Financing Urbanization in China*

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Abstract

The developing world has experienced rapid urbanization, yet governments are fiscally challenged in financing urban infrastructure. China's central government launched a national initiative that encouraged local governments to adopt public-private partnerships (PPPs) to finance infrastructure investments between 2014 and 2020. By leveraging novel pilot variation and assembling newly digitized, linked administrative data, this paper studies the effectiveness of PPP adoption and its fiscal and economic consequences. I have four findings. First, PPP adoption is unlikely to mitigate fiscal pressures in providing public goods, as pilot-induced PPP projects are more likely to rely on non-user-charged payback mechanisms, and fiscally constrained counties adopt fewer PPP-financed projects. Second, the market mechanism of PPPs intended to select capable contractors through competitive procurement is undermined by political considerations, where contract allocations are distorted by local officials' promotion incentives with favoritism toward state-owned enterprises. Third, introducing PPPs generates substitution effects on traditional land-based financing, especially for county-level governments, with each RMB of PPP financing associated with a 0.21 RMB reduction in land-based revenue. Lastly, there is no evidence that PPP investments improve the local economy, cautioning against viewing investment-led expansion as a growth panacea. I conclude with policy implications.

Keywords: Public–Private Partnerships, Urbanization, Land-Based Financing, Fiscal Federalism, Chinese Economy
JEL Classification: H54, H77, L32, O23, P21, R14, R51

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1 Introduction

Cities and infrastructure investment fundamentally shape economic productivity, welfare, and life expectancy (Glaeser, 2012; Gordon, 2017). Yet developing countries still exhibit relatively low levels of urbanization, and their governments are fiscally constrained in financing urban infrastructure.[1] Rapid urbanization over recent decades has therefore made how to finance urban infrastructure a central public finance question, both academically and for policy design. To address these challenges, between 2014 and 2020, China launched a top-down national initiative to accelerate urbanization, introducing public-private partnerships (PPPs) as a financing mechanism for local governments to fund infrastructure and experimentally conducting a nationwide pilot program to facilitate policy learning. In theory, PPPs mobilize private capital and expertise for the provision of public goods, thereby alleviating fiscal pressures and improving project efficiency. In practice, however, their effectiveness remains uncertain, particularly in China, where non-competitive markets and political promotion incentives may distort implementation. In addition, through introducing PPP financing, the central government aims to reduce local governments' reliance on traditional land-based financing and ultimately to promote local economic development. Despite the policy importance, little is known about the fiscal and economic consequences of PPP adoption.

China provides one of the most compelling settings to study these questions. Over the past few decades, the country has experienced rapid urbanization (Figure 1a), with local governments relying heavily on land-based finance since 2000 and adding PPPs as a major funding source after 2014 (Figure 1b). Between 2014 and 2021, local governments initiated 10,243 PPP projects with a total expected investment of US$2.25 trillion (China Ministry of Finance, 2021), positioning China as the leading country in PPP implementation globally.[2] PPPs offer two theoretical advantages from the perspective of economics. First, they address market failures of infrastructure provision by mitigating fiscal constraints. This is particularly important for countries like China, where PPPs serve as an alternative financing instrument for county-level governments—the largest subnational

[1] By 2019, while more than 80% of the population in developed countries lived in urban areas, only around 51% did so in developing countries(UNCTAD, 2020).

[2] For comparison, the World Bank Private Participation in Infrastructure database reports more than 7,400 projects in low- and middle-income countries between 1990 and 2021, totaling over USD 1.7 trillion (https://ppi.worldbank.org/en/ppidata). The European Investment Bank reports about 1,800 projects valued at 368 billion euros over the same period (https://data.eib.org/epec/), while the United States implemented 475 projects totaling over USD 166.5 billion by the end of 2019 (https://www.infrapppworld.com/report/usa-ppp-market-2019).

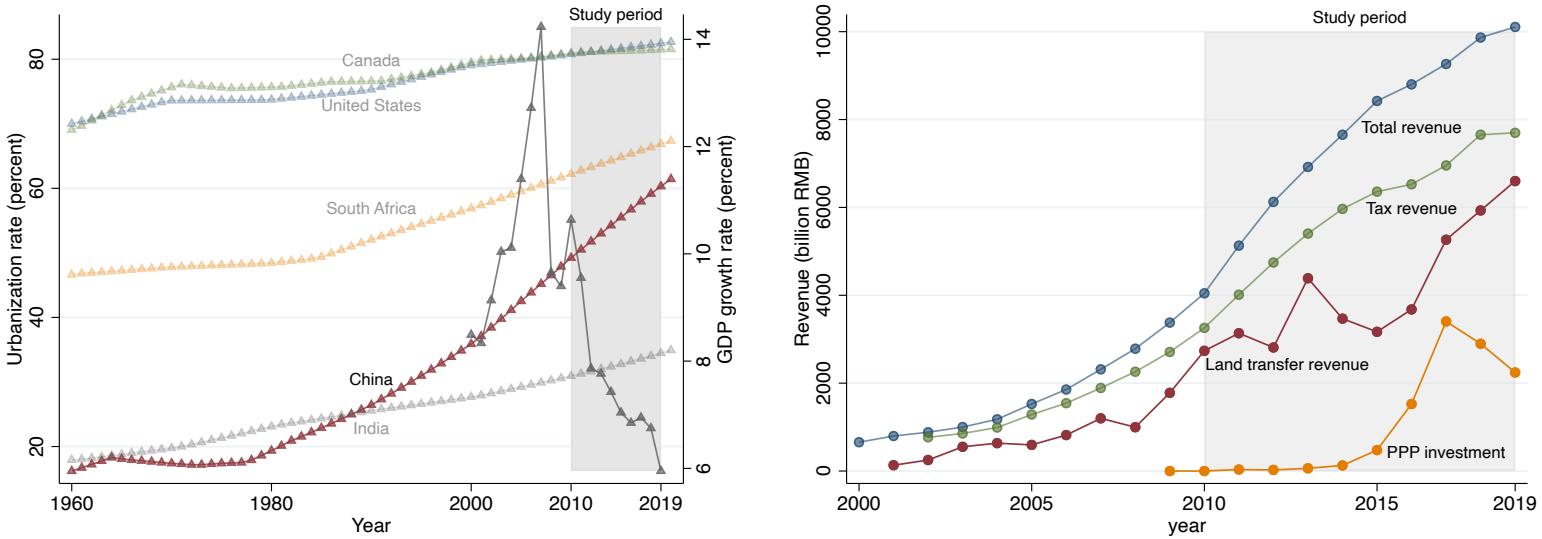
units in the country with urbanization demand—that otherwise face strict borrowing limits.[3] Second, by introducing competitive procurement auctions, PPPs create market mechanisms to select capable private firms to build and operate infrastructure efficiently. This is particularly valuable in China's decentralized fiscal system, where local governments have strong growth incentives but often pursue non-market-oriented strategies such as local protectionism (Fang, Li and Wu, 2022) and short-termism (Song and Xiong, 2024). These features provide a rationale for the central government's adoption of PPP financing as part of its recent urbanization agenda..[4] Despite the scale and policy-relevance of PPP implementation, selection bias and data constraints have thus far hindered a systematic investigation of their effectiveness and the resulting fiscal and economic consequences.

I address selection issues by exploiting an ideal policy experiment launched by China's central government to gain policy learning on urbanization reforms, with the adoption of PPP financing designated as a central reform agenda. In 2014, the Central Committee and the State Council jointly issued the "China's New Urbanization Plan (NUP), 2014-2020". Under the plan, a nationwide pilot program was established in which selected localities were assigned specific reform agendas. Using text analysis of the 854-page agenda documents for all pilots, I identify PPP financing as one core reform objective. Empirically, the identification leverages variation generated by the pilot program's staggered three-wave roll-out between 2015 and 2017, which covers approximately 29% of all counties nationwide. Although pilot selection is not random, I construct a balanced treatment and control sample to identify novel county-level roll-out variation that enables researchers to examine the PPP adoption and its consequences in a causal-and-effect manner.

[3]Subnational governments in China have been prohibited from issuing bonds since the 1994 Budget Law. This changed with the 2014 amendment, which authorizes provincial and prefectural governments to issue bonds but continues to limit financing options for lower-level governments. Note that China's administrative division system is designated in the following order: central (1st), province (2nd), prefecture (3rd), county (4th), and township (5th). See Figure B1 for a simplified framework for this hierarchy.

[4]Around 2014, both the Asian Development Bank (ADB) and the World Bank (WB) also believed and promoted that the PPP would be a suitable tool in financing China's urbanization. See reports by ADB https://www.adb.org/sites/default/files/publication/42860/public-private-partnerships-urbanization-prc.pdf, and jointly by WB and China's State Council at https://documents1.worldbank.org/curated/en/274891468018263655/pdf/Urban-China-toward-efficient-inclusive-and-sustainable-urbanization.pdf. Interestingly, Figure 1a indicates that dramatic urbanization and sluggish economic growth coexist in the 2010s, raising an additional puzzle about why state-led urbanization seems to fail become an economic growth engine.

Figure 1: Urbanization and Extrabudgetary Revenue in China



(a) Urbanization and GDP Growth Rate

(b) The Significance of Extrabudgetary Revenue

Notes: Subfigure (a). 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.
Subfigure (b). 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: Subfigure (a). World Bank Open Data at https://data.worldbank.org/indicator. Subfigure (b). China Statistical Yearbook (2001-2020); China National Land Resource Yearbook (2002-2018) and China Natural Resource Yearbook (2019-2020); and Ministry of Finance China Public Private Partnerships Center.

To overcome data unavailability, I collected, digitized, and linked millions of administrative data records covering the period from 2010 to 2019. First, I assemble a comprehensive dataset of PPP projects from the Ministry of Finance (MOF), which includes all MOF-approved projects during the 2010s. This serves as the ideal dataset for studying this wave of PPP adoption in China. I further digitize the full set of project-level bidding documents, creating a unique dataset that records participating and winning firms along with their evaluation scores from the scoring-auction procurement process. I then link these firms to the administrative firm registry to obtain detailed firm characteristics, including registered capital and ownership structure. Second, to study the fiscal impact of introducing PPPs on local governments' reliance on land-based financing, I obtain universal land transaction records from the Ministry of Natural Resources. I also link these records to a complete list of local government financing vehicles (LGFVs) maintained by the China Banking Regulatory Commission (CBRC), which allows me to examine the role of LGFVs in land-based financing. Lastly, to examine local economic impacts, I assign satellite-based nighttime light intensity data to highly granular, community-level administrative divisions, using a self-collected Rural-Urban Continuum Codes (RUCC) dataset from China's National Bureau of Statistics (NBS). The RUCC contains unique urbanicity codes, which enable me to classify each community as urbanized or non-urbanized based on its baseline urbanicity. This classification improves the precision of estimating the heterogeneous local economic effects of PPP adoption. To the best of my knowledge, none of these three purpose-built datasets has previously been used in the literature.

I find that pilot localities adopt significantly more PPP projects to raise revenues. On average, pilot counties adopt 0.077 additional PPP projects, a 50% increase relative to the mean of the dependent variable. In addition, the average investment per PPP in pilots is 76 million RMB higher than that in control counties, about a 93% increase. In total, pilot localities raise 118 million RMB more investment from these additional PPP projects, nearly doubling the baseline level (a 97% increase). Examining project characteristics reveals that these pilot-induced PPP projects tend to have longer contract durations, are more likely to subsequently become exemplary projects, and are more often greenfield investments that build new infrastructure. More importantly, pilot-induced PPP projects predominantly rely on payment schemes under which local governments use future fiscal revenues to make repayments over the contract period. This financing structure implies that

the adoption of PPP projects was unlikely to alleviate fiscal constraints and instead may have generated additional long-term fiscal obligations.

I next examine the effectiveness of PPP adoption by analyzing how the adoption varies with counties' baseline fiscal capacity and local officials' promotion incentives. On the one hand, fiscally constrained pilot counties—those with lower baseline revenues or expenditures—adopt less PPP financing. This finding contrasts with the motivation that local governments could use PPP financing to address market failures in providing optimal levels of public goods, and indicates that PPP adoption is unlikely to alleviate fiscal burdens. Instead, the result raises the concern that PPPs may have operated more as an additional debt-raising financing vehicle. On the other hand, PPP contract allocation appears to be distorted by the local officials' promotion incentives. Pilots governed by the party secretary with stronger promotion prospects adopt significantly more PPP projects, while those led by officials approaching retirement (i.e., who have a low likelihood of promotion) do not exhibit comparable increases. In addition, local officials with stronger career incentives are more likely to award PPP contracts to local firms and state-owned enterprises. Together, these results raise concerns about PPP's market mechanisms that aim at ensuring project efficiency and highlight the potential risk of business-government collusion.

Further investigation examines the fiscal and economic consequences of PPP adoption in pilot counties. First, I investigate whether the introduction of PPP financing reduces local governments' reliance on traditional land-based finance, which is a central policy objective of the pilot program. The results indicate that county-level pilots significantly reduce their reliance on land-based financing, as reflected in two outcomes: (1) a decline in total land revenue, and (2) a lower likelihood of transacting land parcels to LGFVs, which raise funds through land mortgages and land-secured loans from the banking sector. The estimates imply that each RMB of pilot-induced PPP financing is associated with a 0.21 RMB reduction in land-based financing. Next, I examine implications for land-use efficiency. Relative to control counties, pilot counties transact land parcels with a lower floor-area-ratio (FAR) limit, a higher likelihood of being allocated for commercial use, and a lower probability of residential designation. Linking geocoded land parcels to nightlight intensity to formally measure land-use efficiency, I find a negative but statistically insignificant effect, suggesting that these shifts in land allocation do not translate into measurable declines in overall land-use efficiency. Lastly, I evaluate the economic impacts of pilot-induced PPP investments.

