Financing Urbanization in China*

Jian Zou†

January, 2025

Preliminary Draft

Abstract

China experienced rapid urbanization but sluggish economic growth in the 2010s, raising questions about why urbanization failed to drive economic development. I propose low-efficiency extrabudgetary financing by local governments for infrastructure provision under state-led urbanization as one reason. This paper studies the fiscal expansion of local governments and its welfare effects in the context of China's New Urbanization Plan (NUP). To conduct the study, I identify novel policy variations from the NUP pilot program and assemble millions of linked administrative records. I have three sets of main findings. First, pilot counties increasingly adopt public-private partnership (PPP) financing, engaging in larger projects and establishing projects with a potential "nominal equity but actual debt" issue, with evidence of potential collusion. Second, there is no evidence supporting that pilot units reduce reliance on land finance, but they allocate land to projects with lower floor area ratios and more commercial uses. Third, alongside anecdotal evidence of inefficient investments, pilot counties are estimated to experience a 1.7% loss in economic growth, as measured by nightlight intensity. This study provides new insights into fiscal federalization in post-socialist economies through the first comprehensive evaluation of fiscal expansion during China's recent urbanization scheme.

Keywords: Urbanization, Fiscal Expansion, Land Finance, Public–Private Partnership, China Economy
JEL Classification: H30, H77, O23, P21, R14, R51

*I acknowledge the Robert W. Harbeson Dissertation Fellowship and University Library Data Purchase Grant on financial support for the completion of this research. I thank Dan Bernhardt (University of Illinois) and Loren Brandt (University of Toronto) for their numerous guidance and support. Jacky Chen, Miya Hu, and William Wang provide excellent research assistance, and Zhenyu Wang helps with geocoding the Rural-Urban Division Code. The paper benefits from conversations with Benjamin Marx and Yao Luo. All errors remains mine.

†School of Industrial and Labor Relations, Cornell University, 335 Ives Hall, Ithaca, NY 14853. jz2326@cornell.edu.

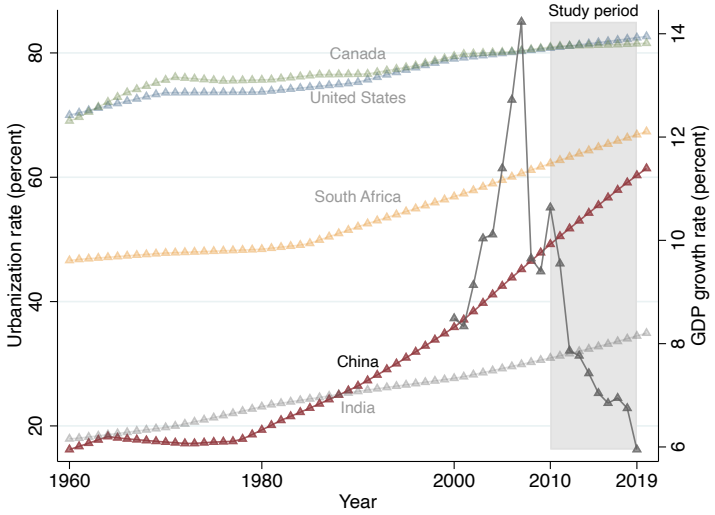
1 Introduction

China experienced a dramatic urbanization transition in the past half-century. Figure 1 indicates that China's urbanization rate more than tripled from 1980 to 2020, topping other countries (e.g., the US, Canada, South Africa, and India) during the same period. Classic urban economic models indicate a rapid urbanization contributes to the aggregated economic growth due to the agglomeration economies (Henderson, 2005; Duranton and Puga, 2014). However, in the 2010s, along with China's urbanization rate increases of around one quarter (from 49.23% in 2010 to 61.43% in 2020), the GDP growth rate decreased by about 44% from 10.64% in 2010 to 5.95% in 2019. The coexistence of dramatic urbanization and sluggish economic growth raises a puzzle about why urbanization failed to become an economic growth engine in China in the 2010s.

I propose the low efficient fiscal expansion of local governments for urban infrastructure provision as one reason. Figure 2 indicates the revenue structure of local governments between 2000 and 2019, highlighting the significance of extrabudgetary revenues. Most local governments' budgetary revenues (the total revenue) are from the tax revenue. In addition to budgetary revenues, local governments also have extrabudgetary (or off-budget) revenues, which have been financed for infrastructure projects through selling land use rights (or land transferring) since 2000. Starting in 2014, public-private partnerships (PPP) became another significant source of extrabudgetary revenues, which is, however, less studied in the literature.

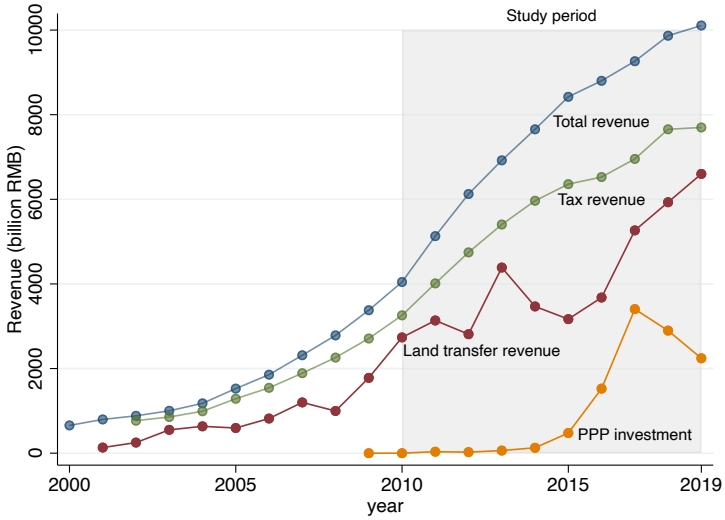
In this paper, I study the fiscal expansion of local governments in the context of New Urbanization Plan (NUP), the first and ever national plan on urbanization in China. NUP designs a pilot program that incentivizes pilot localities with top-down political agendas to adopt alternative extrabudgetary financing tools to finance urban infrastructure investment. Exploiting the novel pilot roll-out variance and millions of linked administrative data, I study the adoption of the pilot program on PPP and land finance during China's recent urbanization, its efficiency, and the overall welfare effect.

Figure 1: Urbanization and GDP Growth Rate in China



Notes: The left y-axis plots the urbanization rate between 1960 and 2020, measured as the percentage of total population living in urban areas, in China (maroon), Canada (green), United States (navy), South Africa (orange), and India (gray). The urbanization rate in China rises from 16.20% in 1960 to 61.43% in 2020. The right y-axis plots China's GDP growth rate between 2000 and 2019, measured by the annual percentage growth rate of the GDP at market prices based on constant local currency. The GDP growth rate in China drops from 10.64% in 2010 to 5.95% in 2019.
Sources: World Bank Open Data at https://data.worldbank.org/indicator.

Figure 2: The Significance of Extrabudgetary Revenue



Notes: The y-axis plots the revenue (in billion RMB) of local government in China between 2000 and 2019, for total revenue (navy), tax revenue (green), land transfer revenue (maroon), and PPP investment (orange). The total and tax revenue indicate the budgetary revenue of local governments in China, while the land transfer revenue and PPP investment present the extrabudgetary revenue. All revenues are re-scaled and deflated to 2019 RMB.
Sources: China Statistical Yearbook (2001-2020); China National Land Resource Yearbook (2002-2018); China Natural Resource Yearbook (2019-2020); and Ministry of Finance China Public Private Partnerships Center.

Economists have long proposed the negative long-term impact of the low efficient fiscal expansion of China's local government (e.g., Bai, Hsieh and Song (2016) on the four-trillion yuan fiscal stimulus program in 2009), but establishing causal evidence has been empirically difficult. For instance, localities experience larger fiscal expansion may have more credit access, policy benefits, distinct officer motivation, or different historical roots. These factors make localities that have fiscal expansion differ to those that do not. To overcome the issues, I study the fiscal expansion of local governments in the context of China's New Urbanization Plan. Although NUP pilot program selected pilot localities based on multiple considerations, the selection of pilot localities is unlikely to be random. Balanced treated and control groups are carefully selected to identify the policy variance, forming a novel county-level staggered roll-out from the pilot program for identification. In addition, I overcome data availability constraints by linking millions of self-collected administrative records, which provides a unique perspective to understand how the majority of local governments (i.e., county-level governments) in China finance their urban public goods. These investigations complement discussion in the literature that mostly focuses on financing at the level of prefectural cities or provinces where financing tools information is more available to researchers (e.g., Huang, Pagano and Panizza (2020); Chen, He and Liu (2020)).

China's central government has long believed that urbanization is a powerful engine for economic development. Since 2001, urbanization has been promoted as a national strategy. In 2014, the Central Committee and State Council jointly issued the "China's New Urbanization Plan (NUP), 2014-2020", in the goal of further pushing forward state-led urbanization. The top-bottom national urbanization plan conducts a pilot program where selected localities are assigned with specific reform agendas on using alternative financing tools to raise revenues for urban infrastructure projects. The pilot program consists of a 3-wave pilot scheme in areas ranging over 841 counties (about 30% of total counties) across the entire nation in the following 2014-2016 period. I identify a novel variation from the county-level roll-out to study the adoption of extrabudgetary finance, its efficiency, and the

overall welfare impact.

The pilot program encourages local governments to use alternative financing instruments, especially PPP finance, to reduce the reliance on land finance. To study the adoption of PPP and land finance and the overall welfare effect, I collect and link millions of administrative data between 2010 and 2019. First, I obtained a comprehensive PPP project database from the Ministry of Finance (MOF) that covers over 10,000 MOF-approved projects. I manually encoded the bid documents for these projects to understand how firms from the private sector participate in the PPP projects. Second, I use the universal land transaction records from the Ministry of Natural Resources to study land finance. In addition, I link a list of local government financing vehicles (LGFVs) managed by the China Banking Regulatory Commission (CBRC) to the land transaction records to study land financialization. Lastly, I assign the satellite nightlight intensity to highly granular community-level administrative divisions to estimate the impact on economic growth.

I have three sets of findings. First, pilot localities use adopt PPP finance to raise revenues. Pilot localities, on average, adopt 0.076 more PPP projects and raise 113 million RMB more investment from PPP projects, about a 50% and 93% increase relative to the mean of the dependent variable, respectively. The average investment per PPP in pilots is also 73 million RMB larger than that in control units, an 88% increase relative to the dependent variable mean. Pilot localities are also more likely to use the "government payment" or "viability gap funding", but not the "user charges", as the payment scheme. The choice of payment scheme suggests treated localities are more likely to adopt PPP projects that have the "nominal equity but actual debt" issue (Wang et al., 2020). To further examine the efficiency of PPP finance, I manually encode the bid documents to understand how firms in the private sector are involved in the PPP bid process. In the spirit of Chassang et al. (2022), collusion tests reveal that the winning firm often achieves a significantly higher evaluation score compared to the second-highest score, while the scores of the second and third-highest bidders are notably closer. This pattern suggests potential collusion between the winning firms and

local governments, where the winning firms may gain access to privileged information about the evaluation criteria, giving them an unfair advantage over other participants.

The NUP pilot program encourages the use of alternative financing tools to reduce the reliance of local governments on land finance. Thus, I next study the fiscal adoption of land finance of pilot localities following the New Urbanization Plan. The findings indicate that, while pilots indeed decrease the number of transacted land parcels, there is no evidence supporting that pilot localities reduce their reliance on land finance. The results show that there are not significant differences between treated and control counties on land conversion rate, land revenues, land area, and the likelihood of using LGFVs for land transactions. When investigating the efficiency of land finance, transacted land parcels in pilot counties have a lower floor-area-rate limit, a higher likelihood to be commercial land, and a lower likelihood to be residential land. These results indicate a lower efficiency use of transacted lands in the pilot localities.

