefficient (G) and Atkinson index (A) are two different measures of interpersonal inequality. Atkinson index is more sensitive to lower-income groups.
Source: Ahmad et al. (2020)

Table 6. Beneficial property tax to finance education spending in Guangzhou's districts

RMB billion			
Districts	**2% GDP Property tax**	**Education Spending**	**Surplus/Defilicit in Financing**
Tianhe	7.60	2.43	5.18
Huangpu	6.01	2.17	3.84
Yuexiu	5.82	2.03	3.79
Panyu	3.51	2.96	0.81
Baiyun	3.28	2.66	0.63
Haizhu	3.10	2.08	1.02
Nansha	2.56	1.00	1.56
Huadu	2.34	2.24	0.10
Liwan	2.16	2.35	(0.19)
Zengcheng	2.09	2.63	(0.53)
Conghua	0.75	1.73	(0.98)

Source: Ahmad et al. (2020)

challenge for local governments in all the cases studied. A property tax raising around 2% of GDP would roughly cover current education spending in each of the cities, except Shanghai.[3] The Gini coefficients (G) reveal that a property tax linked to an education benefit would effectively reduce average inequality within all of the cities.

The simulations show that the precise form of a beneficial property tax should be decided by metropolitan governments based on their specific population and demographic profiles. Thus, a policymaker in Shanghai might prefer to impose a tax on all properties, as this in itself improves distributional outcomes in that city and raises sufficient revenues to replace land sales. With the higher share of low-income migrants in Guangzhou, the linkage with benefits (including for migrants) is important. In Fuzhou, where migrants have higher incomes, targeting benefits to migrants actually worsens income distribution. In all six cities, providing a universal educational benefit ensures a progressive outcome.

Beneficial property taxes also need to be accompanied by an equalization transfer system within provinces/cities to ensure a decent quality of local services across all districts. Otherwise, for Guangzhou, as shown in **Table 6**, the poorer districts of Conghua, Liwan and Zengcheng will fall short, while the prosperous districts of Huangpu, Tianhe and Yuexiu generate a significant surplus, which could reinforce inequalities among neighborhoods.

4.5. Information flows and managing local fiscal risks

Determining the overall resource envelope for the government over the medium term, and then apportioning debt limits across lower levels of government, will be critical for a fiscally sustainable urban transition. A key part of this will be determining the own-source tax handles for those levels of government that will be permitted access to capital markets, as explored in Section 4 above. The essential complement to this is ensuring full information on the liabilities generated through

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3. Shanghai has unusually high levels of spending on education, which contributes to its strong performance in international education rankings. This expenditure is partially made possible because of its joint provincial-metropolitan status, and so Shanghai benefits from the full provincial-level share of the VAT, unlike the other cities in the sample.

their borrowing and PPPs. In 2001, China introduced the IMF's Governance Finance Statistics Manual framework (GFSM2001/14), an integrated system for measuring fiscal stocks and flows at the central and provincial levels. Treasury systems were modernized at the same time, with the establishment of a nested system of Treasury Single Accounts for the central and provincial governments.

The adoption of the full GFSM2001/14 framework and the nested system of Treasury Single Accounts means that the central government should be able to track cash flows in the economy, establish more detailed spending targets for local officials and minimize the diversion of funds.

However, accrual accounting was only introduced at the provincial level in 2015 and local operations are still mainly managed on a cash basis. Liabilities are not recorded effectively in the budget and treasury systems or in local balance sheets. There is also a significant debt overhang from the countercyclical policies adopted between 2008 and 2010, when China's stimulus package was substantially financed through UDICs and LGFVs. It seems likely that local governments and their special-purpose vehicles will not be able to service this debt but will have to pass it on to the central government. While the central government has the capacity to handle subnational debts easily, it creates moral hazard and weakens the overall budget constraints. Yet without full information on levels of indebtedness, incentives remain for local officials to meet the detailed spending targets through further build-up of liabilities—as we have seen in Jieshou, where the full extent of the liabilities was a multiple of the figure reported in local balance sheets.

On the other hand, investors are becoming increasingly wary of lending to Chinese local governments. The central government has permitted the issuance of municipal bonds since 2015, expecting that these debts would be easier to monitor than those concealed off-balance sheets in UDICs, LGFVs and PPPs. However, since municipal bonds are not linked to own-source revenues, liabilities are not actually borne by the government that issues the bond. Similar issues arise with the less well-monitored financing sources, such as PPPs. In 2018, the NDRC paused the approval of PPPs to assess the repayment capabilities of local governments. As a result, 2,000 proposed infrastructure projects were suspended or canceled—including plans for new metro systems in Batou and Hohhot.