Using nighttime light intensity as a proxy for local economic activity, I find no evidence that PPP expansion generates sustained economic growth. Event-study estimates reveal that while economic conditions improved in the first year following the pilot implementation, they declined significantly in the third and fourth years. This dynamic pattern suggests that pilot localities may have experienced short-term, revenue-driven boosts, but ultimately directed resources toward projects with limited long-run returns, raising concerns about the sustainability of PPP-driven infrastructure investments as a growth strategy.

The contributions of this paper are threefold. First, this study directly contributes to the literature on urbanization in China (for review, see Henderson (2009)).[5] While most existing studies focus on China's urbanization during the 2000s, there has been limited discussion of the more recent phase of urbanization in the 2010s. By studying the New Urbanization Plan (2014-2020), the country's first national plan for urbanization, this study sheds new light on four dimensions. First, through text analysis of reform agendas across all pilots, this study uncovers a public finance reform agenda embedded in the plan, an aspect that has been largely overlooked in both academic research and the policy domain. Second, leveraging novel policy variation and newly digitized PPP procurement data, this study provides the first assessment of local governments' PPP adoption, as well as its fiscal and economic consequences, under China's New Urbanization Plan in the 2010s. Third, by linking multiple administrative datasets, this paper offers a comprehensive and novel perspective on how the majority of local governments in China (i.e., county-level governments) finance urban public goods.[6] Lastly, the findings are highly policy relevant. As China continues to advance its urbanization agenda through the New Urbanization Plan (2021-2035), the results provide a benchmark for understanding the ongoing plan and its long-term implications.

Second, this paper contributes to the literature on PPP financing (for review, see Fabre and Straub (2023) and Engel, Fischer and Galetovic (2022)). Much of the existing work emphasizes

[5]Broadly speaking, this study also relates to the literature on urbanization in developing countries (for review, see Bryan, Glaeser and Tsivanidis (2020) and Henderson and Turner (2020)). This study sheds new light on two persistent gaps in the literature (Glaeser and Henderson, 2017): (i) wealthier urban areas are better studied than poorer ones, naturally creating a knowledge gap; and (ii) the role of national policies in strengthening or weakening cities in the developing world remains less studied. By analyzing PPP adoption, its effectiveness, and its fiscal and economic impacts in the context of China's New Urbanization Plan (2014–2020), this study directly addresses these gaps.

[6]These investigations complement the existing literature, which predominantly focuses on the financing of public goods at the prefectural or provincial level, where information on financing tools is more readily accessible to researchers (e.g., Huang, Pagano and Panizza (2020); Chen, He and Liu (2020)).

theoretical contract design of PPPs that mitigates project uncertainties, while evidence on real-world adoption remains scarce. This study fills the gap by investigating PPP adoption in one of the most compelling real-world settings: China in the 2010s, when rapid expansion of PPPs positioned the country as the global leader in implementation, both in total capital mobilized and in the breadth of sectors covered. Moreover, this study provides new insights into how PPPs operate in a non-competitive environment. This study shows that, in a setting where SOEs play an important role in the private sector and political promotion incentives shape resource allocation in the public sector, PPP implementation can be distorted in ways that limit effectiveness regardless of contract design. For China, this study has two additional implications. First, while previous research has documented the pivotal role of land finance in shaping urbanization (for review, see Gyourko et al. (2022)), the more recent surge of PPP investments has received far less attention. This paper thus enriches our understanding of the country's evolving financing mechanisms for urbanization. Second, the findings are policy-relevant. As China resumed its promotion of PPPs in 2022, this study provides timely lessons and policy implications for evaluating the ongoing push to expand PPP financing.[7]

Third, this study contributes to the fiscal federalism literature. Classic economic theories show how the appropriate assignment of responsibilities for taxation and public goods across jurisdictions can enhance welfare (Tiebout, 1956). Since the 1990s, local governments have increasingly partnered with the private sector, through collaborative arrangements such as PPPs, to enhance public service and infrastructure delivery (Engel, Fischer and Galetovic, 2014). Yet little is known about how fiscal decentralization interacts with private-sector participation, where non-competitive markets and government-business collusion may limit the effectiveness. This study provides the first investigation of this interaction in a real-world setting. Fiscal decentralization also raises concerns about moral hazard: higher-level governments may implicitly guarantee local debt, encouraging excessive borrowing by local governments (Oates, 2005; Weingast, 2009). This study shows that without complementary policies that harden budget constraints, such as limits on

[7]The policy relevance is further underscored when revisiting the origins of PPP promotion in China. In 2014, a joint report by China's State Council and World Bank, which promoted PPPs as a suitable tool for advancing urban public finance reforms (See Section 4 of the report, available at https://documents1.worldbank.org/curated/en/274891468018263655/pdf/Urban-China-toward-efficient-inclusive-and-sustainable-urbanization.pdf. The investigation of this study highlights how conceptually sound policies can diverge in practice when implemented without careful institutional assessment.

SOE participation, ongoing monitoring, and market-based mechanisms (e.g., user-charged payback mechanism), PPPs could evolve into additional debt-like financing vehicles rather than sources of efficiency gains. In the Chinese context, prior work has linked fiscal federalization to the country's post-1978 economic growth, emphasizing intergovernmental competition in improving resource allocation.[8] This paper extends this line of research by showing how promotion-driven competition under the fiscal federalization could distort PPP adoption and contribute to the expansion of off-budget finance, echoing Tsai (2004). Relatedly, Song and Xiong (2024) proposes a theoretical framework that incorporates short-termism into fiscal federalization, indicating that the overall welfare effect is unclear when debt constraints are relaxed. This study provides a direct empirical assessment of the framework, where the introduction of PPPs relaxes local governments' budget constraint while imposing additional market mechanisms. The results indicate that these PPP investments do not generate significant economic gains.

The paper proceeds as follows. Section 2 provides background on China's urbanization and local government financing, and documents key stylized facts on PPP financing. Section 3 describes the data, and section 4 presents the empirical strategy. Section 5 investigates the PPP adoption in the pilot program and its effectiveness. Section 6 presents the further consequences on land finance and the local economy. Section 7 concludes.

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

2 Urbanization and Local Government Financing

China's dramatic urbanization is characterized by a top-down institutional design. On one hand, the central government has promoted urbanization as a national strategy since the Tenth Five-Year Plan in 2001, emphasizing that urbanization "can provide a broader market and lasting engine for economic development."[9] On the other hand, local governments are responsible for implementing urbanization by providing urban infrastructure, which in turn attracts industries and high-skilled migrants, thereby boosting the local economy. As a result, the question of how local governments finance these investments becomes a crucial component of China's state-led urbanization process.

2.1 Land-Based Financing

Since 2000, local governments in China have heavily relied on land-based financing, primarily through land transfer fees, to fund urban infrastructure. The origins of this land finance model can be traced back to two key reforms in the 1990s. The first was the 1994 tax-sharing reform, which restructured fiscal relations by reallocating a substantial share of tax revenues from local governments to the central government. The second was the 1998 amendment to the Land Management Law, which authorized local governments to generate revenue by selling land use rights within their urban jurisdictions. Together, these reforms shifted local officials' priorities from industrial development to urbanization, as land-generated revenues became a critical source of funding that further fueled local economic growth, ultimately giving rise to the land finance system.

After the Great Recession, local governments increasingly relied on land-based financing by mortgaging land use rights through Local Government Financing Vehicles (LGFVs). These LGFVs served as off-budget platforms that allowed local governments to use land assets as collateral to raise funds, thereby circumventing the 1994 Budget Law, which had prohibited direct debt financing. In 2009, in response to declining exports, the central government launched a 4 trillion RMB stimulus package aimed at boosting domestic demand through infrastructure investment. However, much of the financing burden was shifted to local governments. As a result, LGFVs proliferated under a regulatory environment characterized by lax oversight. Over time, these entities have become a

[9] See China's Tenth Five-Year Plan: https://www.gov.cn/gongbao/content/2001/content_60699.htm.

growing fiscal concern, fueling the expansion of shadow banking and exacerbating off-balance-sheet debt, which poses long-term risks to China's fiscal sustainability.

Following the 2014 amendment to the Budget Law, local government financing for urban infrastructure entered a new phase. Often referred to as China's "economic constitution," the amended law introduced new financing instruments for subnational governments. On one hand, the law authorized provincial and prefectural governments to raise funds through bond issuance, while continuing to prohibit lower-level governments from directly issuing bonds. On the other hand, it allowed local governments to engage in multi-year fiscal planning, thereby laying the institutional foundation for adopting public-private partnerships as an alternative financing mechanism, particularly for those jurisdictions unable to issue bonds. Since 2014, municipal bonds and PPPs have become the two non-negligible mechanisms for financing urban infrastructure, both explicitly endorsed and encouraged by the central government.

2.2 The Resurgence of PPPs and Stylized Facts

Public-private partnerships involve private sector participation in public sector projects, particularly those requiring large-scale capital investments and long-term contractual commitments. Under a common Build-Operate-Transfer (BOT) model, private companies finance and complete the construction of an infrastructure project, operate it for a period typically ranging from 20 to 30 years, and ultimately transfer ownership back to the government. In practice, PPPs are implemented through a special purpose vehicle (SPV) jointly established by the government and private partners. The government purchases services from the SPV, while firms within the SPV contribute capital, expertise, and management, taking responsibility for building and operating the project before eventually transferring it to the local government.

The use of PPPs to finance infrastructure is not new in China. The practice dates back to the construction of the Shajiao B power plant in Shenzhen in 1988. Following this initial project, the central government encouraged local governments to attract foreign investment through BOT arrangements in sectors such as power generation, transportation, and water supply. By 1997, PPPs accounted for approximately 36% of total infrastructure investment, representing a quantitatively significant share (Tan and Zhao, 2019). However, this early wave of PPP activity quickly declined with the onset of the 1998 Asian Financial Crisis, which marked a shift toward land-based financing

as an alternative. A second wave of PPPs emerged in the 2000s but remained limited in scope, focusing primarily on toll roads, water and sewerage systems, and city gas infrastructure (Engel, Fischer and Galetovic, 2014).

PPPs have experienced a resurgence since 2014, when the central government explicitly highlighted them as an alternative to traditional land-based financing and encouraged local governments to adopt PPPs to bridge the fiscal gap on funding urban infrastructure. This policy direction was formalized in two key documents issued by the Ministry of Finance (MOF), which promoted the use of PPPs for infrastructure projects in parallel with the phasing out of LGFVs.[10] Subfigure (a) of Figure 2 illustrates the rapid rise of PPPs in China after 2014. Growth continued until 2017, when the MOF introduced new regulations amid concerns that PPPs were being misused as local governments' debt-raising vehicles.[11] This new wave of PPPs has been applied not only to transportation, water, energy sectors, but also increasingly to areas such as environmental protection, education, tourism, medical services. In addition, unlike earlier waves of PPPs that primarily relied on foreign capital, the recent expansion has been driven largely by domestic firms, including state-owned enterprises.

2.2.1 Stylized Facts

Theoretically, PPPs help isolate financial risks, alleviate fiscal pressures, and improve project efficiency by leveraging private sector technology and managerial expertise. However, these benefits are not guaranteed, especially in markets that lack competition or where governments exhibit favoritism in selecting partners. Using newly digitized PPP contracts and bidding documents, below I document two sets of stylized facts regarding the recent wave of PPP implementation in China.

SOEs Favoritism.— State-owned enterprises (SOEs) have played an increasingly significant role in this wave of PPP adoption. The share of PPP projects contracted to SOEs rose from 5% in 2014 to 20% in 2020 (Subfigure b in Figure 2).[12] Moreover, SOEs tend to participate in PPP

[10] See *"Notice on Issues Related to Promoting the Public-Private Partnership (PPP) Model"* (No. 76 [2014], MOF Fin Dept) and *"Notice on Issuing the Operational Guidelines for the Public-Private Partnership (PPP) Model (Trial)"* (No. 113 [2014], MOF Fin Dept).

[11] See *"Notice on Regulating the Investment and Financing Behavior of Financial Enterprises for Local Governments and State-Owned Enterprises"* (No. 23 [2018], MOF Fin Dept)

[12] I use the "type of entity" classification in the firm registry to identify whether a firm is an SOE. This classification likely provides a lower bound of state involvement, as SOEs can also participate in PPPs indirectly through equity

projects that involve larger total investments. The raw estimates indicate that PPP projects won by SOEs have, on average, 50% more total investments than those won by non-SOEs. This SOE investment gap remains substantial after accounting for a rich set of controls, where the results show that SOE-awarded projects still involve approximately 20% more investment and the difference is statistically significant (Subfigure c in Figure 2).[13] These results indicate that local governments favor SOEs in allocating PPP contracts, particularly for projects involving larger investment amounts.

Noncompetitive Bidding.— I next examine whether local governments allocate PPP contracts through competitive auctions, which serves as the "market mechanism" of PPPs. Firms participate in PPP projects via scoring auctions, where contracts are awarded to bidders with the highest score.[14] To assess the degree of bidding competition, I compare the evaluation score gaps between (i) the two highest-scoring bidders and (ii) the second- and third-highest-scoring bidders. Under a fully competitive process, these two gaps should be similar and close to zero, reflecting that the top three bidders competed intensely and produced closely matched proposals. By contrast, under noncompetitive bidding, insider firms colluding with local governments may gain access to privileged information before bidding begins. This advantage allows the insider to submit a superior application, resulting in a large score gap between the winning bidder and the runner-up, while the second- and third-ranked firms have similar, closely clustered scores.[15]

Subfigure (d) in Figure 2 plots the distributions of these two score gaps. The figure reveals that the second-to-third score gap is highly concentrated near zero, indicating that these two bidders are similar in quality and information. In contrast, the first-to-second score gap is spread

stakes in private firms. This is especially relevant given recent increasing trends in which many of the largest private firms have direct equity investments form SOEs (Bai et al., 2020).