Lastly, I examine the welfare effects of the pilot program. I begin by presenting anecdotal evidence from two pilot localities: Danzhou City in Hainan Province and Dushan County in Guizhou Province. Danzhou City embarked on the construction of the "Ocean Flower Island," the largest artificial archipelago project to date, while Dushan County accumulated a debt exceeding 40 billion RMB despite having an annual GDP of only 1 billion RMB. Both cases were marked by significant unfinished construction projects and instances of governmental corruption. Next, using nightlight intensity as a proxy for economic conditions, I formally estimate that pilot localities experienced an overall economic loss of 1.7% to 2.1% compared to the control group. Event study estimates reveal that economic conditions improved in the first year following the pilot program but showed statistically significant declines in the third and fourth years. This pattern suggests that pilot localities directed investments toward projects with lower returns in the long run.

The contributions of this paper are fourfold. First, this study directly speaks to the literature on urbanization in developing countries (for review, see Bryan, Glaeser and

Tsivanidis (2020) and Henderson and Turner (2020)), and specifically, urbanization in China (for review, see Henderson (2009)). Most studies in the literature focus on China's urbanization in the 2000s, while the discussion related to China's new urbanization scheme remains limited. Despite its significance, little is known about the assessment of the New Urbanization Plan.[1] This study provides the first investigation on the fiscal adoption of local governments for urban public goods provision under China's new urbanization scheme, with novel identifying policy variation and new linked administrative data, adding to the literature where we know every little about urbanization in developing countries.

Second, this paper contributes to the public finance literature regarding the adoption of land-based (Gyourko et al., 2022) and PPP finance (Wang et al., 2018; Fabre and Straub, 2023). Many studies have discussed the land finance model for urbanization in China.[2] As noted in Glaeser (2022) (pg. 14), "The Chinese model includes an unusual combination of limited property rights (the government technically owns all land) with implicit public subsidies of new development through a combination of eminent domain and public lending". However, the adoption of PPP finance in China's urbanization is less discussed in the literature. With the detailed investigation using comprehensive PPP projects, this study provides new discussion regarding how local governments adopt PPP finance and how the private sector is involved in government procurement through PPP projects during China's recent urbanization.

Third, this study offers new insights into the literature on fiscal federalization in post-socialist economies.[3] Previous studies have used fiscal federalization to explain China's economic growth following the reform and opening-up in 1978, emphasizing the role of

[1]The few existing studies that have evaluated the NUP are from Urban Studies, which are qualitative, correlative, and regionally specific (Chen et al., 2018, 2019; Chu, 2020; Peng et al., 2021). In addition, case-based studies might put a higher weight on experiences of urbanized regions (e.g., Chen et al. (2019)), potentially leading to non-generalizable conclusions.

[2]For example, see studies on how fiscal reform affects land finance and investment behaviors of local governments (Kung, Xu and Zhou, 2013; Han and Kung, 2015; Fu, 2015), and land use and urban sprawl during China's urbanization (Becker and Morrison, 1999; Lichtenberg and Ding, 2009; Anglin et al., 2014; Wang, Zhang and Zhou, 2020). Broadly speaking, this paper also adds new perspectives to urbanization in transforming economies (Becker and Morrison, 1999).

[3]See Qian and Weingast (1997); Qian and Roland (1998); Zhuravskaya (2000), among others.

intergovernmental competition in improving factor allocation. More recently, Song and Xiong (2024) proposed a theoretical framework that incorporates the element of short-termism within this framework of fiscal federalization. Building on this foundation, this study provides empirical evidence by leveraging a policy experiment designed by the central government to evaluate the welfare effects of fiscal federalization during China's recent urbanization scheme.

Lastly, this paper contributes a detailed investigation that complements recent macroeconomic literature on the slowdown of the Chinese economy (Bai, Hsieh and Song, 2016; Zilibotti, 2017; Chen et al., 2023). By examining extrabudgetary fiscal expansion in China, this study offers new evidence on the classic soft-budget constraints in post-socialist and transition economies.[4] Understanding the efficiency of fiscal expansion and its welfare effects provides important policy implications for China, particularly during this period of slowing economic growth.

The paper proceeds as follows. Section 2 provides background on urbanization and local government financing in China. Sections 3 describes the data and 4 presents the empirical strategy. Sections 5, 6, and 7 investigate the impact of NUP pilot program on PPP adoption, land finance, and economic growth, respectively. Section 8 concludes.

[4]See Kornai (1986); Kornai, Maskin and Roland (2003); Qian and Xu (1998), among others.

2 Urbanization and Local Government Financing

China experienced a dramatic urbanization transition during the first twenty years of the 21st century. The population living in urban areas in China has risen from 35.88% in 2000 to 61.43% in 2020, making it a major contributor to the growing global urban population. One of the significant phenomena in China's urbanization is urban sprawl, where suburban areas or urban-rural fringes are converted into urban areas (Henderson, 2009; Chan, Henderson and Tsui, 2009). The urban sprawl is largely motivated by the local governments' economic incentives, where urban development can bring revenues and the GDP development can bring them political promotion (Wang, Zhang and Zhou, 2020). These institution-shaped incentives create extensive new urban areas, ranging from building a whole new city center to industrial parks, creating the so-called "city-building movement" in China.[5]

The key to understanding the efficiency of waves of urban construction falls into the decision-making of how local governments finance the provision of urban infrastructures. I apply the regionally decentralized authoritarian (RDA) framework, developed by Xu (2011), to guide us on how institutions shape local governments' extra-budgetary financing decisions during the urbanization transition in China. The RDA regime characterizes a system featuring political centralization and economic decentralization, and local governments compete with each other on economic development for political promotion.[6]

In the following sections, I first discuss how local governments financed urban public goods for urbanization in the 2000s. In what follows, I introduce China's new urbanization scheme, which began in 2014, and its pilot program, illustrating how we can use the pilot

[5]One famous example is Ordos city in the Inner Mongolia Autonomous Region, where a new city center (Kangbashi district, a county-level urban division) was built between 2004 and 2015 with around 30,000 people in 2009. The Ordos city was then referred as a "ghost city" by the BBC (https://www.bbc.com/news/magazine-17390729)

[6]I draw a simplified framework of China's administrative hierarchy in the 2010s in Figure A1, based on NBS Rural-Urban Division Codes between 2010 and 2019. The hierarchy displays five authority levels: central (1st), provincial (2nd), prefectural (3rd), county (4th), and township (5th). Below the township level, there is a community level consisting of residents (urban) and villagers' (rural) committees, operating as an additional *de facto* authority organization. The central government is at the top of the hierarchy, while the local governments are the administrative units at the second to fifth levels.

program to understand and evaluate the financing of local governments for providing urban public goods.

2.1 Urbanization in the 2000s and Land Finance

Local governments rely heavily on land finance to raise fiscal revenues and fund their local infrastructure projects in the 2000s. Land finance refers to local governments selling land use rights to raise land transfer fees and collect relevant tax revenues from building projects based on the sold lands. Two institutional reforms jointly shaped the reliance of local governments on land finance for urbanization in the 2000s: the 1988 Constitution amendment and the 1994 Tax-Sharing Reform. The Constitution was amended in 1988 to allow the transaction of land use rights. The detail is specified later by Land Management Law 1998, which authorizes local governments as the sole seller of the use rights over the urban land in their jurisdictions. Land in rural areas is collectively owned and can only be transacted after being converted to state-owned land. The 1994 tax reform shifted the source of the local fiscal system from enterprise tax to land tax, resulting in local governments' increased reliance on income gained from selling land-use rights. This so-called "land finance" leads to local government's investment changes from industrialization to urbanization, as well as inefficient land use (Kung, Xu and Zhou, 2013; Han and Kung, 2015; Fu, 2015) and urban sprawl (Becker and Morrison, 1999; Lichtenberg and Ding, 2009; Anglin et al., 2014; Wang, Zhang and Zhou, 2020). Figure A2 subfigure (a) illustrates the conceptual framework on how local governments interact with the agricultural sector and use land finance to raise revenues.

Land finance has become a significant tool for generating extrabudgetary revenue for local governments. According to Chen and Kung (2016), land revenue accounted for less than 10% of extrabudgetary revenue before 1998 but experienced remarkable growth over time. By 2008, it constituted 79% of extrabudgetary revenue and approximately 38% of total fiscal revenue. Fang et al. (2016) further demonstrate that the average share of land

revenues in city fiscal budgets rose to 60% in 2009 and exceeded 70% in 2010.

2.2 The 2008 Great Recession and Land Financialization

The 2008 Great Recession dramatically reduced exports of China, which became one of the main drivers of economic growth. In response to the shock of reduction, the central government implemented a 4 trillion RMB stimulus package in 2009 to expand domestic demand, mainly in terms of infrastructure. However, most of the financing is transferred to local governments, forcing local governments to initiate Local Government Financing Vehicles (LGFVs) to raise revenues. LGFV provides a financing platform that allows local governments to use future land sale revenues as collateral to raise debt. With the involvement of banking sectors, land fiance is then transferred to land financialization. LGFVs become a growing issue for the fiscal revenue of local governments, leading to shadowing banking and off-the-sheet government debts (Bai, Hsieh and Song, 2016; Huang and Du, 2018; Chen, He and Liu, 2020; Wu, 2022). Figure A2 subfigure (a) illustrates the conceptual framework for land fiance, involving two sectors (agricultural sectors and local governments). Adding LGFVs to the picture, Figure A2 subfigure (b) illustrates the framework for land financialization, adding additional involvement from LGFVs.

2.3 The New Urbanization Plan (2014-2020)

China's central government has long believed that urbanization is a powerful engine for economic development. The central government first established urbanization as a national strategy in the Tenth Five-Year Plan in 2001, noting that urbanization "can provide a broader market and lasting engine for economic development."[7]

In March 2014, the plan, literally entitled *"China's New Urbanization Plan, 2014-2020"*, was announced jointly by the Central Committee and State Council.[8] The NUP is China's first national plan on urbanization, which covers comprehensive dimensions of urbanization issues and highlights the transition from land-centered urbanization to people-oriented urbanization.[9]

One of the major goals of the NUP is converting rural migrants into urban residents. First, the NUP mentions one explicit target as, up to 2020, on 60% population and 45% hukou population living in urban areas. Second, the press briefing of the State Council Information office also refers to this new urbanization scheme as people-oriented urbanization to distinguish it from the land-centered urbanization in the 2000s. Third, the plan was followed by complementary waves of *hukou* system reform in July 2014,[10] fully eliminating the migration restrictions about 46% of prefectural cities (Liu, Xu and Zou, 2024).

[7]The Tenth Five-Year Plan: https://www.gov.cn/gongbao/content/2001/content_60699.htm.

[8]China's New Urbanization Plan (2014 - 2020), issued on March 16, 2014, http://www.gov.cn/zhengce/2014-03/16/content_2640075.htm. Also see the press briefing from the State Council Information Office, March 19 2014, http://www.scio.gov.cn/ztk/xwfb/2014/30634/30639/Document/1366872/1366872.htm.

[9]In November 2013, the guiding principles of the plan were mentioned in the Third Plenum of the 18th Central Committee of the CCP, also highlighting the economic role of this new urbanization plan. Note that the CCP Central Committee holds seven plenums (or plenary sessions) every five years. Each plenum has its own conventional goal, with the third one focusing on the major economic reforms. For example. the "Reform and Opening Up" policy was proposed in the Third Plenum of the 11th CCP's Central Committee in 1978.

[10]See *The State Council's opinions on further deepening of hukou system reform*, issued on July 30, 2014, at http://www.gov.cn/zhengce/content/2014-07/30/content_8944.htm.

2.3.1 NUP's Pilot Program

To facilitate policy learning of the implementation of this national urbanization plan, the leading National Development and Reform Commission (NDRC), along with 10 commissions and ministries, conducted a 3-wave pilot scheme in areas ranging over 841 counties (about 30% of total counties) across the entire nation in the following 2014-2016 period[11]. Figure 3 visualizes the roll-out variance, and Figure A3 displays the list of the pilots by roll-out wave.