A core objective of the 14th Five-Year Plan is to position local governments to comply with sustainable fiscal targets in their jurisdictions. To achieve this, steps need to be taken to strengthen local governments' capacity to manage debt, both by increasing their own-source revenues through specific tax handles (as outlined above) and by generating full balance sheet information. Significant work is therefore needed to generate full information on arrears and liabilities within local balance sheets as a precondition for future access to credit, whether bank loans, bonds or PPPs (Ahmad and Zhang, 2020). Pending the development of full balance sheets, the weekly/monthly monetary survey by the People's Bank of China can, with certain assumptions, be used to monitor trends in credit usage and act as an early-warning mechanism for local problems in meeting spending mandates and financing liabilities.

The NDRC and the Ministry of Finance are already introducing more rigorous standards for infrastructure investment, requiring local governments to have fiscal revenues that are three times higher than under previous criteria, as well as tightening other indicators, such as population and GDP. Local governments are also expected to complete more robust feasibility studies, with clearer

cost recovery plans and realistic projections of passenger flow. With these new urban rail investment criteria, metro plans in 13 cities are under threat, including Guiyang, Kunming, Lanzhou and Xi'an.

This is not to imply that China should halt investment in much-needed urban infrastructure across the northern rust belt and central and western provinces. Rather, given the existing subnational debt overhang, the weakly developed subnational tax system and the risks involved with another 2009-type stimulus, the NDRC acted in a sensible manner, with a carefully targeted expansion of city-level clean investments. For example, in 2019 the NDRC authorized a bond issuance for CNY78.7 billion to finance a light rail system of 135 km in Jilin, a provincial capital in the northeast rust belt. Recognizing that neither the provincial nor city government would be able to handle the financing costs of the bond issuance, these will be met by the central government. The light rail investment will help to create a cleaner and more efficient city in the future, making Jilin more attractive for both workers and private investors. This may help to revive a deindustrializing city that is losing workers.

A financing strategy should be entirely in line with the medium-term objective of minimizing fiscal risks and using capital investments to stimulate regional economic development, while advancing distributional and environmental goals. If successful, the medium-term goal would then be to strengthen the provincial and city governments' balance sheets and repay existing debts so that they can undertake responsible borrowing and investment in the future.

5. Conclusion

The 14th Five-Year and Perspective Plan (to 2035) establishes clear goals of rebalancing to the interior for domestic consumption, while maintaining export competitiveness (the "dual circulation" concept). This also should help in meeting commitments to achieve net-zero emissions targets by peaking emissions by 2030 and addressing distributional and employment generation objectives. A consistent investment policy is needed together with a coordinated tax and financing regime.

First, it is urgent that provincial and city governments have own-source revenues with the authority to set the rate at the margin, within a centrally legislated band. Access to own-source revenues would improve local governments' accountability for service delivery and protect their budgets from the effects of national tax cuts. It would also create incentives for prudent fiscal management by enabling sustainable access to private finance. Carefully designed subnational tax handles can help the central government to achieve its distributional and environmental goals. Given China's unitary constitution, the NPC can legislate bands within which piggy-backs or surcharges can be imposed, and this proviso is already in use for property transfers. Options include:

(1) A piggy-back on personal income tax, especially in provinces and Tier 1 metropolitan areas. This would generate substantial own-source revenues for local governments. It could also reduce interpersonal inequality within provinces and cities in two ways: first, by increasing the marginal tax rate on high-income earners and second, by encouraging local governments to generate information that can expand the tax base beyond wages to assets, profits and rents.

(2) A local piggy-back on a national carbon tax. A national carbon tax would help to achieve environmental goals by signaling the importance of greenhouse gas emission reductions and

preventing a race to the bottom. A piggy-back on this carbon tax would permit the provinces and metropolitan areas with higher pollution to impose higher marginal rates, aggressively tackling congestion, air pollution and greenhouse gases.

(3) A "beneficial property tax", where a simple tax based on occupancy, location, property size and the cost of local service delivery is explicitly linked to specific public services, such as education. A beneficial property tax would help to achieve distributional goals by improving the taxation of assets and enabling vulnerable unregistered migrants to access services. A property tax that is clearly linked to benefits should reduce inequality, which would help to overcome political resistance.

The provincial piggy-backs would require a reformulation of the national equalization framework, and the beneficial property tax would require a within-province/metro area fiscal equalization. This is to ensure that all jurisdictions have the capability to provide similar levels of service at similar levels of tax effort.

Second, it is urgent to incorporate full information on liabilities into the relevant local balance sheets. The case studies of incomplete local balance sheets illustrate the extent of indebtedness at the county level. The GFSM2001/14 framework has only recently been introduced to sub-provincial governments and much more work needs to be done to fully record accruals. The framework should also be adopted by all levels of government as a precondition for debt financing or PPPs. Improved recording and monitoring of liabilities should be complemented by more stringent criteria for new infrastructure projects to ensure that all capital investments are helping to create compact, connected and clean cities in the interior to meet the objectives of the 14th Five-Year Plan.

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