[13]The SOE investment gap is estimated using the specification:

$$Investment_{ict} = \beta \cdot SOE_{ict} + Controls_{ict} + \epsilon_{ict},$$

where $Investment_{ict}$ is the log of total investment for PPP project i in city c and year y, and SOE_{ict} is an indicator for whether the winning firm is an SOE. $Controls_{ict}$ include city, year, industry fixed effects, the winning firm's industry fixed effects, log registered capital, and firm scale fixed effects.

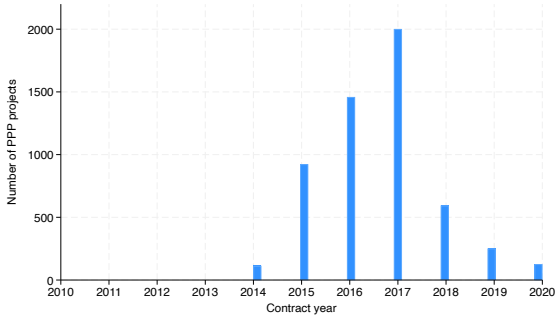
[14]Figure B4 illustrates the basic process of a scoring auction. Local governments first make a public announcement to invite bids. Firms then submit applicants, which are screened in a pre-qualification stage by a government-organized review committee. Qualified firms proceed to the bidding stage, where the review committee evaluates proposals using pre-specified rubrics and recommends at least three candidates, ranked by the evaluation scores. Local governments follow the recommendation and award the contract to the bidder with the highest score.

[15]Lu and Wang (2023) documents three ways in which local governments can manipulate procurement: (1) manipulating the choice of procurement method, (2) imposing restrictive qualification requirements, and (3) interfering with the expert evaluation process.

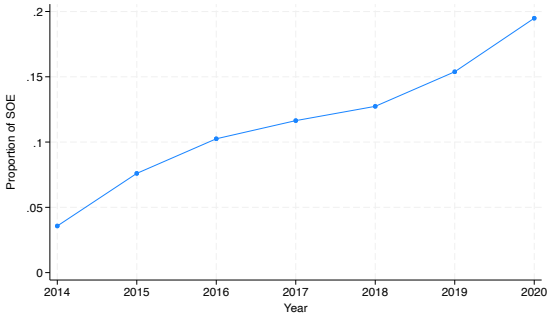
relatively evenly across a range of zero to 20 points, suggesting that the winning bidder often has a substantially stronger application profile. This divergence in patterns suggests noncompetitive bidding, in which insider firms receive favorable treatment and face little effective competition from other bidders.

These results point out that the PPP adoption in the real world is more complicated the solely theoretical gains. Local governments' favoritism toward SOE participation can lead to resource misallocation and potentially crowd out private investment. In addition, evidence of noncompetitive bidding undermines the notion that PPPs inherently improve efficiency, and even raises concerns about government–business collusion. Building on these findings, I next examine the PPP implementation and its effectiveness under China's recent urbanization scheme.

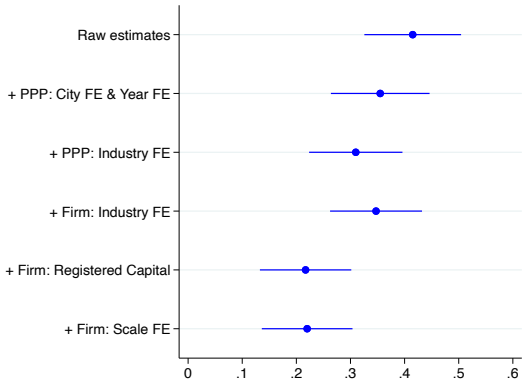
Figure 2: PPPs in China, 2014-2020



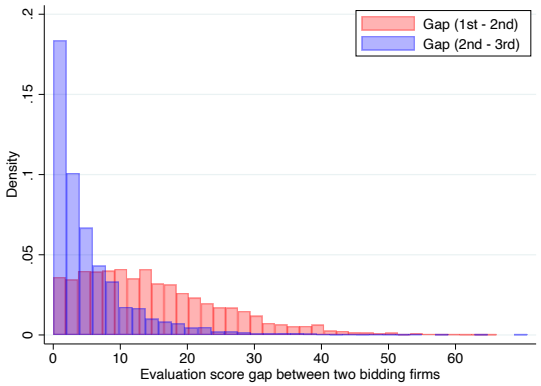
(a) Number of PPPs



(b) Proportion of SOEs per PPP



(c) SOE investment gaps



(d) Evaluation score gaps

Notes: The figures display stylized facts of PPPs in the 2010s. Subfigure (a) displays the number of PPPs across years, while subfigure (b) shows the proportion of SOEs that win PPP contracts between 2014 and 2020. Subfigure (c) presents a set of gap estimates in total investment between SOEs and non-SOEs. Subfigure (d) plots the distributions of the evaluation score gap between the first and second candidates, and the gap between the second and third candidates.

2.3 The New Urbanization Plan: 2014-2020

Believing the urbanization would serve as a new driver of economic growth, the Central Committee and State Council jointly launch *"China's New Urbanization Plan, 2014-2020"* in March 2014, marking the country's first national plan on urbanization.[16] The New Urbanization Plan (NUP) addresses comprehensive dimensions of urbanization issues, including the conversion of rural migrants into urban residents, the sustainability of cities, urban-rural integration, and institutional reforms to support urbanization. Among the institutional reforms, one reform agenda focuses on establishing diversified and sustainable financing mechanisms to support the urbanization (Chapter 25 of the NUP).[17] The public finance dimension of the NUP has been largely overlooked in the literature, partly because financing was not prominently emphasized in the plan document. The diversification of local governments' financing mechanisms, however, is a central reform agenda within the NUP's pilot program.

2.3.1 The Pilot Program

To facilitate policy learning, the National Development and Reform Commission (NDRC), together with ten other ministries, launched a three-wave pilot program between 2014-2016. This program covered 841 counties, which is about 30% of all counties in China, spanning the entire country.[18] Figure 3 illustrates the spatial distribution and roll-out timing of these pilots at the county level.

Each pilot locality was assigned to a tailored reform agenda reflecting local needs and policy priorities. For example, Figure B2 presents a reform agenda from the Tongzhou district in Beijing. Using text analysis of reform documents of all pilots across the three waves, I identify "Diversification of Financing" as one of the most common themes: 89% of the pilots (208 out of

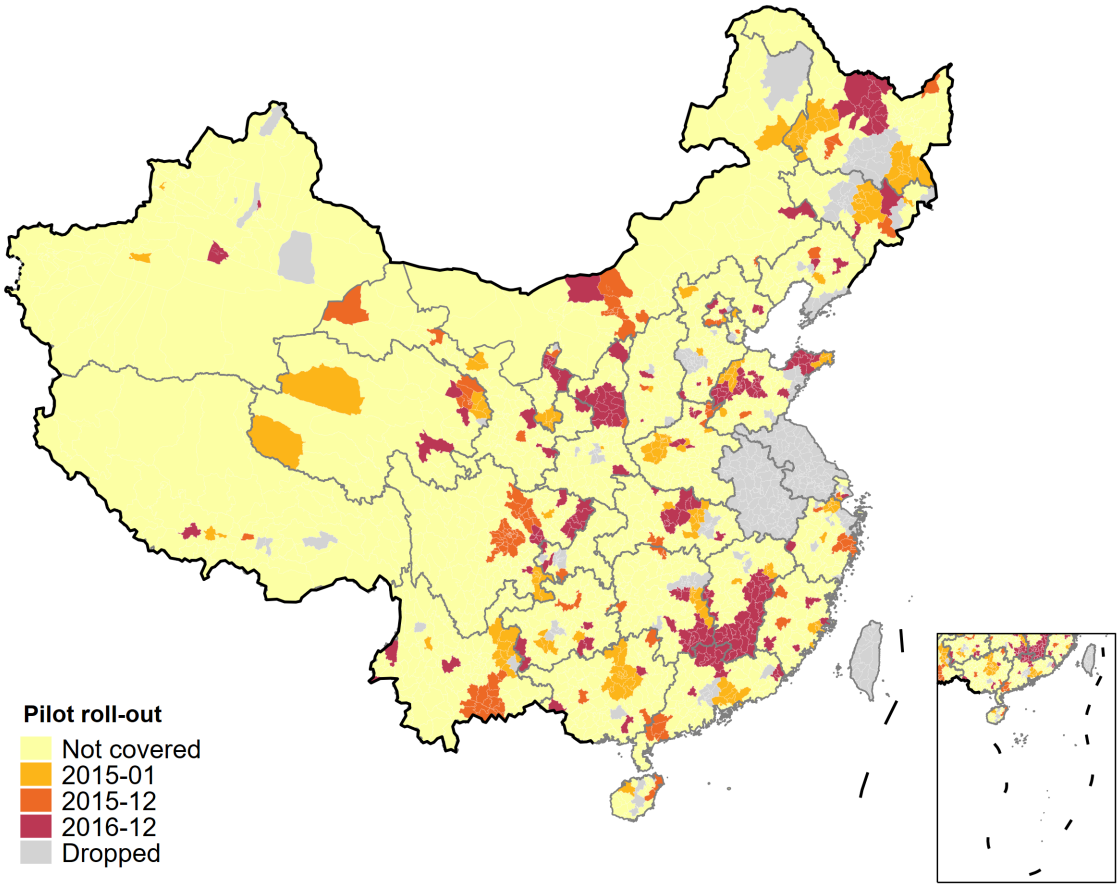
[16] China's New Urbanization Plan (2014 - 2020), issued on March 16, 2014, http://www.gov.cn/zhengce/2014-03/16/content_2640075.htm. Prior to the plan, the CCP Central Committee convened a high-level meeting on urbanization in late 2013, which is the first Central Committee meeting focused on urbanization since the 1978 reform and opening-up. At the meeting, urbanization was described as "a major event in China's economic and social development, a significant measure in the deepening of reform, and a milestone in the country's modernization process." (see https://www.gov.cn/jrzg/2013-12/14/content_2547863.htm).

[17] The guiding principles of the NUP were mentioned at the Third Plenum of the 18th Central Committee of the CCP (November 2013), which underscores the economic importance of the NUP. 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 major economic reforms.

[18] 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. Table B1 lists all policy documents related to the New Urbanization Plan and the pilot program, while Figure B3 displays the list of pilots by roll-out wave.

234) included a reform agenda related to adopting diversified financing mechanisms.[19] Among the se new financial instruments, public-private partnerships are the most frequently mentioned.[20]

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



Notes: The map shows the roll-out variation for localities of the New Urbanization Plan pilot program in three waves (2015-01, 2015-12, and 2016-12). "Not covered" localities are counties that are not selected in the pilot program, and "Dropped" include counties excluded from the estimation sample (see main text for details). Figure B3 displays the list of pilot units by roll-out wave.

[19]Of the 26 pilots without a "Diversification of Financing" agenda, 10 are township-level pilots, which may have limited demand for large-scale infrastructure projects.

[20]Keywords used to identify PPP finance include "PPP", "concession", "societal capital", and "private capital". Other financing tools — such as special funds, policy-oriented or development finance institutions, intergovernmental transfers, and financial subsidies or support from upper governments — were also mentioned, but sporadically.

2.3.2 Identifying Pilot-Program Variation

The main challenge in exploiting variation from the pilot-program arises from the non-random nature of pilot selection. Taking the first wave as an example, 169 localities applied for the program following a call-for-applications announcement in June 2014, and 64 were ultimately selected by the NDRC based on a range of factors, including their application materials, background conditions, geographic location, and administrative hierarchy.[21] Selection bias becomes a concern when the winners, applicants, and non-participating localities systematically differ in their characteristics. An ideal identification would come from comparing selected pilots and runners-up who are similar to each other. However, information on the runners-up is not available.

Although pilot selection process is not random, the treatment assignment nevertheless allows for positive identification strategies. Nearly all selected counties were required to implement reform agendas emphasizing diversified financing, yet their selection was influenced by a variety of considerations that are largely independent of their baseline extrabudgetary conditions. One important factor, however, that do warrant consideration when assessing the selection issue is the administrative hierarchy across pilot localities, which may generate heterogeneous incentives and constraints. For instance, province-level pilots generally face fewer fiscal constraints, as they benefit from broader tax bases and have access to a wider range of financing tools (e.g., direct bond issuance). In addition, some special prefectural pilots (i.e., the separately listed prefectures and sub-provincial prefectures) possess greater institutional capacity to undertake policy experiments to facilitate learning, making them more likely to be selected in pilot programs (Wang and Yang, 2021).[22] As a result, I define these localities as outliers and exclude them from the analysis. This exclusion yields a more balanced comparison between treated and control counties in terms of their baseline socio-economic conditions, as detailed below in Table 1. The county is used as the unit of analysis, as it represents the most disaggregated level available in the data.[23] The spatial

[21] See an interview with NDRC's Chairman Shaoshi Xu in 21st Century Business Herald (2015): https://m.21jingji.com/article/20150108/herald/da7ff518b8e1cff42db08e4e314101ef.html.

[22] Separately listed prefectures in China hold a special status in economic planning and budgeting, operating with a degree of fiscal independence from their respective provincial governments. There are currently five such prefectures: Dalian, Ningbo, Qingdao, Shenzhen, and Xiamen. Among them, Dalian, Ningbo, and Qingdao were selected for the pilot program in wave one. In addition, seven sub-provincial prefectures were selected in wave one: Shijiazhuang, Changchun, Harbin, Wuhan, Changsha, Guangzhou, and the nine main districts in Chongqing. These sub-provincial prefectures hold certain independent authority in their fiscal management. Figure B3 for a detailed list of pilot localities across the three waves.

[23] Accordingly, I also drop counties that contain piloted townships, since township-level information is not

distribution of excluded pilot localities is shown in gray in Figure 3.