Five guidance-type goals are set for the pilot program: 1) establishing cost-sharing mechanisms for converting rural migrants to urban residents; 2) establishing diversified and sustainable financing mechanisms for urbanization; 3) reforming the rural homestead system; 4) exploring administrative management innovation and cost reduction; 5) Promoting comprehensive institutional reform and innovation.

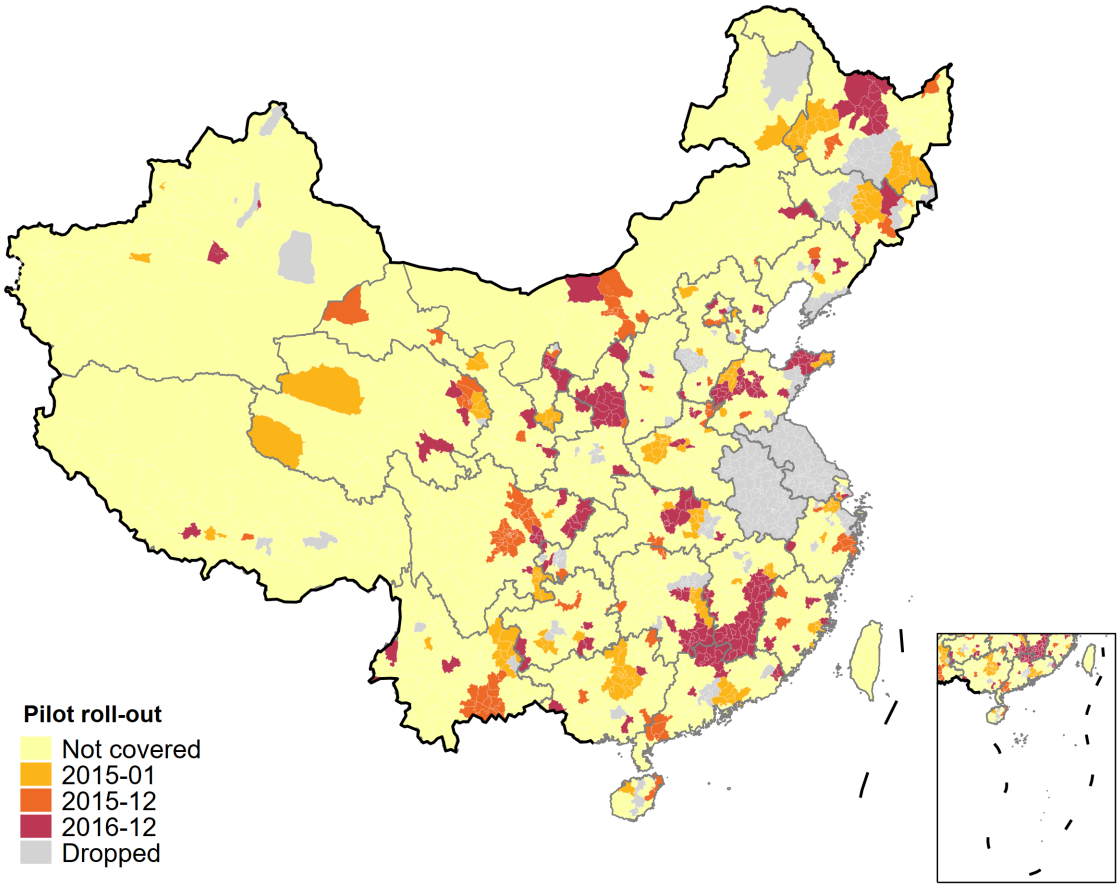
In addition to the broad reform goals, each pilot is assigned to a tailored reform agenda. Through reading the reform documents for all pilots across the three waves, I found two of the most common reform agendas, both relating to the financing of pilot localities to implement urbanization. The first one relates to fiscal-sharing of implementation on "converting rural migrants to urban residents". This goal is intended to be fulfilled using the inter-governmental transfer. The second one is the "diversification of financing," which relates to the use of alternative financial tools, instead of land finance and LGFVs, to finance infrastructure projects in urbanization.[12] Among the alternative financial instruments, PPP is the most commonly mentioned (keywords include PPP, concession, social capital, and private capital).[13]

[11] See *"Notice on the Comprehensive Pilot Program of National New Urbanization"*, issued in June 2014, at https://www.gov.cn/xinwen/2015-02/04/content_2814341.htm.

[12] About 89% (26 out of 234) of the pilots have reform agenda related to "Diversification of Financing". Among the 26 pilots that do not have a "Diversification of Financing" agenda, 10 of them are township-level pilots, which might not have a great demand for infrastructure projects.

[13] Other tools include special funds, policy-oriented or development finance institutions, intergovernmental transfers, and financial subsidies or support (from upper governments).

Figure 3: The New Urbanization Plan Pilot Scheme Roll-Out



Notes: The map shows the roll-out variance in three waves (2015-01, 2015-12, and 2016-12) for localities of the New Urbanization Plan's pilot program. "Not covered" counties are localities not selected in the pilot program, and "Dropped" counties are those excluded from the estimation sample (see the main text for details).

2.3.2 Identifying Pilot-Program Variation

The pilot program is unlikely to select pilot localities randomly. Thus, potential endogenous issues (e.g., selection bias) should be addressed before exploiting the variation. I first argue that a locality is selected for the program due to multiple considerations. However, almost all chosen localities are assigned a reform agenda of adopting diversified financing, regardless of their baseline extrabudgetary condition. While the rationale of not having a single selection criterion might mitigate the selection issues, the administrative hierarchy of pilot localities could generate different incentives and constraints. For example, provincial pilots in general face fewer financial constraints, as they have a large tax base and more financing tools (e.g., issuing bonds). In addition, provincial pilots that have a greater capacity to undertake policy experiments and acquire policy learning may have a greater chance of getting chosen (Wang and Yang, 2021). These two considerations also apply to the three separately listed prefectural cities (jihua danlie shi) and seven provincial capital cities selected into the pilot program in wave one.[14] Therefore, I exclude these localities from the analysis. I also dropped all counties containing the piloted townships because the most disaggregated level of the employed data is at the county level. The spatial distribution of these excluded pilots is plotted in gray in Figure 3.

Table 1 provides supporting evidence for this argument, which presents the determinants of being selected for the pilot program, using both the full and restricted sample. Column (1) presents the determinants of selection into the pilot program for all pilot units ("full sample"), whereas Column (2) replicates the determinant exercise using only the pilot prefectures and counties as the treated units, excluding the pilot provinces, separately listed prefectural cities, and capital cities in wave one ("restricted sample"). The results in Column (1) show that

[14]Separately listed prefectural cities in China have a special status in regard to planning and budget, and they are economically independent of their provincial government. There are currently five separately listed cities in China: Dalian, Ningbo, Qingdao, Shenzhen, and Xiamen. Dalian, Ningbo, and Qingdao were selected for the pilot program in wave one. The seven selected provincial capital cities in wave one are Shijiazhuang, Changchun, Harbin, Wuhan, Changsha, Guangzhou, and the nine main districts in Chongqing. See Figure A3 for a detailed list of the pilot localities across waves.

counties with a higher share of employees in the secondary (i.e., manufacturing) industry, more fiscal spending, and a more substantial reliance on agriculture are more likely to be chosen. When looking at results in Column (2), however, most of the significant associations vanish, except the "investment in fixed assets". Fixed asset investment could reflect local governments' expenditures and experiences with urbanization-related projects, indicating the pilot program indeed favors localities with more experience in infrastructure investment. Overall, the comparisons across the two columns show that the treated and control counties in the "restricted sample" are balanced. The joint-test p-values also indicate that, after excluding the "investment in fixed assets", determinants in the restricted sample can not predict the likelihood of being selected into the pilot program (p-value = 0.7844). As a result, counties in the "restricted sample" are used as the analyzed units throughout this study. Although the policy variation is not as-good-as-random among the restricted sample, later I also present evidence on balancing pre-trends when examining the impacts of the pilot program to further mitigate the endogenous concerns.

Table 1: The Determinants of Being Selected into the Pilot Program

	Pr(Pilot program = 1)	
	Full sample	Restricted sample
	(1)	(2)
Basic information		
Administrative area (km^2)	-0.0000	-0.0000
	(0.0000)	(0.0000)
Hukou Population (10,000)	0.0016*	0.0001
	(0.0010)	(0.0010)
Employees in the secondary inductry (10,000)	0.0062***	0.0034
	(0.0024)	(0.0025)
Employees in the third inductry (10,000)	-0.0011	0.0001
	(0.0022)	(0.0022)
Economics conditions		
GDP (billion RMB)	-0.0035	-0.0049
	(0.0031)	(0.0036)
Value added of the first inductry (billion RMB)	-0.0061	0.0042
	(0.0109)	(0.0119)
Value added of the second inductry (billion RMB)	0.0025	0.0087
	(0.0048)	(0.0055)
Fiscal Expenditure (billion RMB)	0.0269**	0.0168
	(0.0110)	(0.0113)
Agriculture and industry		
Area of agricultural facilities (km^2)	0.0008***	0.0002
	(0.0003)	(0.0003)
Total grain production (1,000 tonne)	0.0001**	-0.0000
	(0.0001)	(0.0001)
Total value of output of above-scale industries (billion RMB)	0.0003	-0.0005
	(0.0005)	(0.0006)
Investment in fixed assets (billion RMB)	0.0070***	0.0061***
	(0.0015)	(0.0017)
Education and social security		
Number of students in elementary school (10,000)	-0.0318***	-0.0094
	(0.0090)	(0.0094)
Number of social welfare programs	0.0001	0.0000
	(0.0006)	(0.0006)
P-value of joint significance:		
Determinants	0.0000	0.0000
Determinants (excluding "investment in fixed assets")	0.0000	0.7844
R-squared	0.1303	0.0425
Observations	1,701	1,547

Notes: The table shows the determinants of a county being selected into the NUP pilot program, using county characteristics in 2014. The dependent variable 'Pr(Pilot program = 1)' is an indicator equals to 1 if the county is selected into the NUP pilot program and 0 otherwise. The independent variables are various county characteristics in four dimensions: *basic information*, *economics conditions*, *agriculture and industry*, and *education and social security*. The sample in column (1) uses the full sample, while the sample in column (2) uses the restricted list of counties (See main text for details). $***p < 0.01, **p < 0.05, *p < 0.1$
Sources: China County Statistical Yearbook 2014.

2.3.3 Public-Private Partnership

Public-private partnership (PPP) refers to the investment of the private sector to the public sector, especially on projects that require a large amount of investment. The PPP mode also often requires governments to contract out projects to the private sector for long-term operation. In a common Build-Operate-Transfer (BOT) model, companies from the private sector are responsible for financing and finishing the construction of the infrastructure project, operating the project for usually 20-30 years, and eventually transferring the project back to the government.

Chinese governments' utilization of PPPs tracked back to the Shajiao B power plant in Shenzhen in 1988. Since then, there have been two rounds of PPPs. The first round was in the 1990s, directed mostly at the water and power sectors, while the second wave happened in the 2000s, focusing on toll roads, water and sewerage projects, and city gas (Engel, Fischer and Galetovic, 2014). In 2014, the central government encouraged local governments to adopt PPP for infrastructure projects, parallel to the calling off of LGFVs. The new wave of PPP adoption has happened since the 2010s. The 2010s wave of PPP has not only been widely used in various transportation projects, but has also increasingly appeared in water, energy, communications, medical services, education, and many other projects.

In the NUP pilot program documents, one reform agenda is diversified financing. In many cases, local governments from the pilot program are encouraged to finance their infrastructures using the public-private partnership. Through PPP, governments purchase services from the private sector, while firms in the private sector participate in funding, building, operating, and eventually transferring infrastructures to local governments.