Table 1 provides supporting evidence for the balancing between treated and control pilots by comparing the determinants of pilot selection, using both the full and restricted samples (i.e., samples with and without outlier pilots). Column (1) presents the determinants of selection into the pilot program for all pilot units ("full sample"), while Column (2) replicates the determinant exercise but excludes the outlier pilots ("restricted sample"). Results in Column (1) indicate that counties with higher shares of employment in the secondary (i.e., manufacturing) industry, greater fiscal spending, and a greater reliance on agriculture were more likely to be chosen as pilots. However, when comparing to Column (2), most of these significant associations disappear after excluding outliers, with the sole exception of "investment in fixed assets". Fixed asset investment reflects local governments' experiences with urbanization-related projects, suggesting that the program indeed favors localities with more experience in infrastructure investment. This exercise is informative for understanding the selection process. When examining the joint significance, the joint-test p-values indicate that, after excluding "investment in fixed assets", determinants in the restricted sample cannot predict the selection into the program (p-value = 0.7844). This result imply that treated and control counties in the restricted sample are well balanced, providing a stronger basis for causal analysis. As a result, "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, the constructed treatment and control group provides a firmer foundation to exploit the pilot program variation. Evidence of balancing event-study pre-trends is also provided when examining the impacts of the pilot program to further mitigate endogeneity concerns.

consistently observed in the dataset.

Table 1: 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). $***p < 0.01, **p < 0.05, *p < 0.1$

3 Data

I assemble millions of administrative records from multiple sources and construct three main datasets to investigate the PPP financing by local governments and its consequences under China's new urbanization initiative between 2010 and 2019. First, to study PPP adoption, I compile a comprehensive set of PPP projects, digitize their bidding documents, and collect bidders' information from the firm registry. I further complement the dataset with county-level fiscal and official information to assess the effectiveness of PPP financing. Next, I link the universal land transaction records with a complete list of LGFVs to study whether the introduction of PPP finance reduces local governments' reliance on traditional land-based finance. Lastly, I assign nighttime light intensity to highly granular committee-level administrative divisions to examine the overall local economic effects, as well as the heterogeneity between urbanized and non-urbanized regions.

3.1 PPP Finance

PPP Project Data.— I obtain a comprehensive list of public-private partnership projects from the China Public Private Partnerships Center (CPPPC) housed by the Ministry of Finance (MOF).[24] Local governments need approval from the MOF to initiate PPP projects, and all approved projects are included in the CPPPC database. The resulting database covers 10,082 PPP projects between 2014 and September 2021. For each project, the database provides administrative and procurement information, including project identifier, project name, located province/prefecture/county, industry, 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. the bid evaluation documents and contracts. The database also contains bid evaluation documents and, in many cases, full project contracts. I manually digitize the bidding documents to extract information on participating firms, winning

[24] Following the promotion of PPP financing, Ministry of Finance established the China Public Private Partnerships Center (CPPPC) per *"Notice on the Operation of the Comprehensive Information Platform for Public-Private Partnerships (PPP)"* (No. 166 [2015], MOF Fin Dept). According to the notice, all new PPP projects should be listed in the CPPPC. Later in 2017, MOF issued an information disclosure act, *"Interim Measures for Information Disclosure of the Comprehensive Information Platform for Public-Private Partnerships (PPP)"* (No. 1 [2017], MOF Fin Dept), which made the CPPPC information publicly available online. I collected the database in September 2021, when it was publicly available. The CPPPC website (`https://www.cpppc.org/maintain.html`), however, has been under maintenance since 2023.

bidders, and evaluation scores. For projects with missing bidding documents, I supplement that data by coding winners from bid-winning notices.[25]

Firm Registry.— Based on bidder information extracted from the digitized bidding documents, I collect registration records for PPP-participating firms from China's administrative firm registry.[26] The registry, which is from the State Administration for Industry and Commerce of China (SAIC) and available through tianyancha.com, contains the universe of newly registered firms in China. Through linking PPP bidders to the firm registry, I can identify whether winning firms are local (i.e., registered in the same prefecture), whether they are state-owned enterprises (SOEs), and their registered capital that captures the firm scale.

3.2 Land Finance

Land Transaction Records.— I obtain land transaction records from the Ministry of Natural Resources (formerly the Ministry of Land and Resources), which are publicly available through www.landchina.com. The data include every land transaction record in China's primary land market.[27] Each record contains detailed information on 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 date. I drop a few extreme observations with transaction prices exceeding 300 billion RMB and validate the aggregated transaction statistics against official statistical yearbooks.[28] Following Chen and Kung (2019), I restrict transactions conducted through bilateral agreement, English auction, invited bidding, and listing auction, which together account for roughly 70% of all records. I further winsorize prices at the 1% and 99% percentiles to mitigate potential outlier effects. In the end, the land data analyzed in this study includes 871,211 transaction records from 2010 to 2019. I aggregate these records to construct county-year measures of land revenue.

List of LGFVs.— Since 2008, local governments have been using local government financing vehicles (LGFVs) to leverage funding via the land mortgage and land-secured loan from the banking

[25] Figure A1 presents an example of a bidding document and a bid-winning notice.

[26] When multiple firms join as a bidder to participate in a bidding, I use the leading firm to represent the bidder.

[27] 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.

[28] The annual transaction totals match closely with yearbook statistics over the study period (2010–2019), as shown in Figure A2, although some outlier prices appear in years prior to 2008.

sectors. To study this land financialization channel, I link the land transaction data with a complete list of LGFVs. LGFVs are monitored via a special list system maintained by the China Banking Regulatory Commission (CBRC) between 2010 Q3 and 2018 Q4, which is shared with commercial banks on a quarterly basis.[29] The LGFV list I obtained is updated through 2018 Q4, which include the majority of LGFVs for the year 2019, as the increase in LGFVs has been extremely slow in recent years due to regulation.[30] The list includes various types of LGFVs, regardless of whether they issue bonds, that can be linked to land transaction data to determine whether an LGFV purchased the land transaction. Land purchased by the LGFVs is more likely to be used to finance mortgages for raising local government revenue. The list contains 11,737 LGFVs as of June 2019.

3.3 Local Economy

Rural-Urban Continuum Codes.— To measure economic conditions at a precisely granular region level, I first collect the Urban-Rural Continuum Codes (RUCC) data from the National Bureau of Statistics (NBS).[31] The RUCC data includes all NBS-designated administrative division records of China, issued by the NBS in 2008.[32] 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 RUCC analyzed in this study includes 6,789,166 communities from 2010 to 2019.[33] In the end, I geocode the communities using the Baidu Map API to obtain their coordinates.

[29] There are two advantages of the CBRC LGFV registry. First, the list provides the broadest coverage of LGFVs in China. Second, the list continues to record LGFVs even after they become inactive or are transformed into operating companies. A common used alternative is the WIND database, which covers only LGFVs that issue bonds. Because many LGFVs do not issue bonds and tend to be difficult to detect, the CBRC registry offers substantially more comprehensive coverage.

[30] Figure A3 plots the number of cumulative and active LGFVs between 2012 and 2019 in the CBRC data. The figure shows that, following the 2014 regulation, the total number of LGFVs has remained stable, while more LGFVs have been removed from the list. For the LGFV regulation policy, see *"Opinions of the State Council on Strengthening the Administration of Local Government Debts"* (No. 43 [2014], State Council).

[31] The data is obtained from NBS at: `http://www.stats.gov.cn/tjsj/tjbz/tjyqhdmhcxhfdm`, which is currently not available online.

[32] See *"Provisions on the Statistical Delineation of Urban and Rural Areas"*(No. 60 [2008], State Council Info Office). 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 continuum codes are 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).

[33] Figure A4 presents the number and composition of administrative divisions at the prefecture, county, township, and community levels between 2010 and 2019. During this period of rapid urbanization, the figure illustrates the conversion of counties into districts, the transformation of townships into towns and subdistricts, and the overall decline in the number of rural communities.

Satellite Nighttime Lights.— To measure economic growth, I assign the nighttime light intensity to the geocoded communities from the RUCC 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 VIIRS Nighttime Lights V2 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 2012 to 2020 (Elvidge et al., 2021).[34] Relative to China's yearbook-based GDP statistics, the nighttime light intensity is 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.[35]

Table 2 presents the summary statistics of local government financing and nightlight intensity by pilot roll-out wave. Counties in the pilot program in generate experience more PPP investments and raise more revenues from land transactions than the control counties, illustrating a positive correlative relationship between pilot program and extra-budgetary funds. When using nightlight intensity to proxy local economy, counties in the pilot program in general are wealthier than those in the control group.

[34]The annual VIIRS Nightttime Lights V2 is available at https://eogdata.mines.edu/nighttime_light/annual/v20/.

[35]Figure A5 presents the average nightlight intensity across communities with different urbanicity.

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)
Average investment per PPP (million RMB)	122.222	121.961	85.241	75.455
	(653.044)	(543.313)	(333.433)	(444.950)
Total investment (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				
Number of land	3.432	3.575	3.434	3.210
	(1.092)	(1.059)	(0.971)	(1.094)
Land area (hectare)	4.155	4.193	4.102	3.681
	(1.184)	(1.197)	(1.434)	(1.400)
Land revenue (million RMB)	5.784	6.005	5.804	5.162
	(1.618)	(1.607)	(1.434)	(1.783)
LGFVs	0.018	0.015	0.016	0.013
	(0.061)	(0.055)	(0.058)	(0.053)
Observations	1,340	1,020	1,670	13,740
Panel C. Local economy				
Nightlight intensity	5.618	5.800	3.226	4.459
	(7.336)	(8.720)	(5.392)	(8.457)
Observations	1,415	963	1,681	14,944

Notes: The table reports summary statistics of outcome variables of PPP finance, land finance, and local economy by pilot program roll-out wave. The mean is in the cell, and the standard deviation is in parentheses. Panel A includes county-year level PPP finance from 2,482 counties between 2010 and 2019. Panel B includes land parcel transaction records from 1,777 counties between 2010 and 2019, while Panel C consists of 19,003 county-year nightlight intensity measures between 2012 and 2019. Panel B presents the log value of the number of land parcel, land area, and land revenue.

4 Identification Strategy

In this section, I present the baseline empirical specification investigating the impacts of the New Urbanization Plan pilot program on PPP adoption, land-based finance, and local economy.

With the staggered roll-out variance of the pilot program, I employ the difference-in-differences (DiD) model to identify the fiscal and economic effects of the pilot program. To account for heterogeneous treatment effects (i.e., the average treatment effects on the treated vary by treatment cohort or calendar time), I adopt a stacked DiD design (Cengiz et al., 2019).[36] I implement the stacked DiD approach in three steps. First, I create cohort(j)-specific panel datasets, where each dataset contains a single treated cohort along with the never-treated cohorts as "clean controls." For example, counties that were selected into the first wave of the pilot program (see Figure B3) comprise one treated cohort, and the never-treated counties are the controls. Next, I stack these datasets and line them up according to the dataset indicators. Finally, I estimate the model using DiD specifications on this stacked dataset, with fixed effects interacting with the dataset indicator group.

Formally, to estimate the average treatment effects, I employ the following specification:

$$\mathrm{Y}^{h}_{s(i)jt} = \beta \cdot \mathrm{Pilot}^{h}_{st} + \delta_{sj} + \delta_{jt} + \epsilon_{s(i)jt} \tag{1}$$

where $\mathrm{Y}^{h}_{s(i)jt}$ is the outcome i in county s year t and stack j. The $\mathrm{Pilot}^{h}_{s,t}$ is an indicator that is 1 if county s implements the pilot program and zero otherwise. δ_{sj} and δ_{jt} are the stack-by-county and stack-by-year fixed effects, respectively. The error term ϵ_{isjt} is clustered at the county level, which is the level of the pilot variation.

The NUP pilot program adopts a multi-tier administrative design, with pilot localities ranging from the provincial to the township level in order to facilitate policy experimentation and learning. In our analysis, we thus further distinguish between prefecture-level and county-level pilots to examine whether the program effects vary across administrative tiers. Accordingly, in the specification, the superscript $h \in \{prefecture, county\}$ indicates whether the treatment is defined based on prefecture-level or county-level pilot implementation.

[36] I assess the sensitivity of the choices of dynamic DiD estimators (e.g., Borusyak, Jaravel and Spiess (2024)) and find robust estimates. For an overview of the recent DiD literature on identifying dynamic treatment effects when there are multiple groups/periods in the DiD framework, see Roth et al. (2023).

The identification strategy does not require the pilot roll-out to be as-good-as-random across counties and years. The central requirement for the identification is the parallel-trend assumption: the outcomes would have experienced a similar trend in the absence of the pilot program. To assess the assumption, I conduct an event study that captures treatment effects over each of the pre- and post-periods. The specification is similar to equation (1) but replaces the single treatment indicator with a group of event-time indicators, allowing for differential treatment effects over time:

$$\mathrm{Y}^{h}_{s(i)jt} = \sum_{k=-5, k\neq -1}^{k=3} \beta_k \cdot \mathrm{Pilot}^{h}_{st} \times \mathbb{1}\left(t = t^* + k\right) + \delta_{sj} + \delta_{jt} + \epsilon_{s(i)jt} \tag{2}$$

where β_k represents the effect of the pilot program in year t^* on outcomes k years later (or previously, for $k < 0$). These effects are measured relative to year $k = -1$, which is omitted as the reference year. We truncate the number of periods pre- and post-treatment k at -3 and 5, so β_{-3} represents average outcomes three or more years prior to the the pilot program, and β_5 indicates average outcomes five or more years following the pilot program. The rest of the notations are the same as those in equation (1).

5 The Implementation of PPPs

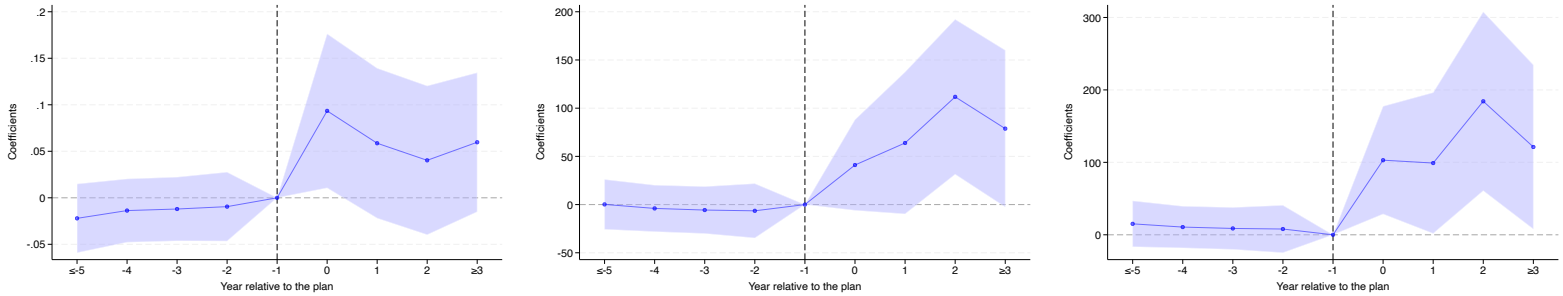
Figure 4 presents event-study estimates of the impact of the pilot program on PPP adoption. The PPP financing is measured using three county-year outcomes: the number of PPP projects, average investments per PPP project (million RMB), and total PPP investments (million RMB). The estimates reveal flat and statistically indistinguishable pre-trends between treated and control counties across all three outcomes, lending support to the identifying assumption. In the post-treatment period, pilot counties exhibit a pronounced increase in PPP adoption, with the rise in total investment remaining statistically significant for up to four years following pilot implementation.

Table 3 reports the corresponding average treatment effects. Column (2) in Panel A shows that pilots, on average, adopt 0.077 more PPP projects, a 50% increase relative to the mean of the dependent variable. Average investment per PPP in pilots is also 76 million RMB larger than that in control units, about a 93% increase relative to the dependent variable mean. In the end, pilot localities raise 118 million RMB more investment from the increased PPP projects, a 97% increase relative to the dependent variable mean. Taken together, the results indicate that the pilot program substantially accelerated PPP adoption and played a central role in driving PPP expansion during the study period.

Comparing the effects of county- versus prefecture-level pilots, Columns (3) and (4) indicate that county pilots generate stronger PPP adoption responses. Specifically, county pilots adopt more PPP projects than their prefecture counterparts, and the difference is marginally statistically significant (p-value = 0.094). Although county pilots also exhibit larger increases in average investment per project and total PPP investment, these effects are not statistically distinguishable from those of prefecture pilots.

Results in Panel B characterize these pilot-induced PPP investments. The results indicate that pilot-induced PPP projects have longer contract duration, reflecting that these projects involve larger-scale investments. Moreover, these projects are more likely to be subsequently designated as exemplary projects, suggesting that the PPP adoption may be driven not only by infrastructure financing needs but also by local officers' career promotion incentives. In addition, pilot-induced PPPs are more likely to be greenfield projects that build new infrastructure, rather than brownfield

Figure 4: Event Study Figure on PPP Finance



(a) Number of PPP **(b)** Average investment **(c)** Total 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, average investment per PPP project, and total investment 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.

Table 3: Impacts of New Urbanization Plan on PPP Finance

	Mean of dep var	Stacked DiD	Pilot level		*P-value* of difference
			County	Prefecture	
	(1)	(2)	(3)	(4)	(5)
Panel A. PPP finance					
Number of PPP	0.154	0.077***	0.145**	0.059**	0.094
		(0.024)	(0.061)	(0.025)	
Average investment	82.159	76.383***	111.786**	67.064***	0.352
		(18.582)	(51.895)	(18.642)	
Total investment	121.221	117.591***	151.698**	108.633***	0.493
		(28.826)	(71.805)	(30.620)	
Panel B. PPP characteristics					
Contract duration	1.927	1.017***	1.948***	0.770***	0.038
		(0.241)	(0.588)	(0.256)	
Exemplary project	0.020	0.016***	0.035***	0.011**	0.057
		(0.005)	(0.012)	(0.005)	
Greenfield project	0.130	0.052**	0.094*	0.041*	0.243
		(0.022)	(0.056)	(0.023)	
Payment scheme					
Government payment	0.041	0.024***	0.031*	0.022**	0.614
		(0.008)	(0.016)	(0.009)	
Viability gap funding	0.052	0.026***	0.040**	0.023**	0.364
		(0.009)	(0.020)	(0.009)	
User charges	0.007	0.001	0.009	-0.001	0.213
		(0.003)	(0.008)	(0.003)	
Contract allocation					
Registered capital	0.652	0.374***	0.443**	0.356***	0.622
		(0.085)	(0.194)	(0.093)	
State-owned enterprises	0.012	0.000	0.000	0.000	0.994
		(0.004)	(0.009)	(0.004)	
Local firms	0.024	0.001	0.003	0.000	0.823
		(0.006)	(0.013)	(0.006)	

Notes: The table shows estimates of the impact of the pilot program on PPP financing (Panel A) and project characteristics (Panel B) at the county-by-year level, using the stacked DiD estimator. The dependent variables in Panel A include the number of PPP projects, average investment, and total investment. In Panel B, the dependent variables include contract duration (in years), indicator of being selected as an exemplary project, indicator for the greenfield proejct, distribution of payment schemes (government payments, viability gap funding, and user charges), and contract allocation characteristics (winning firm's registered capital, indicator for an SOE, and indicator for a local firm). Column (1) displays the mean of the dependent variable, while Column (2) presents the estimates. Columns (3) and (4) show the estimates for county-level and prefecture-level pilots, respectively. Column (5) reports the p-value for the difference between the estimates in Columns (3) and (4). The number of observations is around 24,820. All regressions include county and year fixed effects, with standard errors clustered at the county level. $***p < 0.01, **p < 0.05, *p < 0.1$

ones that renovate existing facilities.[37] Comparing across administrative tiers, county-level pilots are more likely than prefecture-level pilots to adopt PPPs with longer contract durations and a higher probability of receiving exemplary status, with both differences statistically significant.

Payment Scheme. — PPPs can be financed through three payment mechanisms: 1) government payment, in which governments use fiscal revenues to compensate contractors; 2) user charges, where end-users directly pay the contracted company; and 3) viability gap funding (or hybrid payment), in which both governments and customers jointly share project costs. Among these mechanisms, user charges best reflect the intended rationale of PPPs. User-charged projects not only reduce fiscal pressure on governments but also better align private contractors' incentives with project performance, thereby serving as an effective tool on screening out white elephant projects (Engel, Fischer and Galetovic, 2021).

Panel B of Table 3 examines the distribution of payment schemes among adopted PPPs, measured by the share of projects financed through each mechanism. The results show that PPPs in pilot localities are disproportionately funded through government payment or viability gap funding, rather than through user charges.

From the public-sectors perspective, this pattern indicate that pilot-induced PPP adoption may not have effectively alleviated local fiscal constraints, since the dominant schemes continue to rely on government revenues in subsequent fiscal periods. In addition, the lack of user-charged PPPs raises concerns that these projects may have primarily served as alternative off-budget debt-raising vehicles rather than genuine risk-sharing equity investments.[38] These findings are consistent with the motivation behind the 2017 PPP regulatory tightening. As noted by a Ministry of Finance official, local governments had increasingly used PPPs as a form of off-budget borrowing, effectively transforming them into debt-like instruments.[39]

From the private-sectors perspective, non-user-charged PPPs are not inherently problematic, as private contractors may still manage operational risks and ensure project efficiency. However,

[37] I classify PPPs based on contract type. Projects using "BOT" (built-operate-transfer), "TOT (transfer-operate-transfer)+BOT", "BOO" (build-own-operate), or "TOT+BOO" are classified as greenfield, while those using "TOT", "ROT" (renovate-operate-transfer), "OM" (operation and maintenance), or "MC" (management contract) are categorized as brownfield (Tan and Zhao, 2019).

[38] This reflects the phenomenon known in Chinese as "equity in name, debt in reality" (*minggu shizhai*). Analyzing PPPs implemented between 2014 and 2016, Wang et al. (2020) find that nearly all PPPs financed by government payment or viability gap funding fall into this category, whereas those relying on user charges more closely resemble true equity structures.

[39] See Xinhua News at https://www.gov.cn/xinwen/2017-12/01/content_5243767.htm.

this becomes concerning when SOEs dominate the PPP market. Figure B5 decomposes SOEs participation by payback mechanism and shows that SOEs increasingly enter the PPP market by securing contracts for non-user-charged PPPs. When both local governments and SOE contractors anticipate implicit central-government support, the associated SPV may be subject to heightened renegotiation risks. In some cases, bailouts can represent an extreme form of renegotiation through which the central government ultimately bears the full downside risk.

Contract Allocation.— The last three rows of Panel B in Table 3 examine the characteristics of firms awarded PPP contracts by local governments. The outcomes include the average log value of the registered capital of the winning firms, and the share of projects assigned to state-owned enterprises or local firms. A firm is defined as local if it is registered in the same prefecture as the PPP project. The results reveal that pilot localities are more likely to award contracts to firms with a larger registered capital, consistent with the earlier findings that pilot-induced PPPs involve greater investment scale and longer contract durations. In addition, there is no evidence that pilot governments systematically favor state-owned enterprises or local firms in contract assignment. Overall, these findings indicate that, at least on average, pilot program did not generate SOE or local favoritism in PPP contract allocation that could undermine allocative efficiency.

Robustness Checks.— Table C1 presents a battery of robustness checks for the baseline estimates. Column (1) reproduces the baseline results, while Column (2) applies an alternative dynamic DiD estimator — the "imputation" estimator proposed by Borusyak, Jaravel and Spiess (2024). Column (3) includes province-by-year fixed effects to account for concurrent policies and confounding factors at the province-by-year level (e.g., the business tax to value-added tax reform implemented between 2012 and 2016) that could influence PPP adoption and land finance. Columns (4) and (5) assess sample sensitivity by excluding: (i) centrally administered municipalities (Beijing, Shanghai, Tianjin, and Chongqing), which may differ from other provinces in their economic fundamentals, and (ii) the two provinces with the largest share of PPP adoption (Henan and Shandong), which could be outliers driving the baseline findings. Across all specifications, the results remain stable and quantitatively similar, reinforcing the robustness of the baseline findings.

5.1 Fiscal Alleviation or Burdens?

I first assess the effectiveness of pilot-induced PPPs by examining one of their central promises: whether they alleviate local governments' fiscal constraints. In principle, PPPs can mobilize private to finance infrastructure provision, thereby alleviating fiscal pressures while addressing market failure. Yet whether the pilot-induced PPP adoption actually leads to fiscal alleviation remains an open question. On the one hand, when properly implemented, PPPs may help local governments overcome financing constraints in delivering urban infrastructure. On the other hand, in a growth-oriented system that generates strong incentives for infrastructure overinvestment, PPPs may instead open a new door for debt competition across local governments (Tsai, 2004). Consistent with this latter possibility, the results in Table 3 suggest that local governments have relied on PPP arrangements resembling debt-like financing, potentially exacerbating fiscal burdens rather than alleviating them.

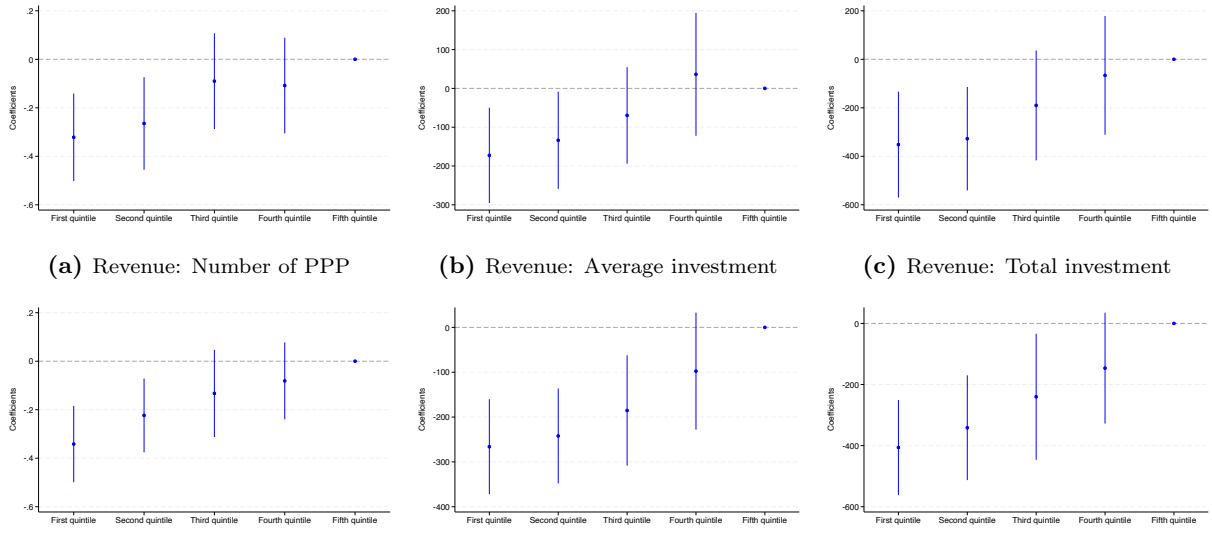
To further investigate this issue, I examine whether PPP adoption following the pilot program was concentrated in more fiscally constrained counties. Specifically, I divide counties into quintiles based on their baseline revenue or expenditure (normalized by GDP) using data from the 2013 China County Statistical Yearbook.[40] I then interact these quintile indicators with the pilot treatment variable and re-estimate the baseline specification with these interaction terms.

Figure 5 plots the estimates of these interaction terms, using counties in the highest revenue/expenditure quintile (the fifth quintile) as the reference group. The results show that, in general, fiscally constrained counties (i.e., those with lower baseline revenue or expenditure) adopt fewer PPP projects, adopt projects with smaller average investments, and raise less total investment through PPPs. These patterns stand in sharp contrast to the intended purpose of PPPs as a mechanism to relax financing constraints in the provision of public goods. Instead, they suggest that PPPs have been leveraged as tools for debt competition to boost local economy, ultimately heightening concerns about the additional fiscal burdens following the PPP adoption.[41]

[40] About 90% of the counties in the PPP estimation sample are matched to the yearbook. data

[41] If fiscally stronger counties adopt more use-charged PPPs, then PPP expansion is not likely to be associated with the use of alternative debt-raising vehicles. However, Figure C3 shows evidence that the patterns in Figure 5 are concentrated among non-user-charged PPP projects.