From the perspective of the public sector, contracting out projects to potentially more efficient firms mitigates financial risks and solves fiscal pressure. However, recent studies point out that local governments use PPP as an additional financial vehicle. The typical phenomenon is the "equity in name, debt in reality" (minggu shizhai) issue, which disguises PPP projects as fake equity but real debt to local governments (Wang et al., 2020).

3 Data

I assemble millions of administrative records from multiple sources and build three unique main datasets to investigate the extrabudgetary finance of local governments between 2010 and 2019 under the New Urbanization Plan. First, I obtain all public-private partnership (PPP) projects and collect the bidding information of PPP-participating firms to study PPP adoption. Next, I link the universal land transaction records with a complete list of LGFVs to study land finance and financialization. Lastly, I assign nighttime light intensity to highly granular committee-level administrative divisions to study the aggregated economic growth.

3.1 PPP Finance

PPP Project Data.— I obtain a comprehensive list of public-private partnership (PPP) projects from the China Public Private Partnerships Center housed by the Ministry of Finance (MOF).[15] Local governments need approval from the MOF to initiate the PPP project, and all approved projects are included in the China Public Private Partnerships Center database. The database contains 10,082 PPP projects between 2009 and September 2021. The dataset includes basic information for each PPP, as well as the bid evaluation documents and contracts. The basic information includes project identifier, project name, province, city, county, first industry code, second industry code, total investment, current stage (preparation, sourcing, or implementation), project initiation time, payment mechanism, project description, the scope of cooperation, terms of cooperation, contract type, procurement method, value-for-money evaluation assessment, and financial affordability assessment. For bidding documents, I manually digitize them and collect information regarding the participating firms, the winner, and their evaluation scores.

[15]The website for China Public Private Partnerships Center is https://www.cpppc.org/maintain.html, which has been under maintenance since 2023.

3.2 Land Finance

Land Transaction Records.— The land transaction records are obtained from the Ministry of Natural Resources (formerly the Ministry of Land and Resources), which is available at www.landchina.com. The data includes every land transaction record in China's primary land market.[16] Each record includes information about the transacted land parcel, including its location, area, sale price, use purpose, land source, sale method, quality level, land use right holder, floor-area ratio, issued authority, and contract time. I drop a few extreme cases with a transaction price of over 300 billion RMB and crosscheck statistics with those from the statistical yearbooks. Although some outlier prices exit in years prior to 2008, the aggregated annual transactions match well with those from the yearbooks for my study period (2010-2019), as Figure A4 indicates. I further winsorize the price at the 1% and 99% percentiles to mitigate potential outlier effects. Following Chen and Kung (2019), I include records that are in the following sales methods: bilateral agreement, English auction, invited bidding, and listing auction, accounting around 70% of all land transaction records.In the end, the land data analyzed in this study includes 1,885,255 transaction records from 2010 to 2019.

List of LGFVs.— To further study land financialization, where local governments use local government financing vehicles (LGFVs) to leverage funding via the land mortgage and land-secured loan from the banking sectors, I link the land transaction data with a complete list of LGFVs. The LGFV list is managed and maintained by the China Banking Regulatory Commission (CBRC), which is shared with the banks in China and updated quarterly.[17] The

[16]The primary land market consists of most land transactions in China. According to the calculation of Liu and Xiong (2018), the payment in the secondary land market only accounted for 3.75% of all land transactions from 2000 to 2015.

[17]There are two advantages of this LGFV list: First, this list includes the broadest LGFVs in China. Second, the list contains information on LGFVs even after these LGFVs became inactive or transformed into operation companies. An alternative for the LGFVs list is from the WIND database, a database that is widely used in finance studies provided by the Wind Information Company. However, the list from the WIND database only covers the LGFVs that issue bonds. Given that many LGFVs do not issue bonds and they tend to be very undetectable, the list of LGFVs from the CBRC is used in this study to obtain better coverage.

LGFV list I obtained was updated through the second quarter of 2019, which should include the majority of LGFVs for the year 2019, as the increase in LGFVs has been extremely small in recent years due to policy regulations. The list includes various types of LGFVs, regardless of whether they issue bonds or not, that can be linked to land transaction data to determine whether an LGFV purchased the land transaction. The land purchased by the LGFVs is more likely to be used to finance mortgages for raising local government revenue. The list includes 11,714 LGFVs as of June 2019.

3.3 Aggregated Economic Growth

Rural-Urban Division Codes.— To measure economic conditions at a precisely granular region level, I first collect the Urban-Rural Division Codes (RUDC) data from the National Bureau of Statistics (NBS).[18] The RUDC data includes all NBS-designated administrative division records of China, issued by the NBS in 2008.[19] The dataset includes the name and ID of all divisions and an urbanicity code for each community, the lowest level documented in the statistical-used administrative divisions in China. The RUDC codes comprise 17-digit, where the first 12-digit identifies the statistical use region code (i.e., province-prefecture-county-township-community), and the last five digit identifies the urban-rural division and urbanicity.[20] The RUDC code contains the first 12 digits that identify a region and the last three digits that identify the urbanicity. The urbanicity code has seven categories, including 111 (city center), 112 (city periphery), 121 (town center), 122 (town periphery), 123 (special area), 220 (township center), and 221 (village). The RUDC

[18]The data is obtained from NBS at: http://www.stats.gov.cn/tjsj/tjbz/tjyqhdmhcxhfdm, which is currently not available. Internet Archive provides archives of the website with one example at: https://web.archive.org/web/20210619071650/http://www.stats.gov.cn/tjsj/tjbz/tjyqhdmhcxhfdm/.

[19]See "No. 60 [2008] of the State Council": https://www.stats.gov.cn/sj/pcsj/rkpc/6rp/html/fu11.htm. As pointed out by Gan et al. (2019), this new standard for rural-urban division is mainly for statistical accounting use and is solely based on land contiguity. Thus, the rural-urban division is likely not capturing local integrated labor markets such as commuting zone areas measured by the commuting flows in developed countries (Duranton, 2015), night-light-based approach in developing countries (Dingel, Miscio and Davis, 2021), or the cellphone location data in China (Chen, Gu and Zou, 2024).

[20]See the rules documented by the NBS at: https://www.stats.gov.cn/sj/tjbz/gjtjbz/202302/t20230213_1902741.html.

analyzed in this study includes 6,789,166 communities from 2010 to 2019. In the end, I geocode the communities using the Baidu Map API to obtain their coordinates.

Satellite Nighttime Lights.— To measure economic growth, I assign the nighttime light intensity to the geocoded communities from the RUDC data. The nighttime light intensity data are from the Visible Infrared Imaging Radiometer Suite (VIIRS) satellite of the National Oceanic & Atmospheric Administration (NOAA). I use the V.2 VIIRS Nighttime Lights data produced by the Earth Observation Group, which provides a consistently processed time series of annual measures produced from monthly cloud-free average radiance grids spanning 2013 to 2019 (Elvidge et al., 2021). In comparison to China's yearbook-based GDP statistics, the nighttime light intensity should be a better measure for local economic situations (Martinez, 2022). I assign the nighttime light to the geo-referenced communities between 2013 and 2019 to get a precise and comprehensive measure of local economic circumstances in China.

3.4 Auxiliary Data

China County Statistical Yearbook.— I use China County Statistical Yearbook 2014 to study the determinants of being selected for the NUP pilot program. The yearbook data include various county characteristics, including basic information, economic conditions, agriculture and industry, and education and social security. In 2014, the data includes 2,079 counties.

Table 2: Summary Statistics

	Wave 1	Wave 2	Wave 3	Control
	(1)	(2)	(3)	(4)
Panel A. PPP finance				
Number of PPP	0.153	0.200	0.186	0.147
	(0.504)	(0.672)	(0.590)	(0.561)
Total investment (million RMB)	122.222	121.961	85.241	75.455
	(653.044)	(543.313)	(333.433)	(444.950)
Average investment per PPP (million RMB)	169.609	190.469	126.292	111.614
	(868.030)	(885.320)	(532.009)	(628.848)
Observations	1,850	1,250	2,220	19,500
Panel B. Land finance				
Land finance (county level)				
Log of number of land	3.490	3.644	3.429	3.279
	(1.056)	(1.043)	(1.007)	(1.102)
Land conversion	0.666	0.626	0.646	0.604
	(0.270)	(0.306)	(0.272)	(0.300)
Log of land revenue (million RMB)	10.676	10.813	10.512	10.030
	(1.673)	(1.702)	(1.582)	(1.893)
Log of land area (hectare)	4.357	4.246	4.124	3.845
	(1.152)	(1.234)	(1.255)	(1.429)
LGFVs	0.020	0.019	0.021	0.015
	(0.063)	(0.062)	(0.070)	(0.056)
Observations	1,350	860	920	16,310
Land use (parcel level)				
Floor-area-ratio (FRA) limit	2.033	2.108	2.135	2.191
	(1.373)	(1.534)	(1.582)	(1.632)
Commercial land	0.163	0.152	0.172	0.186
	(0.369)	(0.359)	(0.378)	(0.389)
Residential land	0.475	0.585	0.479	0.529
	(0.499)	(0.493)	(0.500)	(0.499)
Observations[#]	74,516	63,513	78,079	824,855
Panel C. Economic growth				
Nightlight intensity	-0.211	-0.048	-0.470	-0.522
	(1.655)	(1.732)	(1.552)	(1.641)
Observations	305,287	235,898	435,649	3,309,952

Notes: The table reports summary statistics of outcome variables of PPP finance, land finance, and economic growth by NUP pilot program roll-out wave. The mean is in the cell, and the standard deviation is in parentheses. Plane A includes county-year level PPP finance from 2,482 counties between 2010 and 2019, while Panel B consists of 1,040,963 land parcel transaction records from 1,944 counties between 2010 and 2019. Panel C includes 4,286,786 community-year nightlight intensity measures between 2013 and 2019. [#]The observations for 'FRA limit' are smaller (49,864, 32,681, 51,045, and 523,483, for each Column) due to missing variables. *Sources:* PPP project database 2010-2019 (Panel A), land transaction records 2010-2019 (Panel B), and nightlight intensity and rural-urban division code (Panel C) 2013-2019.

4 Identification Strategy

In this section, I present the baseline empirical specification investigating the impacts of the New Urbanization Plan pilot program on extrabudgetary finance and economic growth.

To identify the effects of the New Urbanization Plan's pilot program and verify the parallel pre-trends assumption of the DD framework, I first employ the following event study model:

$$\mathrm{Y}_{i,s,t} = \sum_{k=-5, k\neq -1}^{k=3} \beta_k \cdot \mathrm{Pilot}_{s,t} \times \mathbb{1}\left(t = t^* + k\right) + \delta_s + \delta_t + \epsilon_{i,s,t} \tag{1}$$

where Y_{ist} is the outcome i in county s and year t. The $\mathrm{Pilot}_{s,t} \times \mathbb{1}$ is an indicator where its value equals to 1 if county s implements the pilot program and zero otherwise. The δ_s is the county fixed effects, and δ_t is the year fixed effects. Last, $\epsilon_{i,s,t}$ is the error term clustered at the county level. The central requirement for identification in DD strategy is the parallel-trend assumption: the adoption of PPP and land finance and economic conditions would have experienced a similar trend in the absence of the NUP pilot program.

Next, I use the associated DD model, which shares the same setting with equation 1 but replaces the timing dummy group with a treatment indicator $\mathrm{Pilot}_{s,t}$. The $\mathrm{Pilot}_{s,t}$ equals to 1 if county s implements the NUP and zero otherwise. Formally, I employ the following DD model:

$$\mathrm{Y}_{i,s,t} = \beta \cdot \mathrm{Pilot}_{s,t} + \delta_s + \delta_t + \epsilon_{i,s,t} \tag{2}$$

The DD model will first be estimated with the traditional two-way fixed effects (TWFE) estimator, and then be re-estimated using the stacked DD estimator proposed in Cengiz et al. (2019) to address potential issues of the TWFE estimator when estimating dynamic treatment effects (See Roth et al. (2022) for an overview).

5 Urbanization and PPP Financing

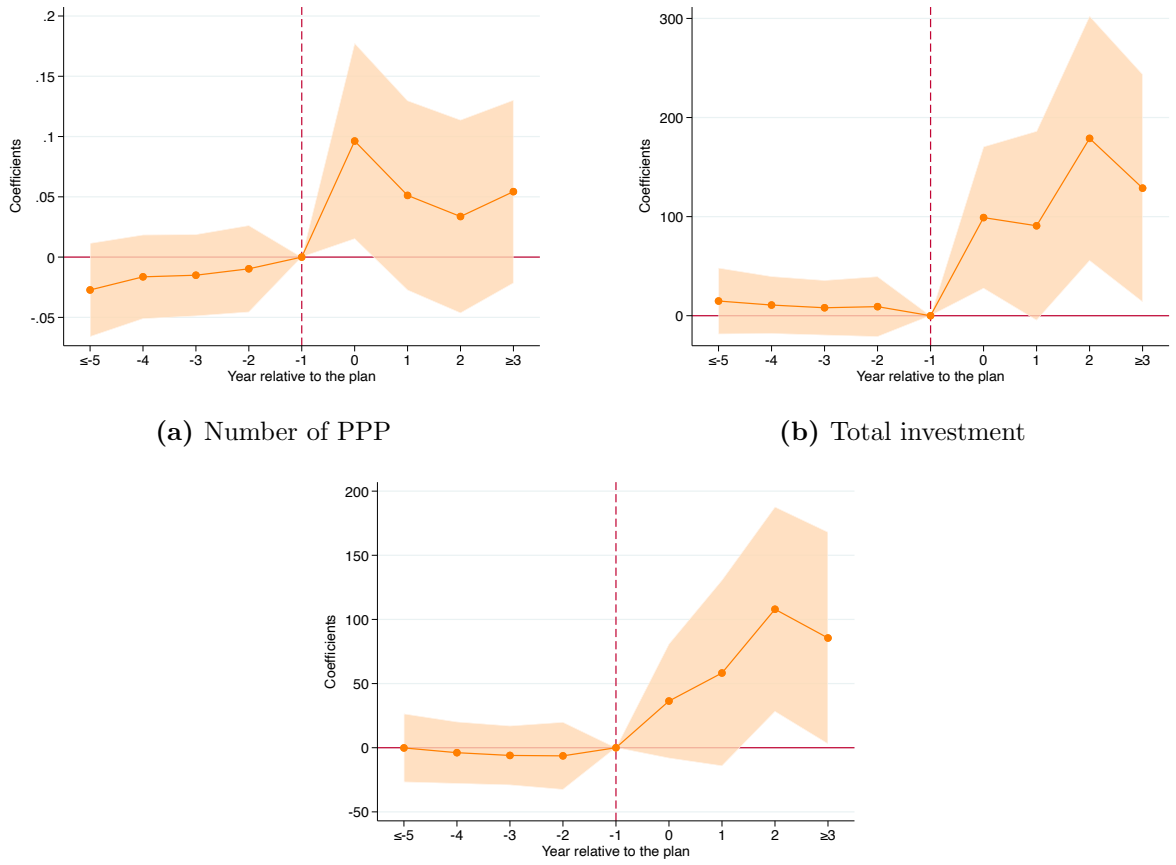
Figure 4 presents the event study estimates of the impact of the pilot program on the adoption of PPP finance. The adoption of PPP finance is measured using three outcomes for each county-year cell: the number of PPP projects, total investment (million RMB), and average investment per PPP project (million RMB). The results first show balancing pre-trends for all three outcomes, supporting the identifying assumption. In addition, the results indicate that pilots experience increased adoption of PPP finance in the post-period. The significant increase in investment from PPP finance lasts four years after the pilot program.

Table 3 presents the average treatment effects. Columns (1)-(3) in Panel A shows the estimates of the impact on PPP finance. Pilot localities on average adopt 0.076 more PPP projects, about a 50% increase relative to the mean of the dependent variable. Pilot localities raise 113 million RMB more investment from the increased PPP projects, a 93% increase compared to the dependent variable mean. The average investment per PPP in pilots is also 73 million RMB larger than that in control units, an 88% increase relative to the dependent variable mean. Panel B provides robust results using the stacked DD estimators to estimate the dynamic treatment effects. The results indicate a dramatic increase in PPP adoption in the treated localities following the pilot program.

With the large-scale increase in PPP project adoption, one question relates to the efficiency of PPP finance. Wang et al. (2020) notes that local governors have political incentives to use the PPP project as an alternative channel to raise revenue under fiscal pressure. A PPP project functions as an equity investment to local governments, where private sectors finance the construction and operation of the project while local governments purchase back the project later. However, local governors might use PPP finance to raise revenues as a debt investment, leading to the "equity in name, debt in reality" (minggu shizhai) issue. Analyzing PPP projects between 2014 and 2016, Wang et al. (2020) find that almost all PPPs funded by "government payment" and "viability gap funding" are nominal equity, and those financed by "user charge" are real equity. Following findings of Wang et al.

(2020), columns (4)-(6) in Panel A examine the ratio of PPP projects that are funded with different payment schemes. The results indicate that a higher percentage of PPP projects in the pilot localities are funded using the "government payment" or "viability gap funding" payment schemes, but not the "user charges". These findings indicate that pilots also adopt more PPP projects that are likely to have the "equity in name, debt in reality" issues, raising concerns about the efficiency of the PPP finance adoption during China's new urbanization plan.

Figure 4: Event Study Figure on PPP Finance



(a) Number of PPP

(b) Total investment

(c) Average investment

Notes: The figure shows event study estimates of the impact of the pilot program on PPP finance, using two-way fixed effects estimators. The dependent variables are the number of PPP projects, total investment (in million RMB), and average investment (in million RMB) per PPP project at the county-by-year level. Event period -1 is normalized to 0. The figures show the 95% confidence interval with standard errors clustered at the county level.
Sources: PPP project database 2010-2019.

Table 3: Impacts of Urbanization on PPP Finance

	PPP finance					
	PPP adoption			Payment scheme		
	Number of PPP (1)	Total investment (2)	Average investment (3)	Government payment (4)	Viability gap funding (5)	User charges (6)
Panel A. TWFE						
Pilot	0.076***	113.497***	72.623***	0.023***	0.025***	0.002
	(0.025)	(29.319)	(18.948)	(0.008)	(0.009)	(0.003)
Mean of dep. var.	0.154	121.221	82.159	0.041	0.052	0.006
R-squared	0.178	0.093	0.078	0.122	0.128	0.019
Observations	24,820	24,820	24,820	24,820	24,820	24,820
Panel B. Stacked DD						
Pilot	0.077***	117.922***	76.736***	0.024***	0.026***	0.001
	(0.024)	(28.857)	(18.626)	(0.008)	(0.009)	(0.003)
R-squared	0.174	0.090	0.074	0.120	0.125	0.015
Observations	63,820	63,820	63,820	63,820	63,820	63,820
County FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓

Notes: The table shows the estimates of the impact on county-level PPP finance, including PPP adoption (columns 1-3) and payment scheme (columns 4-6). The dependent variables in columns (1)-(3) are the number of PPP projects, total investment (million RMB), and average investment (million RMB) per PPP project. The dependent variables in columns (4)-(6) are the ratio of PPP projects that are funded using different payment schemes: government payment, viability gap funding, and user charges. Panel A shows estimates using the traditional Two-Way Fixed Effects (TWFE) model, while Panel B shows estimates using the stacked DD model proposed by Cengiz et al. (2019). All regressions include county and year fixed effects, with standard errors clustered at the county level. $***p < 0.01, **p < 0.05, *p < 0.1$
Sources: PPP project database 2010-2019.

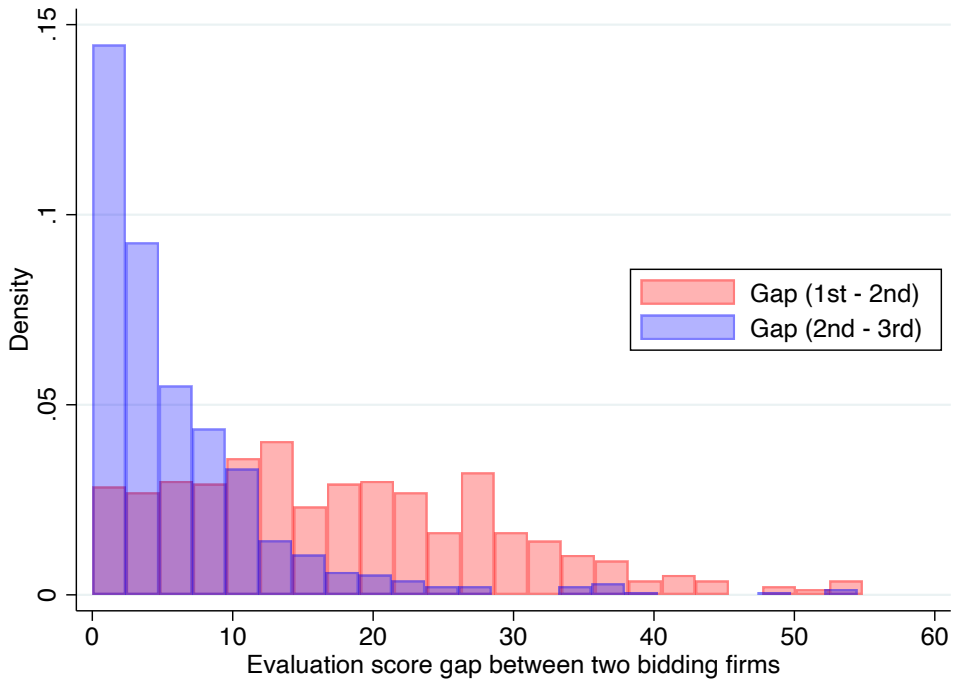
Another way to examine the efficiency of PPP finance is to look at how the private sector participates in PPP projects. Firms from the private sector are involved in PPP projects via open bidding. Figure A5 documents the basic process of open bidding. In an open bidding, local governments first make a public announcement, and several firms (applicants) will participate to bid. Governments then organize a review committee to screen out unqualified applicants in the pre-qualification stage. The qualified applications will continue to participate in the bid, and the review committee will evaluate their bidding documents using rubrics. In the end, the committee will recommend at least three candidates to local governments, ranked by their evaluation scores. Local governments then follow the recommendation and choose the firm with the highest score as the winner.

I use water and sewerage PPP projects as an example to document how firms participate in the bidding process. Building and upgrading wastewater treatment plants (WTTPs) is the most common demand for local government in the use of PPP projects during this period. Around 12% of the PPP projects relate to WTTPs between 2014 and 2019. Among the 943 WTTP PPP projects, I manually collected information from 560 projects with documents on the evaluation process, including recommended firms and their evaluation scores. Building on the insights from Chassang et al. (2022) on noncompetitive bidding in procurement auctions, I examine the evaluation score gap between firms with the first and second highest scores, and the gap between firms with the second and third scores. The intuition is straightforward: under competitive bidding, both gaps should be similar and close to zero, as firms with the first three highest scores bid competitively to minimize the gaps. However, when the bidding is noncompetitive, insider firms colluding with the government could obtain internal information before the bidding, leading to the result that the winner has a higher evaluation score and the other two candidates have similar scores.

Figure 5 directly tests the above hypothesis. The results indicate that the score gap between the first and second highest scores is distributed evenly across ranges between zero and 30, suggesting the winning firm wins the bid with a stronger application profile. However,

the gap between the second and third highest scores skews toward zero, indicating that firms at the second and third rank share similar information when participating in the bidding. These patterns suggest collusion between firms and local governments, at least for the water and sewerage PPP projects. These findings concern the efficiency of using PPP projects to raise investment for infrastructure.