Figure 5: Heterogeneous Impacts on PPP Adoption by Fiscal Capacity



(a) Revenue: Number of PPP **(b)** Revenue: Average investment **(c)** Revenue: Total investment

(d) Expenditure: Number of PPP **(e)** Expenditure: Average investment **(f)** Expenditure: Total investment

Notes: The figure shows event study estimates of the impact of the pilot program on PPP finance interacting with the revenue/expenditure quintile (the highest quintile omitted as the reference group), using stacked DiD estimators. The dependent variables are the number of PPP projects, average investment, and total investment 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.

5.2 SOEs Favoritism behind Career Incentives

I next assess the effectiveness of pilot-induced PPPs by examining another central promise of PPPs: their ability to improve the allocation of government contracts to firms through auctions, known as the market mechanism of PPPs. The potential efficiency gains from PPPs depend on whether contracts are competitively allocated to competent private firms through public procurement auctions, thereby enhancing the efficiency of building and operating public infrastructure. While the baseline results in Table 3 show no evidence that pilot implementation systematically increases favoritism toward SOEs or local firms on average, Figure 2 provides suggestive evidence of non-competitive bidding patterns in contract allocation.

To formally investigate this issue, I examine whether political motivations, rather than economic efficiency considerations, influence PPP contract allocation in ways that disproportionately favor less efficient SOEs. Local officials' career incentives may distort procurement decisions if PPP investments are leveraged to advance promotion prospects. For example, Tang, Wang and Wu (2025) documents substantial local favoritism in China's public procurement, where local officials exhibits systematic bias in awarding contracts to local bidders. They attribute the local favoritism primarily to career incentives, rather than information friction. Since PPPs represent a special form of public procurement, their allocation may similarly be influenced by political promotion incentives.

I exploit local officers' age as a plausibly exogenous measure for career incentives, leveraging institutional features of China's political promotion system (Xi, Yao and Zhang, 2018). First, promotions happen at the National People of Congress (NPC) meetings, and local officials are estimated to be three times more likely to be promoted at the end of a political cycle (i.e., the time of NPC) than at its beginning. Second, officials are typically expected to serve at least three years before promotion and are subject to retirement at age 60. As a result, officials aged 58 and above at the time of an NPC meeting are highly unlikely to be promoted, since they cannot complte the required tenure before reaching retirement.[42]

To conduct the exercise, I obtain resumes of county-level officers from the Chinese Local

[42] Zeng and Zhou (2024) documents that the promotion probability of mayors declines sharply, from around 60% at age 57 to around 5% at age 58.

Government Officials Database (CGOD), compiled by the Chinese Research Data Services.[43] I focus on the main county party secretary and identify the secretary in office at the time of the pilot implementation. For control counties, I identify the secretary in office in 2014.[44] I then calculate each official's age at the 13th NPC in March 2018, when promotions were made. Following Axbard and Deng (2024), I interact age-group indicators with the pilot treatment variable in equation (1), which yields the following specification:

$$\mathrm{Y}_{st} = \beta_0 + \beta \cdot \mathrm{Pilot}_{st} \times \sum_{k=50, k\neq 58}^{k=60} \mathrm{Age}_s + \delta_s + \delta_t + \varepsilon_{st} \tag{3}$$

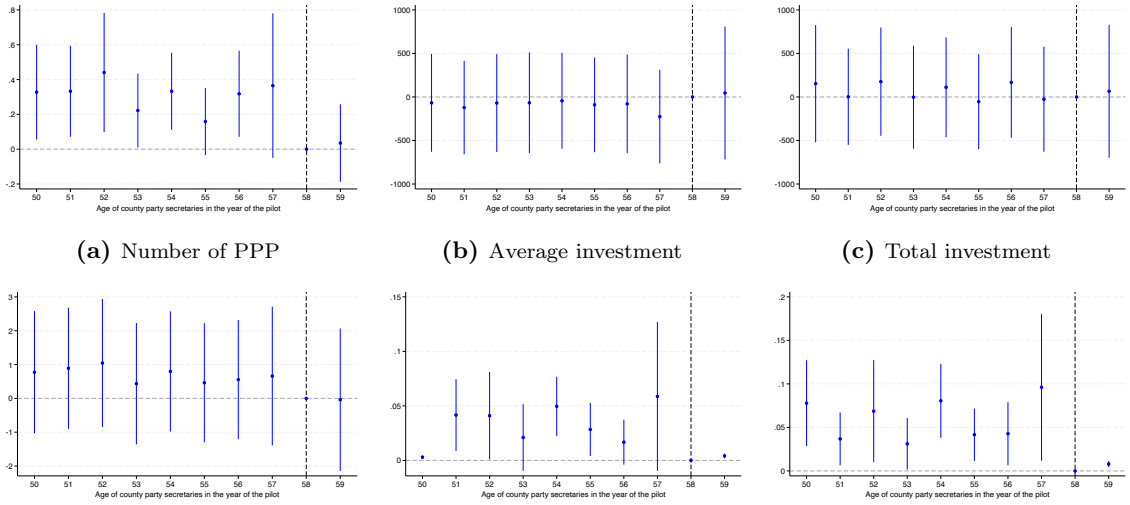
Figure 6 reveals a clear pattern that local officials' promotion incentives affect PPP adoption, primarily along the extensive margin. Specifically, counties governed by officials younger than 58 at the time of the 13th NPC (i.e., those with stronger promotion incentives) adopt significantly more PPP projects, although the scale of investment does not increase proportionally. More importantly, these pilot localities are also more likely to award PPP contracts to SOEs and local firms. These findings are consistent with the career-incentive mechanism underlying local favoritism in public procurement documented by Tang, Wang and Wu (2025).

Taken together, the results highlight how political incentives distort both the adoption and assignment of PPP projects. Such distortion raises concerns about allocative efficiency, as PPPs intended to mobilize private capital for infrastructure investment are instead channeled toward politically motivated objectives. In addition, these patterns suggest potential crowding-out effects, whereby government contracts and local credit are disproportionately allocated to SOEs, potentially displacing private investment (Cong et al., 2019; Huang, Pagano and Panizza, 2020).

[43] When information was missing, I supplemented the database with manual searches on Baidu. About 86% of counties in the PPP dataset were successfully matched to the CGOD.

[44] I focus on party secretaries rather than mayors, consistent with the anecdotal evidence in Appendix Section D, which highlights that major infrastructure investment decisions in pilots are often closely tied to CCP secretaries.

Figure 6: Heterogeneous Impacts on PPP Adoption by Career Incentive



(a) Number of PPP **(b)** Average investment **(c)** Total investment

(d) Registered capital **(e)** State-owned firms **(f)** Local firms

Notes: The figure shows event study estimates of the impact of the pilot program on PPP finance interacting with the age of the local official (58 omitted as the reference group), using stacked DiD estimators. The dependent variables are the number of PPP projects, average investment, total investment, and contract allocation (winning firm's registered capital, likelihood of being an SOE, and likelihood of being a local firm) 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.

6 Further Consequences

So far, I have documented the expansion of PPP adoption following the pilot program and assessed its effectiveness. I now turn to the broader consequences of the PPP adoption by examining the impacts of the pilot program on two central policy outcomes: 1) substitution effects on traditional land-based financing and 2) local economic effects.

6.1 Impacts on Land Finance

One kep objectives of the pilot program in promoting PPPs is to reduce local governments' reliance on land finance and to gradually phase out the use of local government financing vehicles, thereby mitigating rising government debt. To evaluate this policy implication, I examine whether the expansion of PPPs in pilot localities generates substitution effects away from land-based financing.

Panel A of Table 4 shows that, relative to the control group, pilot localities experience an 8.33% ($e^{0.080} - 1$) decline in the number of land parcel transactions. At the intensive margin, however, the pilot program has no significant impact on local governments' reliance on overall land-based financing.[45]

Disaggregating by pilot level reveals substantial heterogeneity. County-level pilots experience significant reduction across all land-finance outcomes, including the number of land parcel transacted, total land area, land revenue, and the likelihood of land transactions through LGFVs. Specifically, county-level pilots exhibit a 15.63% ($e^{-0.170} - 1$) decline in land revenue, corresponding to an average reduction of around 31.88 million RMB ($e^{5.318} * 0.1563$). These estimates imply that each RMB of pilot-induced PPP financing is associated with a 0.21 RMB (31.88/151.70) reduction in traditional land-based finance. In addition, the declines in land area, land revenue, and LGFV-related transactions in county pilots are statistically distinguishable from those observed in prefecture pilots.

Taken together, these findings indicate that introducing PPPs generates substitution effects on land-based financing, with an estimated elasticity of 0.21. These effects are concentrated in county-level jurisdictions, highlighting that decentralizing reform design and implementation to lower levels of government may produce more direct and substantial policy impacts by better

[45] Figure C1 presents event-study estimates supporting the identifying assumption.

aligning local incentives with reform objectives.

Turning to land characteristics in Panel B, the results show that pilot localities experience a higher share of commercial land transactions and a lower share of residential land transactions. In addition, the floor-area-ratio (FAR) limit is significantly lower in pilot areas than in the control group, consistent with the shift toward commercial land allocation. While a lower FAR limit could potentially imply less intensive or less efficient land use, I formally assess land-use efficiency by linking each geocoded land parcel to satellite-based nighttime light intensity. The results indicate that, although nightlight intensity is lower for parcels in pilot counties, these differences are not statistically significant. Overall, while county-level pilots exhibit substitution effects on land finance, there is no evidence of a corresponding significant decline in land-use efficiency.

Table 4: Impacts of New Urbanization Plan on Land Finance and Local Economy

	Mean of dep var	Stacked DiD	Pilot level		*P-value* of difference
			County	Prefecture	
	(1)	(2)	(3)	(4)	(5)
Panel A. Land finance (county level)					
Number of land parcel	3.269	-0.080**	-0.113*	-0.068	0.328
		(0.036)	(0.062)	(0.042)	
Land area	3.786	-0.036	-0.115*	-0.006	0.070
		(0.037)	(0.070)	(0.043)	
Land revenue	5.318	0.005	-0.170**	0.070	0.000
		(0.045)	(0.084)	(0.051)	
LGFVs	0.014	0.002	-0.005***	0.005*	0.001
		(0.002)	(0.002)	(0.003)	
Panel B. Land characteristic (parcel level)					
Commercial land	0.176	0.025***	0.035***	0.021**	0.001
		(0.007)	(0.013)	(0.009)	
Residential land	0.533	-0.037***	-0.045**	-0.033**	0.007
		(0.011)	(0.019)	(0.013)	
FAR limit	2.125	-0.184***	-0.149*	-0.201***	0.002
		(0.053)	(0.087)	(0.060)	
Land use efficiency	1.536	-0.049	-0.019	-0.062*	0.005
		(0.037)	(0.082)	(0.034)	
Panel C. Local economy					
Nighttime light intensity	0.531	-0.018	-0.019	-0.017	0.948
		(0.015)	(0.038)	(0.016)	
By urbanicity					
Urbanized communities	1.185	-0.016	-0.020	-0.015	0.877
		(0.019)	(0.050)	(0.020)	
Non-urbanized communities	0.097	-0.024	-0.012	-0.027	0.530
		(0.016)	(0.034)	(0.017)	

Notes: The table shows estimates of the impact of the pilot program on land financing (Panel A, county-year level) and land characteristics (Panel B, parcel-year level), using the stacked DiD estimator. The dependent variables in Panel A include the log values of total number, area, and value of transacted land parcels, as well as the likelihood that a land parcel is transacted to LGFVs. In Panel B, the dependent variables contain a dummy variable indicating whether the parcel is a commercial or residential land, floor-area-ratio (FAR) limit, and the nightlight intensity of the land parcel. In Panel C, the dependent variable is the county-year aggregate of community-level nightlight intensity. The outcomes in rows under "by urbanicity" are county-year level nightlight intensity aggregated from urbanized and non-urbanized communities base on baseline urbanicity. Column (1) displays the mean of the dependent variable, while Column (2) presents the estimates. Columns (3) and (4) show the estimates for county-level and prefecture-level pilots, respectively. Column (5) reports the p-value for the difference between the estimates in Columns (3) and (4). The number of observations is 17,770 and 17,904 for Panels A and C, respectively, and ranges between 552,000 and 871,000 for Panel B. All regressions include county and year fixed effects, with standard errors clustered at the county level. $***p < 0.01, **p < 0.05, *p < 0.1$

6.2 Impacts on Local Economy

Lastly, I examine whether introducing PPPs for urban infrastructure investment improves the local economy, which is the ultimate policy objective of the pilot program and the broader rationale behind China's investment-led urbanization initiative.

To measure local economic activity, I use satellite-based nighttime light data from 2012 to 2019. I combine these data with the NBS Rural-Urban Continuum Codes (RUCC), which provide unique urbanicity classifications that allow me to separately estimate economic impacts in urbanized and non-urbanized areas. This distinction is important is important because PPP investments are expected to primarily build new infrastructure and thus generate more pronounced effects in less urbanized regions. To do so, I assign nighttime light intensity to geocoded communities and classify them into urbanized and non-urbanized groups based on their baseline urbanicity in 2013. I then aggregate community-level measures to the county level and merge them with the PPP dataset. Finally, I estimate the effects of pilot program on local economic activity using the baseline specification.