Figure 5: Collusion Tests on PPP Bidding Firms



Notes: The figure shows the distributions of the gap between firms with first and second evaluation scores, and the gap between firms with the second and third evaluation scores from the PPP bidding process. The evaluation scores are encoded from bidding documents of all water and sewerage PPP projects between 2014 and 2019.
Sources: PPP project database 2010-2019.

6 Urbanization and Land Finance

The New Urbanization Plan pilot program encourages the adoption of PPP finance to reduce local governments' reliance on land finance and gradually clear out LGFVs to avoid increasing government debt. Thus, in this section, I investigate whether the pilot localities reduce their reliance on land finance and financialization.

Table 4 shows that, compared to the control group, pilot localities indeed have 8.44% ($e^{0.081} - 1$) fewer land parcel transactions (column 1) but have no significant changes on land conversion (column 2). At the intensive margins, the pilot program has no significant impact on local governments' land revenue (columns 3 and 4). Column 5 also indicates no evidence that treated localities are less likely to have land transactions through Local Government Financing Vehicles. The results in Panel B show robust evidence using the stacked DD estimators, and the event study figures in Figure A6 support the identifying assumption. These results support no evidence that pilot localities reduce their reliance on land finance and financialization when providing infrastructure projects for urbanization.

When studying land use efficiency, column (6) indicates that the floor-area-ratio (FAR) limit is lower in pilots than in the controls, suggesting less efficient land use. In addition, pilot counties have more commercial land transactions (column 7) and fewer residential land transactions (column 8). These government-led investments may be associated with long-term inefficiency, similar to the consequences following the investment stimulated by the 2008 fiscal expansion (Bai, Hsieh and Song, 2016).

Table 4: Impacts of Urbanization on Land Finance

	Land finance (county level)					Land use (parcel level)		
	Log(number of land parcel)	Land conversion	Log(land revenue)	Log(land area)	LGFVs	FAR limit	Commercial land	Residential
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. TWFE								
Pilot	-0.081**	0.005	0.044	-0.024	0.004	-0.132**	0.017**	-0.021*
	(0.038)	(0.011)	(0.052)	(0.043)	(0.003)	(0.061)	(0.007)	(0.011)
Mean of dep. var.	3.457	0.585	10.098	4.075	0.015	2.180	0.185	0.517
R-squared	0.651	0.560	0.742	0.617	0.159	0.274	0.127	0.293
Observations	19,440	19,440	19,440	19,440	19,440	657,073	1,040,963	1,040,963
Number of clusters	1,944	1,944	1,944	1,944	1,944	1,700	1,999	1,999
Panel B. Stacked DD								
Pilot	-0.085**	0.005	0.043	-0.027	0.004	-0.134**	0.017***	-0.021**
	(0.037)	(0.011)	(0.050)	(0.041)	(0.003)	(0.053)	(0.006)	(0.011)
R-squared	0.649	0.559	0.742	0.616	0.156	0.282	0.132	0.300
Observations	52,060	52,060	52,060	52,060	52,060	1,704,037	2,690,671	2,690,671
Number of clusters	5,205	5,205	5,205	5,205	5,205	5,245	5,260	5,260
County FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The table shows estimates of the impact on county-level land finance (columns 1-5) and parcel-level land use (columns 5-8). The dependent variables for "land finance" include total number/value/area of transacted land parcels, and percentage of transacted land as the rural-urban conversed land. The dependent variables for "land use" contain floor-area-ratio (FAR) limit, a dummy indicating if the parcel is a commercial land or a residential land. Panel A shows estimates using the traditional Two-Way Fixed Effects (TWFE) model, while Panel B shows estimates using the stacked DD model proposed by Cengiz et al. (2019). All regressions include county and year fixed effects, with standard errors clustered at the county level. $***p < 0.01, **p < 0.05, *p < 0.1$

Sources: Land transaction records 2010-2019.

7 Urbanization and Economic Growth

After documenting the PPP adoption and land finance of pilot localities under the New Urbanization Plan, the last question is about the overall welfare evaluation of the pilot program. In this section, I start with anecdotal evidence from two pilot localities on showy projects provided by the local governments. In what follows, I formally examine the impact of the pilot program on economic growth using nightlight intensity data at the community level.

7.1 Anecdotal Evidence

7.1.1 Danzhou city, Hainan province

One showy project example comes from Ocean Flower Island in Danzhou city, Hainan province. Ocean Flower Island is an artificial archipelago located off the north coast of Danzhou city. It covers an area of around 381 hectares (940 acres), placing it among the world's largest artificial islands (Figure A7). The Evergrande Group (real estate company) invested 160 billion RMB (US $24 billion) on the project, which consists of a mix of tourist attractions, residential complexes, and other infrastructure spread across three distinct islets.[21]

The project was initiated in late 2010, after the former CCP Secretary of Danzhou, Qi Zhang, took office in February 2010. The Evergrande Group obtained the sea-use right in 2013 and then the land-use right in 2015 for the construction of Ocean Flower Island. Danzhou city was selected for the first wave of the NUP pilot program at the end of 2014, and it was the only pilot from Hainan province in that wave. The original documents from the central governments did not include Ocean Flower Island as one pilot goal of Danzhou city. However, in the follow-up documents issued by Danzhou city, Ocean Flower Island

[21]See a video introduction provided by the South China Morning Post at: https://www.scmp.com/video/china/3094196/china-prepares-open-hainan-ocean-flower-island-worlds-largest-man-made-tourist.

became one of the projects that reflects the goal of the New Urbanization Plan.[22]

Later, Qi Zhang lost his office during China's anti-corruption campaign in 2019. Zhang's case was later made as a typical inquiry that highlights cronyism in the Central Commission for Discipline Inspection (CCDI) news.[23] Two issues mentioned in the news are related to the development of Ocean Flower Island. The first is that, while using land reclamation, Zhang divided the whole project into 36 sub-projects, each with an area of less than 27 hectares.[24] By doing so, the project completely avoids requiring permission and review from higher-level authorities on its construction. Second, the Environmental Assessment Report, by local environmental officers, in 2012 indicated that the nearest coral reefs are 4.1km distant from the project during the application of sea use. However, it was later discovered that there are several coral reefs in its within-1km southern sea regions. The partial development of Ocean Flower Island harmed the coral reefs and breached the law.

7.1.2 Dushan county, Guizhou province

Unlike Danzhou city, some of the counties in the pilot program are "impoverished counties" in China. The designation of "impoverished counties" allows these counties to receive higher budgetary transfers from the central government while indicating a lack of resources and chances to attract investment from significant property developers such as the Evergrand Group. However, some flashy projects were also being built, along with debt issues uncovered later among the local governments of these impoverished counties.

One famous example is the Shuisi Building in Dushan county, Guizhou province (Figure A8). Dushan is a county with a GDP of 1 billion RMB (and a population of 356 thousand) in 2018, yet holds a debt of more than 40 billion RMB in the same year. With a nearly 200 million RMB debt, Dushan county started constructing the Shuisi Building. The building has a construction area of 60,000 square meters, a height of 99.9 meters, and a total

[22]See news: http://hainan.sina.com.cn/news/hnyw/2015-11-27/detail-ifxmazmz8903678.shtml.
[23]See news: https://jjjcb.ccdi.gov.cn/epaper/index.html?guid=1408265715324026881.
[24]If the reclamation reaches 50 hectares, it must be approved by the State Council and the State Ocean Bureau, according to the legislation.

of 24 floors. The project started in September 2016, three months before Dushan County was selected for the third wave of the NUP pilot program. After being selected for the pilot program, Dushan County started some other costly projects, including a museum, a college town, a big data center, and so forth.

In addition, Sandu county, which is adjunct to Dushan county and is also selected for the third wave of the NUP pilot program, underwent some costly projects and faced the same debt problems as Dushan county. The County CCP Secretaries of both counties were taken a joint investigation by the CCDI in 2019. As of June 2020, the balance of government debt in Dushan County is 13.568 billion RMB, and the balance of government debt in Sandu County is 9.747 billion RMB.[25]

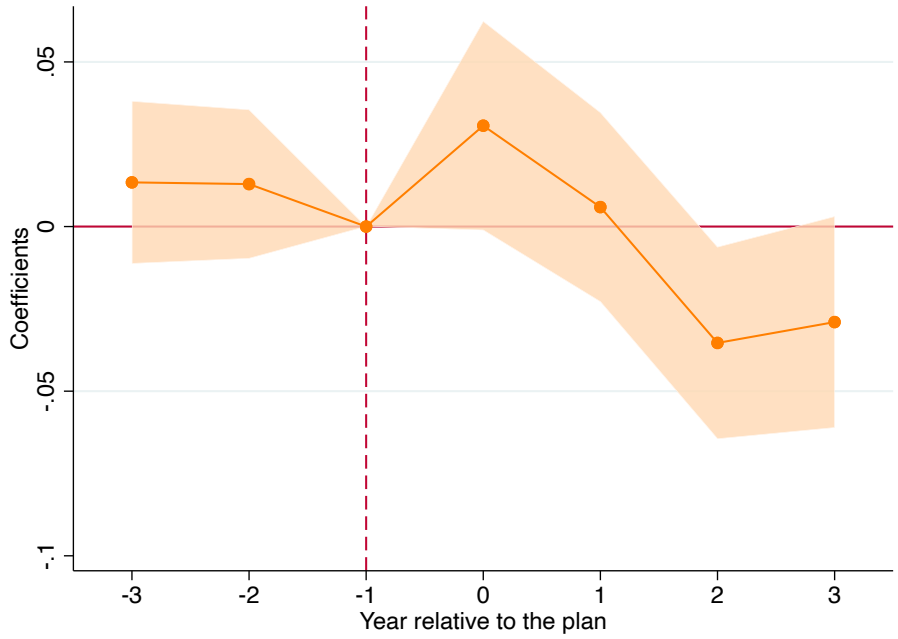
[25]See news at: https://www.ccdi.gov.cn/yaowen/202007/t20200716_222132.html.

7.2 Welfare Effect

Lastly, to formally examine the welfare effects of the pilot program on economic growth, I use the satellite nighttime lights between 2013 and 2019 as the outcome. The estimated average treatment effects are -0.017 (0.012) using the TWFE estimators and -0.020 (0.011) using the stacked DD estimators, where the standard deviations are in parentheses. Results indicate that the treated counties meet a 1.70% ($e^{0.017} - 1$) to 2.06% ($e^{0.020} - 1$) decrease in the nighttime light intensity, indicating an overall negative impact on economic growth among the NUP pilot counties.

The event study estimates in Figure 6 provide more informative evidence. Figure 6 shows an increase in nighttime light intensity in the first year following treatment, potentially driven by the investment shock. However, the welfare effect significantly declines in the third and fourth periods, indicating that pilot localities are investing in projects with lower long-term returns.

Figure 6: Event Study Figure on Night Light Density



Notes: The figure shows event study estimates of the impact of the pilot program on economic growth, using two-way fixed effects estimators. The dependent variables are the log value of night light intensity. Event period -1 is normalized to 0. The figures show the 95% confidence interval with standard errors clustered at the county level.
Sources: Urban-Rural Division Code and satellite nighttime lights 2013-2019.

8 Conclusion

I study the fiscal expansion of local governments' extrabudgetary revenues and its welfare effects within the context of China's New Urbanization Plan during the 2010s. Leveraging novel policy variations from the pilot program rollout and millions of linked administrative records, I have three sets of findings. First, pilot localities increasingly adopt public-private partnership (PPP) financing, with evidence suggesting potential collusion. Second, pilot localities do not reduce their reliance on land finance and allocate land to projects with lower efficiency. Third, alongside anecdotal evidence of inefficient investments in two pilot localities, the study estimates a 1.7% loss in economic growth for pilot areas. Event study results further indicate that pilot localities allocate more investments to projects with lower long-term returns.

This study offers the first comprehensive evaluation of local governments' fiscal adoption under China's New Urbanization Plan. It contributes to the literature by adding new perspectives on urbanization in China and the use of PPP projects for infrastructure investment in developing countries. In addition, it provides insights into fiscal federalization in post-socialist economies and complements recent macroeconomic research on China's economic slowdown, highlighting the classical soft-budget issues faced by local governments among post-socialist economies.

Several questions remain unanswered: How can alternative financing tools for public goods provision be used more efficiently while reducing local governments' reliance on land finance in China? How can public policies better align incentives between central and local governments within the fiscal federalization framework of transition economies? What are the impacts of China's recent urbanization scheme on economic performance in a longer run and on other dimensions? I see these explorations as promising avenues for future research.

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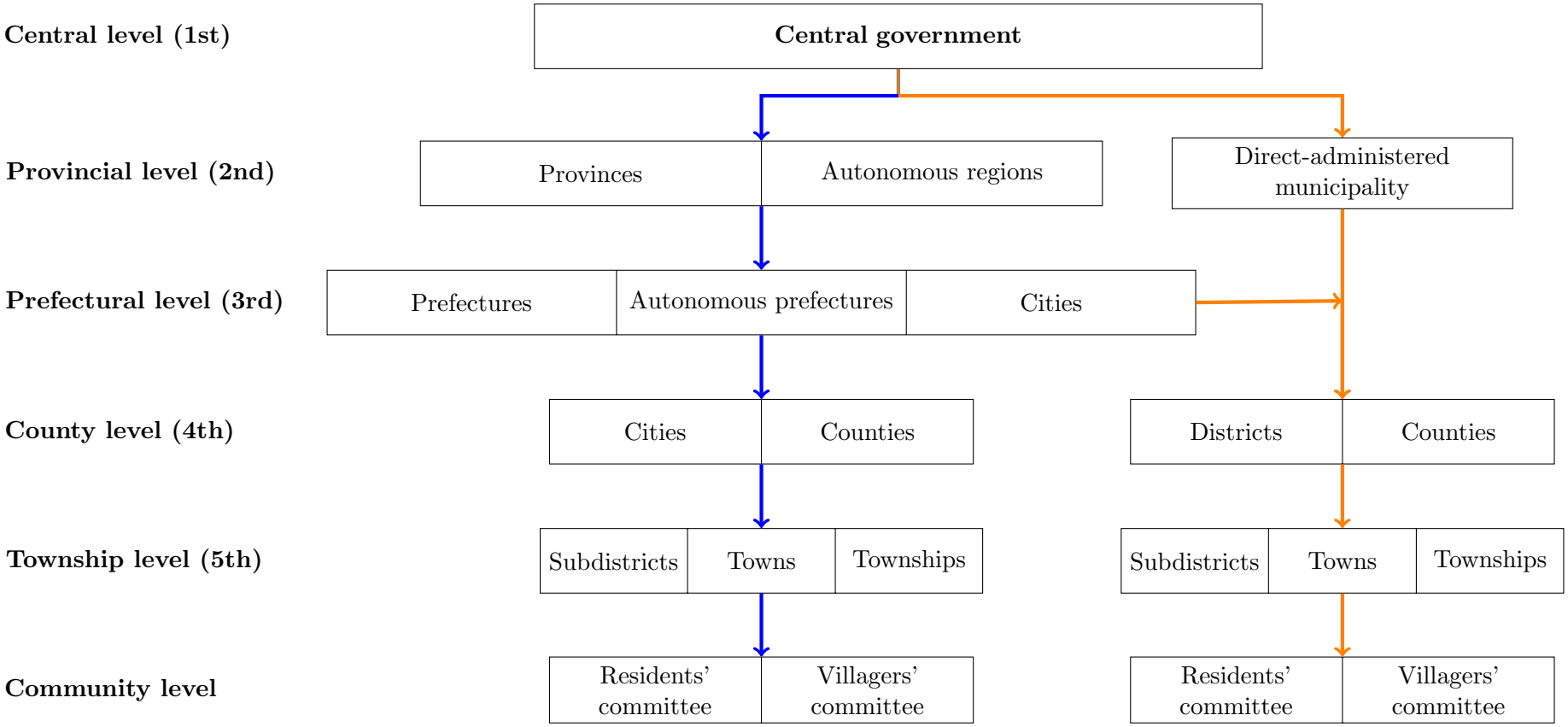
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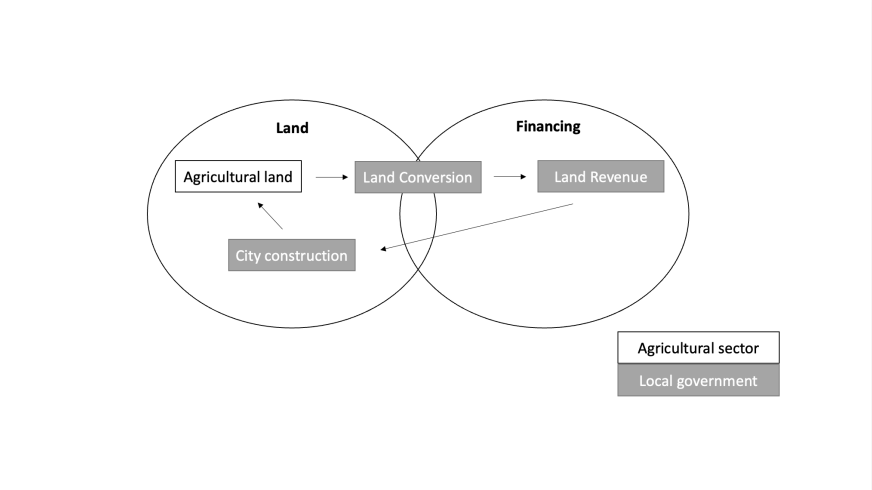
Appendix Figure and Table

Figure A1: China's Administrative Hierarchy in the 2010s: A Simplified Framework

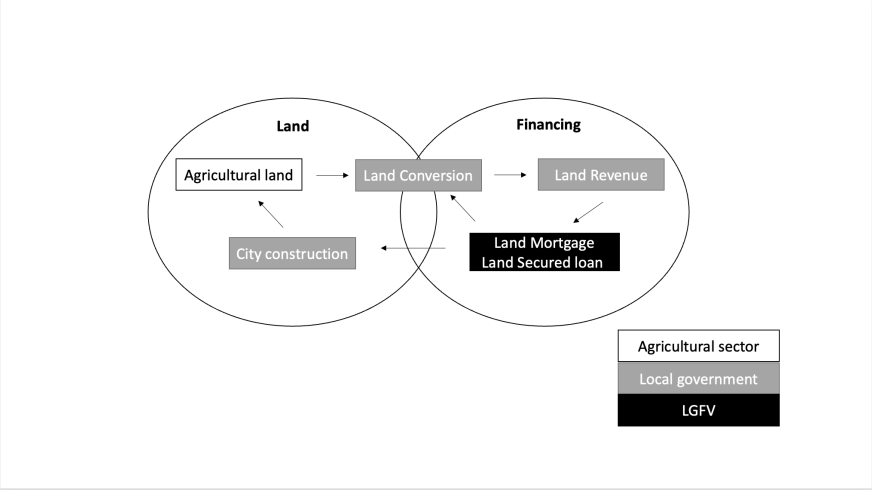


Notes. The figure plots a general framework for the administrative hierarchy of the People's Republic of China in 2010, based on the Urban-Rural Division Code 2010 and Census 2010, which includes all 31 provincial-level administrative regions in mainland China. China's official administrative division consists of five levels: central, provincial, prefectural, county, and township level. Under township-level jurisdictions, there are additional administrative units at the community level. The administrative hierarchy structure remains largely the same according to the Urban-Rural Division Code 2010-2019.

Figure A2: Land Financing of Local Governments in China



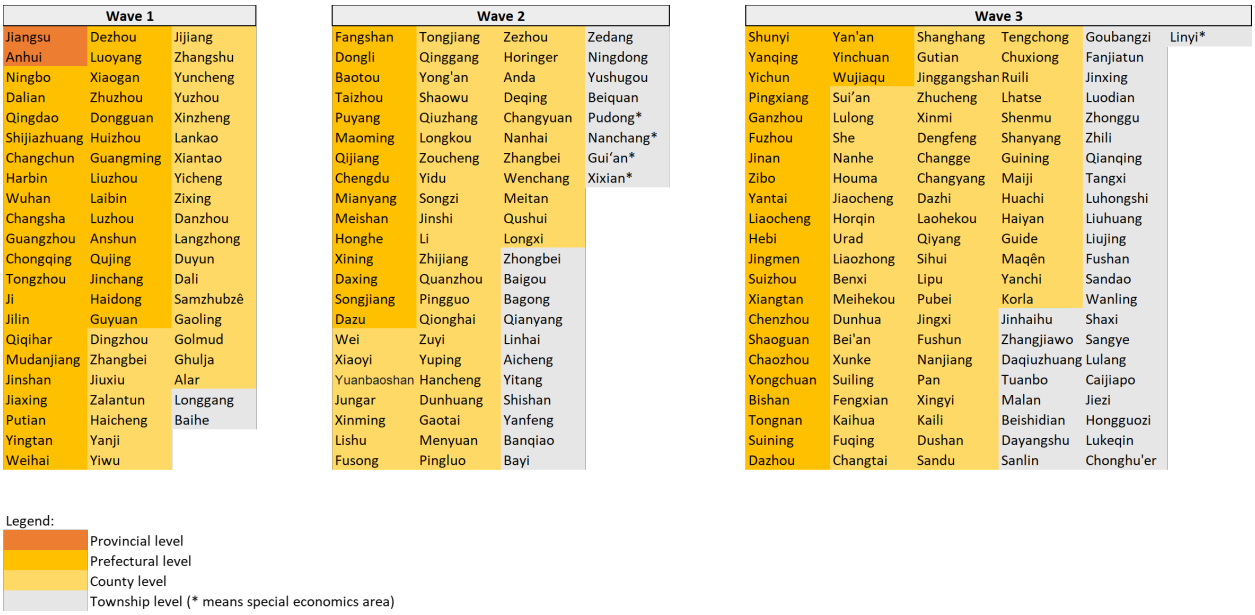
(a) Land finance



(b) Land financialization

Notes: The figure depicts the conceptual framework for local government land finance behaviors in China, based on the models proposed in Zhou (2012) page 237. Subfigure a depicts the land fiance pattern, whereas subfigure b presents land financialization when banking sectors are involved. The agricultural, local government, and LGFV sectors are highlighted in white, gray, and black, respectively.