Panel C in Table 4 presents the results. Overall, pilot localities experience a statistically insignificant 1.82% ($e^{0.018} - 1$) decline in nighttime light intensity. Comparing across pilot level, county- and prefecture-level pilots experience similar reduction in nighttime light intensity, and their difference is negligible (p-value = 0.948). Using the upper bound (adding 1.96 of S.E. to the estimate) of baseline estimates, we can rule out an effect size of 0.011. Applying the elasticity of 0.3 between nighttime lights and GDP estimated by Henderson, Storeygard and Weil (2012), this corresponds to at most a 0.3% increase in economic output, suggesting limited scope for positive growth effects, if any. The next two rows decompose the effects by baseline urbanicity. For urbanized areas, the estimated economic effects remain negative and statistically insignificant, with treated urbanized communities showing a 1.61% ($e^{0.016} - 1$) decline in nighttime light intensity. Similarly, for non-urbanized areas, pilot counties exhibit a statistically insignificant 2.43% ($e^{0.024} - 1$) decline.

The event study estimates provide additional insights into the dynamic effects. Subfigure (e) of Figure C1 shows a short-term increase in nightlight intensity in the first year following the pilot program, likely reflecting the immediate effects of the PPP investment shock. However, this initial

increase is followed by significant declines in the third and fourth years. This pattern suggests that pilot localities may have undertaken projects with limited long-run economic returns. When decompose the effects by baseline urbanicity, Figure C2 subfigures (a) and (b) indicate a more pronounced decline in non-urbanize communities, especially four years after the pilot program. Given that pilot-induced PPPs are primarily greenfield infrastructure projects, these results imply that the negative medium-run effects may stem from inefficient project selection in less urbanized areas. This interpretation echoes Chen et al. (2025), who study the economic returns to subsidized skyscraper construction and highlight poor location choice as a key mechanism behind limited spatial spillovers.

It may be less surprising that PPP investments do not generate sizable economic growth. Between 2014 and 2021, the largest sectors of PPP USE are transportation (22.8%) and wastewater treatment (12.8%). While wastewater treatment facilities represent largely non-productive infrastructure, large-scale transportation projects often yield only modest economic returns relative to their substantial construction costs (Glaeser and Poterba, 2020). What is more striking, however, is the medium-run decline observed in the third and fourth years following the PPP expansion. This pattern raises concerns that pilot-induced PPPs may have facilitated the financing of low-return — or even "white elephant" — projects, particularly because they were predominantly structured as non-user-charged arrangements where direct market discipline is limited.[46]

Ruling out Labor Mobility as an Alternative Interpretation.— Because pilot counties are simultaneously tasked with addressing fiscal gaps to promote rural-to-urban migration, an alternative interpretation for the negative spillovers is a brain drain effect: high-skilled rural residents may migrate to urban areas, leading to economic decline in rural communities. To test this mechanism, I exploit a major labor market reform — the 2014 *hukou* reform, which fully eliminated migration restrictions in 46% of China's prefectural cities (Liu, Xu and Zou, 2024). If the brain drain hypothesis is correct, the negative economic effects of the pilot program should be larger in pilots located within prefectures that removed migration barriers. To do so, I obtain

[46] Appendix Section D provides anecdotal evidence of such showcase projects financed by pilot localities. For example, Danzhou City in Hainan Province launched the construction of Ocean Flower Island, the world's largest artificial archipelago, while Dushan County in Guizhou Province accumulated over 40 billion RMB in debt despite having an annual GDP of only 1 billion RMB. Both cases were characterized by unfinished construction projects and widespread governmental corruption.

the list of prefectures that fully eliminated *hukou* restrictions in 2014.[47] I then interact the reform indicator with the pilot treatment variable to estimate the interaction effects.[48] Results in Figure C2 subfigures (e) and (f) plot estimates of the interaction terms, which reject the brain drain hypothesis. Instead of amplifying the negative effects, pilots in *hukou*-reformed prefectures show increased nightlight intensity in the third and fourth years of the post-period, particularly in the non-urbanized communities.[49]

Taken together, these findings alleviate concerns that the negative economic effects are driven by concurrent migration reforms and instead suggest that greater labor mobility may help mitigate the adverse consequences of inefficient public investment. More broadly, the results highlight the potential gains from combining infrastructure spending with the removal of institutional barriers to factor movement.

[47] The 2014 *hukou* reform classifies prefectural cities (henceforth, city) into five categories, based on the populations in the urban areas of each city: (1) small cities (less than 0.5 million urban population); (2) medium cities (0.5–1 million); (3) type-II large cities (1–3 million); (4) type-I large cities (3–5 million); and (5) megacities (over 5 million). The reform grew more conservative for larger cities: restrictions were fully eliminated in small cities, gradually removed in medium cities, conditionally relaxed in large cities (and more restricted in type-I than type-II large cities), but strictly enforced in megacities. See Liu, Xu and Zou (2024) for the list of reformed prefectures and policy details.

[48] The specification is similar to the equation (2) but add an indicator Hukou_c for prefectures that fully removed the migration restriction (i.e., *hukou* restriction) in 2014 and add the interaction term between the Hukou_c indicator and pilot treatment. Formally, I use the following specification:

$$\text{Y}_{s(i)jt} = \sum_{k=-3, k\neq -1}^{k=3} \beta_k \cdot \text{Pilot}_{st} \times \text{Hukou}_c \times \mathbb{1}\left(t = t^* + k\right) + \text{Pilot}_{st} + \text{Hukou}_c + \delta_{sj} + \delta_{jt} + \epsilon_{s(i)jt}$$

[49] Figure C2 Subfigures (c) and (d) replicate the main event study analysis for the restricted sample with available *hukou* reform data and show patterns similar to subfigures (a) and (b).

7 Discussion and Conclusion

I study the adoption of public-private partnerships financing in local governments' infrastructure investments under China's New Urbanization Plan during the 2010s. I overcome key empirical challenges by identifying novel policy variation from the pilot program and assembling millions of newly digitized and linked administrative records. I find that pilot localities adopt significantly more PPP investments. However, heterogeneity analyses reveal important concerns about the effectiveness of PPPs in practice. First, pilot implementation leads to greater reliance on non-user-charged payment schemes, and fiscally constrained counties adopt fewer PPP projects, indicating that pilot-induced PPPs are unlikely to alleviate fiscal pressures and instead may have functioned as additional debt-like financing vehicle. Second, PPP contract allocation appears distorted by political promotion incentives, undermining the market mechanism through which PPPs are intended to select efficient infrastructure providers via competitive auctions. Further investigation studies the fiscal and economic impacts of PPP adoption. On the fiscal side, introducing PPPs reduces local governments' reliance on traditional land-based financing, particularly among county-level pilots. The estimates imply that each RMB of PPP-financed investment is associated with a 0.21 RMB reduction in land-based financing. On the economic side, I find no evidence that PPP investments generate positive impacts on local economic activity, raising concerns about the effectiveness of infrastructure-led development as a growth strategy.

This study provides the first comprehensive evaluation of local governments' adoption of PPPs, as well as their fiscal and economic effects, within the context of China's New Urbanization Plan. The study contributes new perspectives on the financing of infrastructure during urbanization in developing countries and the use of PPPs in environments where market competition may be limited. In addition, the paper shed new light on how fiscal federalization interacts with private-sectors participation in shaping the efficiency of public goods provision. The substitution effects of PPPs on land-based financing additionally highlight the potential virtue of decentralization in policy design, where incentives and implementation better align due to improved incentive compatibility. Finally, the absence of measurable local growth effects cautions against viewing investment-led expansion as a universal development panacea.

The policy implications are particularly salient given that China's central government has

continued to promote PPP financing since 2022, following multiple rounds of regulatory adjustments between 2017 and 2021. While the effectiveness of future rounds of PPP waves remains uncertain, this study represents an important first step toward understanding how local governments deploy PPPs in the provision of public infrastructure. Notably, the NDRC and MOF issued a new round of PPP regulations in 2023 that explicitly highlights the use of user-charges payment schemes and encourage greater participation by non-state-owned enterprises, which, in light of our findings, should help strengthen market discipline and limit the financing of inefficient projects.[50] At the same time, the State Council has introduced a *New Urbanization Plan (2021-2035)*, scaling up lessons from the pilot program to the national level and integrating the urbanization plan with broader agendas, including industry policy and rural revitalization.[51] These developments underscore the central government's continued view of urbanization as a central pillar of national development. While the efficiency of ongoing urbanization efforts remains uncertain, the lessons from the original NUP pilot program provide valuable insights for policymakers and researchers alike.

Several important questions remain unanswered. First, does preferential credit allocation toward SOEs generate crowding-out effects on private investment, potentially harming broader economic growth? Second, does PPP adoption ultimately mitigate local governments' debt burdens? Third, how are PPP-financed infrastructure investments capitalized into local outcomes, such as housing prices, firm dynamics, and labor market conditions? Finally, given that not all PPP-funded projects generate positive economic returns, what are the long-term effects of these investments on broader social outcomes? I view these explorations as promising avenues for future research.

[50] See *"Guidance on regulating the mechanisms for cooperation between governments and private capital"* (No. 115 [2023], State Council Info Office)

[51] See *"Five-year plan on deepening the implementation of a people-centered new urbanization"* (No. 17 [2024], NDRC)

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Appendix For:

"Financing Urbanization in China"

Jian Zou
Cornell University

February, 2026

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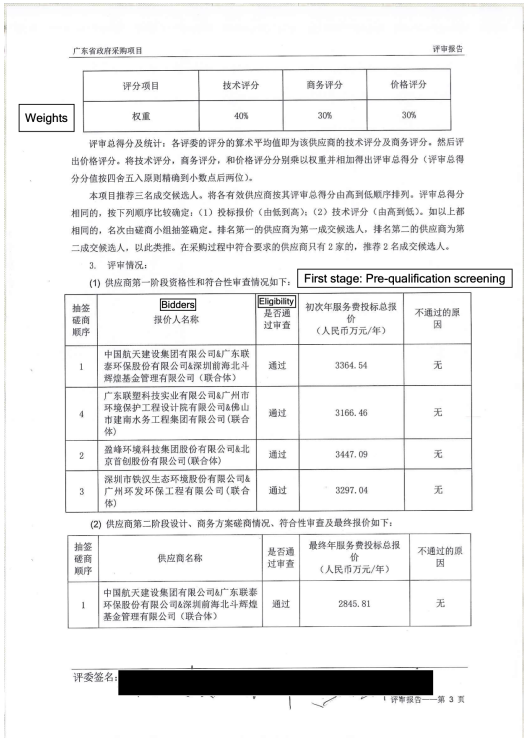
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A Data: Additional Details

A.1 PPP Bidding Document

Figure A1: The PPP Bidding Document and Bid-Winning Notice Example: Taishan City, Guangdong



广东省政府采购项目 评审报告

	评分项目	技术评分	商务评分	价格评分
Weights	权重	40%	30%	30%

评审总得分及统计：各评委的评分的算术平均值即为该供应商的技术评分及商务评分。然后评出价格评分。将技术评分，商务评分，和价格评分分别乘以权重并相加得出评审总得分（评审总得分分值按四舍五入原则精确到小数点后两位）。

本项目推荐三名成交候选人。将各有效供应商按其评审总得分由高到低顺序排列。评审总得分相同的，按下列顺序比较确定：(1) 投标报价（由低到高）；(2) 技术评分（由高到低）。如以上都相同的，名次由磋商小组抽签确定。排名第一的供应商为第一成交候选人，排名第二的供应商为第二成交候选人，以此类推。在采购过程中符合要求的供应商只有 2 家的，推荐 2 名成交候选人。

3. 评审情况：

(1) 供应商第一阶段资格性和符合性审查情况如下； First stage: Pre-qualification screening

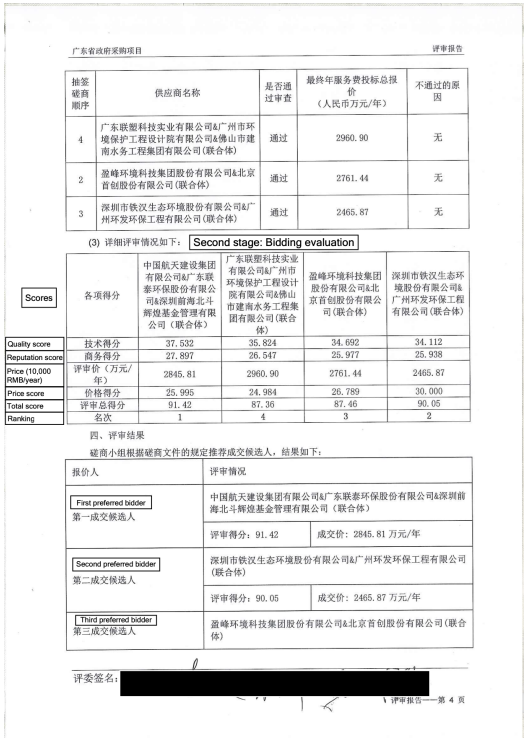
抽签磋商顺序	Bidders 报价人名称	Eligibility 是否通过审查	初次年服务费投标总报价（人民币万元/年）	不通过的原因
1	中国航天建设集团有限公司&广东联泰环保股份有限公司&深圳前海北斗辉煌基金管理有限公司（联合体）	通过	3364.54	无
4	广东联塑科技实业有限公司&广州市环境保护工程设计院有限公司&佛山市建南水务工程集团有限公司（联合体）	通过	3166.46	无
2	盈峰环境科技集团股份有限公司&北京首创股份有限公司（联合体）	通过	3447.09	无
3	深圳市铁汉生态环境股份有限公司&广州环发环保工程有限公司（联合体）	通过	3297.04	无

(2) 供应商第二阶段设计、商务方案磋商情况、符合性审查及最终报价如下：

抽签磋商顺序	供应商名称	是否通过审查	最终年服务费投标总报价（人民币万元/年）	不通过的原因
1	中国航天建设集团有限公司&广东联泰环保股份有限公司&深圳前海北斗辉煌基金管理有限公司（联合体）	通过	2845.81	无

评委签名：[redacted]