Figure A3: The List of NUP Pilot Units by Roll-Out Wave



Wave 1		
Jiangsu	Dezhou	Jijiang
Anhui	Luoyang	Zhangshu
Ningbo	Xiaogan	Yuncheng
Dalian	Zhuzhou	Yuzhou
Qingdao	Dongguan	Xinzheng
Shijiazhuang	Huizhou	Lankao
Changchun	Guangming	Xiantao
Harbin	Liuzhou	Yicheng
Wuhan	Laibin	Zixing
Changsha	Luzhou	Danzhou
Guangzhou	Anshun	Langzhong
Chongqing	Qujing	Duyun
Tongzhou	Jinchang	Dali
Ji	Haidong	Samzhubzê
Jilin	Guyuan	Gaoling
Qiqihar	Dingzhou	Golmud
Mudanjiang	Zhangbei	Ghulja
Jinshan	Jiuxiu	Alar
Jiaxing	Zalantun	Longgang
Putian	Haicheng	Baihe
Yingtan	Yanji	
Weihai	Yiwu	

Wave 2			
Fangshan	Tongjiang	Zezhou	Zedang
Dongli	Qinggang	Horinger	Ningdong
Baotou	Yong'an	Anda	Yushugou
Taizhou	Shaowu	Deqing	Beiquan
Puyang	Qiuzhang	Changyuan	Pudong*
Maoming	Longkou	Nanhai	Nanchang*
Qijiang	Zoucheng	Zhangbei	Gui'an*
Chengdu	Yidu	Wenchang	Xixian*
Mianyang	Songzi	Meitan	
Meishan	Jinshi	Qushui	
Honghe	Li	Longxi	
Xining	Zhijiang	Zhongbei	
Daxing	Quanzhou	Baigou	
Songjiang	Pingguo	Bagong	
Dazu	Qionghai	Qianyang	
Wei	Zuyi	Linhai	
Xiaoyi	Yuping	Aicheng	
Yuanbaoshan	Hancheng	Yitang	
Jungar	Dunhuang	Shishan	
Xinming	Gaotai	Yanfeng	
Lishu	Menyuan	Banqiao	
Fusong	Pingluo	Bayi	

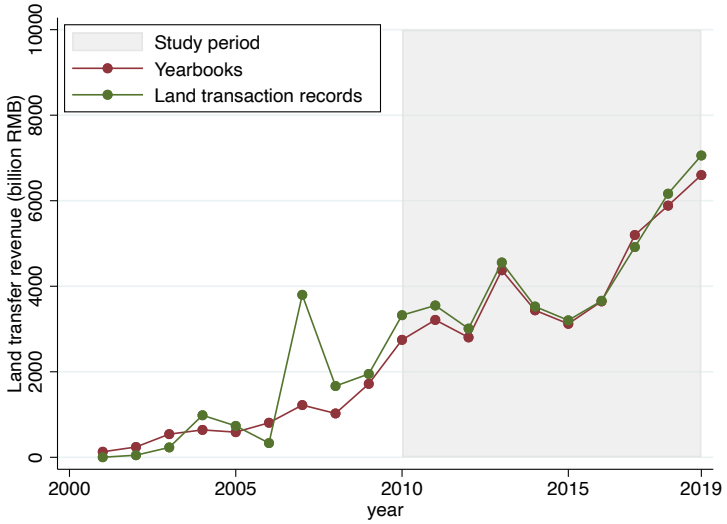
Wave 3					
Shunyi	Yan'an	Shanghang	Tengchong	Goubangzi	Linyi*
Yanqing	Yinchuan	Gutian	Chuxiong	Fanjiatun	
Yichun	Wujiaqu	Jinggangshan	Ruili	Jinxing	
Pingxiang	Sui'an	Zhucheng	Lhatse	Luodian	
Ganzhou	Lulong	Xinmi	Shenmu	Zhonggu	
Fuzhou	She	Dengfeng	Shanyang	Zhili	
Jinan	Nanhe	Changge	Guining	Qianqing	
Zibo	Houma	Changyang	Maiji	Tangxi	
Yantai	Jiaocheng	Dazhi	Huachi	Luhongshi	
Liaocheng	Horqin	Laohekou	Haiyan	Liuhuang	
Hebi	Urad	Qiyang	Guide	Liujing	
Jingmen	Liaozhong	Sihui	Maqên	Fushan	
Suizhou	Benxi	Lipu	Yanchi	Sandao	
Xiangtan	Meihekou	Pubei	Korla	Wanling	
Chenzhou	Dunhua	Jingxi	Jinhaihu	Shaxi	
Shaoguan	Bei'an	Fushun	Zhangjiawo	Sangye	
Chaozhou	Xunke	Nanjiang	Daqiuzhuang	Lulang	
Yongchuan	Suiling	Pan	Tuanbo	Caijiapo	
Bishan	Fengxian	Xingyi	Malan	Jiezi	
Tongnan	Kaihua	Kaili	Beishidian	Hongguozi	
Suining	Fuqing	Dushan	Dayangshu	Lukeqin	
Dazhou	Changtai	Sandu	Sanlin	Chonghu'er	

Legend:

- Provincial level
- Prefectural level
- County level
- Township level (* means special economics area)

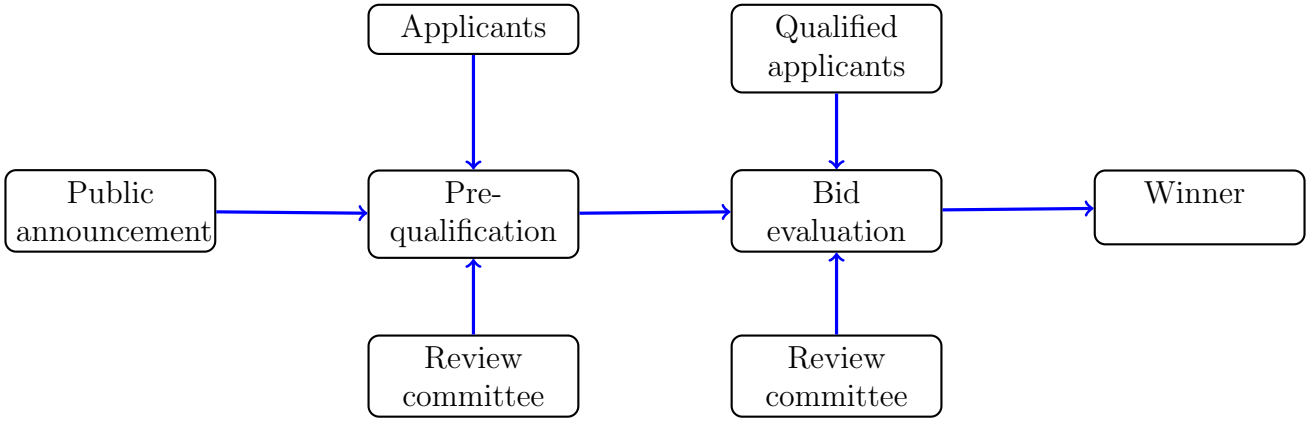
Notes: The figure shows the list of pilot units in the pilot program of the New Urbanization Plan by roll-out wave. "Chongqing" in wave one only includes the central nine districts in Chongqing municipality. "*" indicates special area units: "Pudong*" refers to the Lin-Gang Special Area in Pudong district of Shanghai Municipality; "Nanchang*" refers to the High-Tech Industrial Development Area in Nanchang city of Jiangxi province. "Gui'an*" refers to the Gui'an New Area located across Guiyang city and Anshun city of Guizhou province;"Xixian*" refers to the Xixian New Area located across Xi'an city and Xianyang city of Shaanxi province, and "Linyi*" refers to the Economic and Technological Development Zone in Linyi city of Shandong province.

Figure A4: Comparison of Land Transaction Records and China National Resource Yearbook



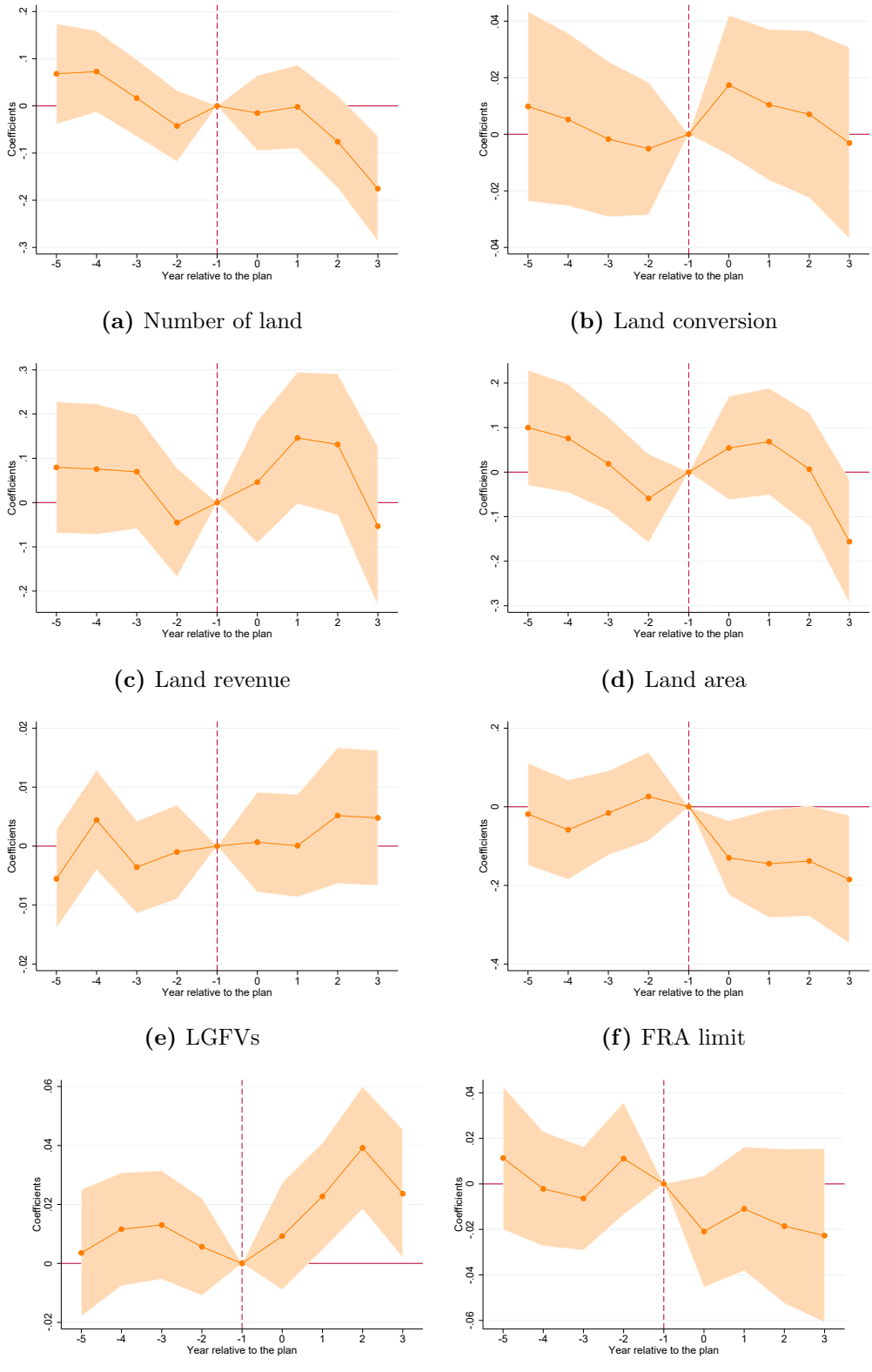
Notes: The figure compares the aggregated annual land transfer revenues between parcel-level land transaction records and annual statistics from yearbooks for the period between 2002 and 2019.
Sources: Land transaction records 2002-2019; China National Land Resource Yearbook 2002-2018; and China Natural Resource Yearbook 2019-2020.

Figure A5: Process of an Open Bidding in the PPP Project



Notes. The figure describes the process of a typical bidding process in the PPP project. The process involves four stages: 1) public announcement from governments; 2) a pre-qualification stage to screen out the unqualified applicants; 3) an evaluation process to rank the participating firms; and 4) the firm with the highest evaluation score is selected as the winning of the bid.

Figure A6: Event Study Figure on Land Finance and Use



(a) Number of land

(b) Land conversion

(c) Land revenue

(d) Land area

(e) LGFVs

(f) FRA limit

(g) Commercial land

(h) Residential land

Notes: The figure shows event study estimates of the impact of the pilot program on land finance and use, using two-way fixed effects estimators. The dependent variables are listed in Panel B of Table 2 Event period -1 is normalized to 0. The figures show the 95% confidence interval with standard errors clustered at the county level.
Sources: Land transaction records 2010-2019.

Figure A7: Ocean Flower Island



Notes: The figure shows a natural-color image of the Ocean Flower Island located in Yangpu Bay, Hainan province. The image is taken on 6 May 2020, by Lauren Dauphin from NASA Earth Observatory images, using Landsat data from the U.S. Geological Survey.
Sources: https://earthobservatory.nasa.gov/images/147129/a-sandy-flower-in-the-pacific.

Figure A8: Shuisi Building



Notes: The figure shows the Shuisi Building located in Jingxingu Scenic Area, Dushan county, Guizhou province.
Sources: https://news.cgtn.com/news/2020-07-15/What-will-happen-to-Dushan-County-s-Shuisi-Building--S8ZbeYzMWc/index.html.