评审报告——第 3 页



广东省政府采购项目 评审报告

抽签磋商顺序	供应商名称	是否通过审查	最终年服务费投标总报价（人民币万元/年）	不通过的原因
4	广东联塑科技实业有限公司&广州市环境保护工程设计院有限公司&佛山市建南水务工程集团有限公司（联合体）	通过	2960.90	无
2	盈峰环境科技集团股份有限公司&北京首创股份有限公司（联合体）	通过	2761.44	无
3	深圳市铁汉生态环境股份有限公司&广州环发环保工程有限公司（联合体）	通过	2465.87	无

(3) 详细评审情况如下： Second stage: Bidding evaluation

Scores	各项得分	中国航天建设集团有限公司&广东联泰环保股份有限公司&深圳前海北斗辉煌基金管理有限公司（联合体）	广东联塑科技实业有限公司&广州市环境保护工程设计院有限公司&佛山市建南水务工程集团有限公司（联合体）	盈峰环境科技集团股份有限公司&北京首创股份有限公司（联合体）	深圳市铁汉生态环境股份有限公司&广州环发环保工程有限公司（联合体）
Quality score	技术得分	37.532	35.824	34.692	34.112
Reputation score	商务得分	27.897	26.547	25.977	25.938
Price (10,000 RMB/year)	评审价（万元/年）	2845.81	2960.90	2761.44	2465.87
Price score	价格得分	25.995	24.984	26.789	30.000
Total score	评审总得分	91.42	87.36	87.46	90.05
Ranking	名次	1	4	3	2

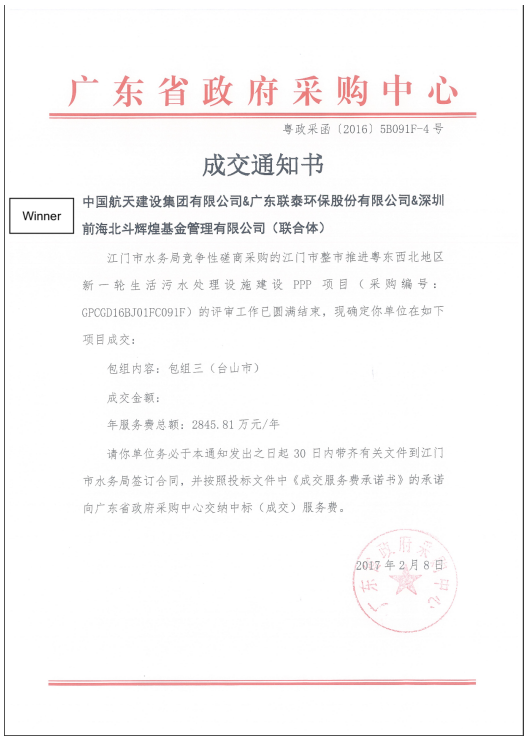
四、评审结果

磋商小组根据磋商文件的规定推荐成交候选人，结果如下：

报价人	评审情况	
First preferred bidder 第一成交候选人	中国航天建设集团有限公司&广东联泰环保股份有限公司&深圳前海北斗辉煌基金管理有限公司（联合体）	
	评审得分：91.42	成交价：2845.81 万元/年
Second preferred bidder 第二成交候选人	深圳市铁汉生态环境股份有限公司&广州环发环保工程有限公司（联合体）	
	评审得分：90.05	成交价：2465.87 万元/年
Third preferred bidder 第三成交候选人	盈峰环境科技集团股份有限公司&北京首创股份有限公司（联合体）	

评委签名：[redacted]

评审报告——第 4 页



广东省政府采购中心

粤政采函〔2016〕5B091F-4号

成交通知书

Winner 中国航天建设集团有限公司&广东联泰环保股份有限公司&深圳前海北斗辉煌基金管理有限公司（联合体）

江门市水务局竞争性磋商采购的江门市整市推进粤东西北地区新一轮生活污水处理设施建设 PPP 项目（采购编号：GPCGD16BJ01FC091F）的评审工作已圆满结束，现确定你单位在如下项目成交：

包组内容：包组三（台山市）

成交金额：

年服务费总额：2845.81 万元/年

请你单位务必于本通知发出之日起 30 日内带齐有关文件到江门市水务局签订合同，并按照投标文件中《成交服务费承诺书》的承诺向广东省政府采购中心交纳中标（成交）服务费。

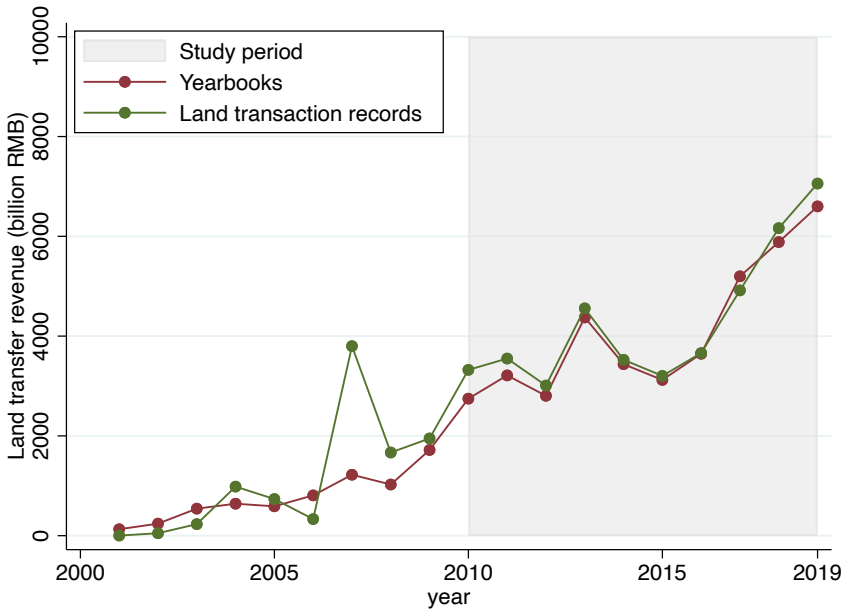
2017 年 2 月 8 日

(a) First stage: Pre-qualification screening **(b)** Second stage: Bidding evaluation **(c)** Bid-winning notice

Notes: The figure shows the bidding documents and bid-winning notice of a PPP project in Taishan city in Guangdong. The first-stage of the bidding procedure (subfigure a) indicates the eligibility of applicants, while the second stage (subfigure b) lists the eligible participating bidders and their evaluation scores. The Bid-winning notice (subfigure c) shows the winner. See Figure B4 for details of a PPP bidding procedure.

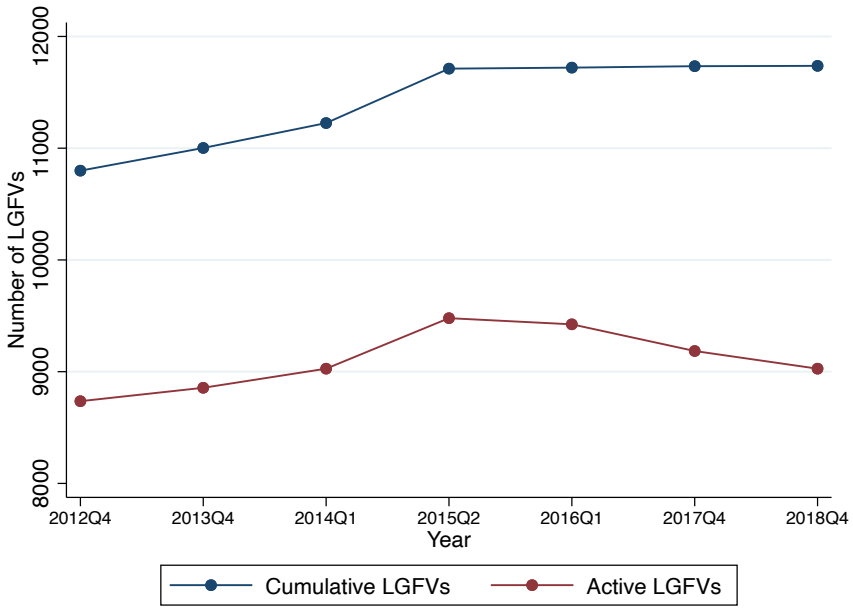
A.2 Land Transaction and LFGVs

Figure A2: 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 (from the Ministry of Natural Resources) and annual statistics from yearbooks (China National Land Resource Yearbook 2002-2018 and China Natural Resource Yearbook 2019) for the period between 2002 and 2019.

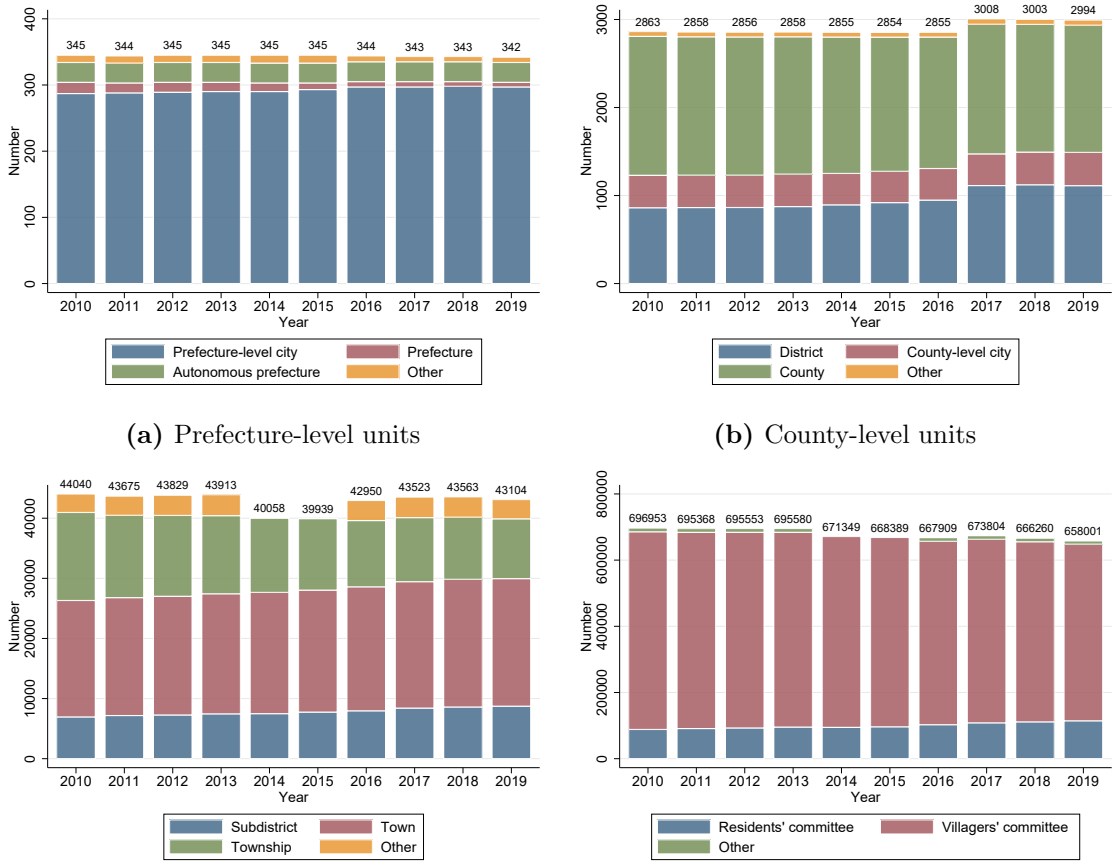
Figure A3: Numbers of LGFVs: 2012-2018



Notes: The figure presents the number of cumulative and active LGFVs using multiple quarterly datasets from the China Banking Regulatory Commission between 2012 and 2018. The X axis presents the year and quarter of the data source.

A.3 Administrative Division Number and Composition

Figure A4: Number of Administrative Units: 2010-2019



(a) Prefecture-level units

(b) County-level units

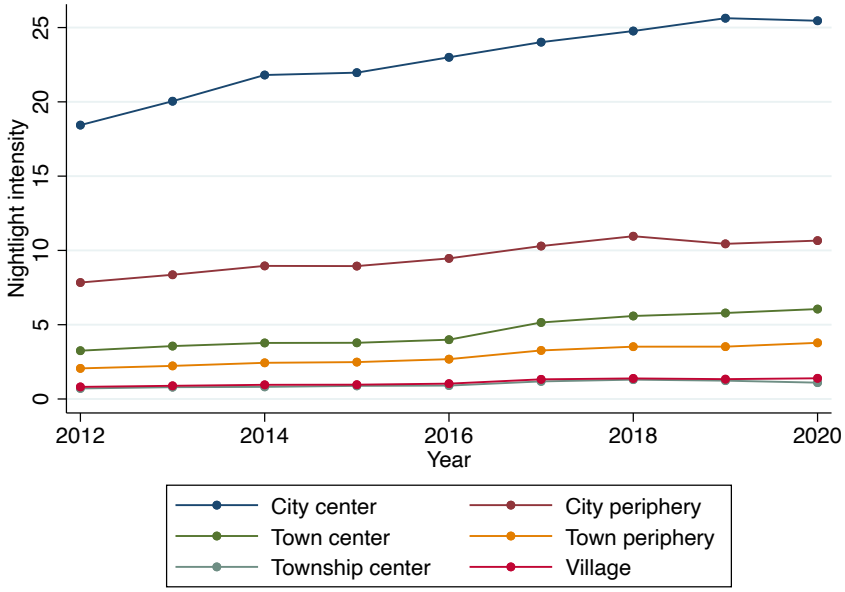
(c) Township-level units

(d) Community-level units

Notes: The stacked figure documents the number of administrative units and the composition across (a) prefecture-, (b) county-, (c) township-, and (d) community-level in China between 2010 and 2019, using the Rural-Urban Continuum Codes. Examples of "Other" unit include the followings: a) prefecture-level: league and provincial direct-administered county; b) county-level: banner, forest/mining district, and special economics zone; c) township level: sumu, development zone, mining areas, and farms; d) community level: development area preparing/virtual (temporary) community, and farms and forestry station.

A.4 Nightlight Intensity across Urbanicity

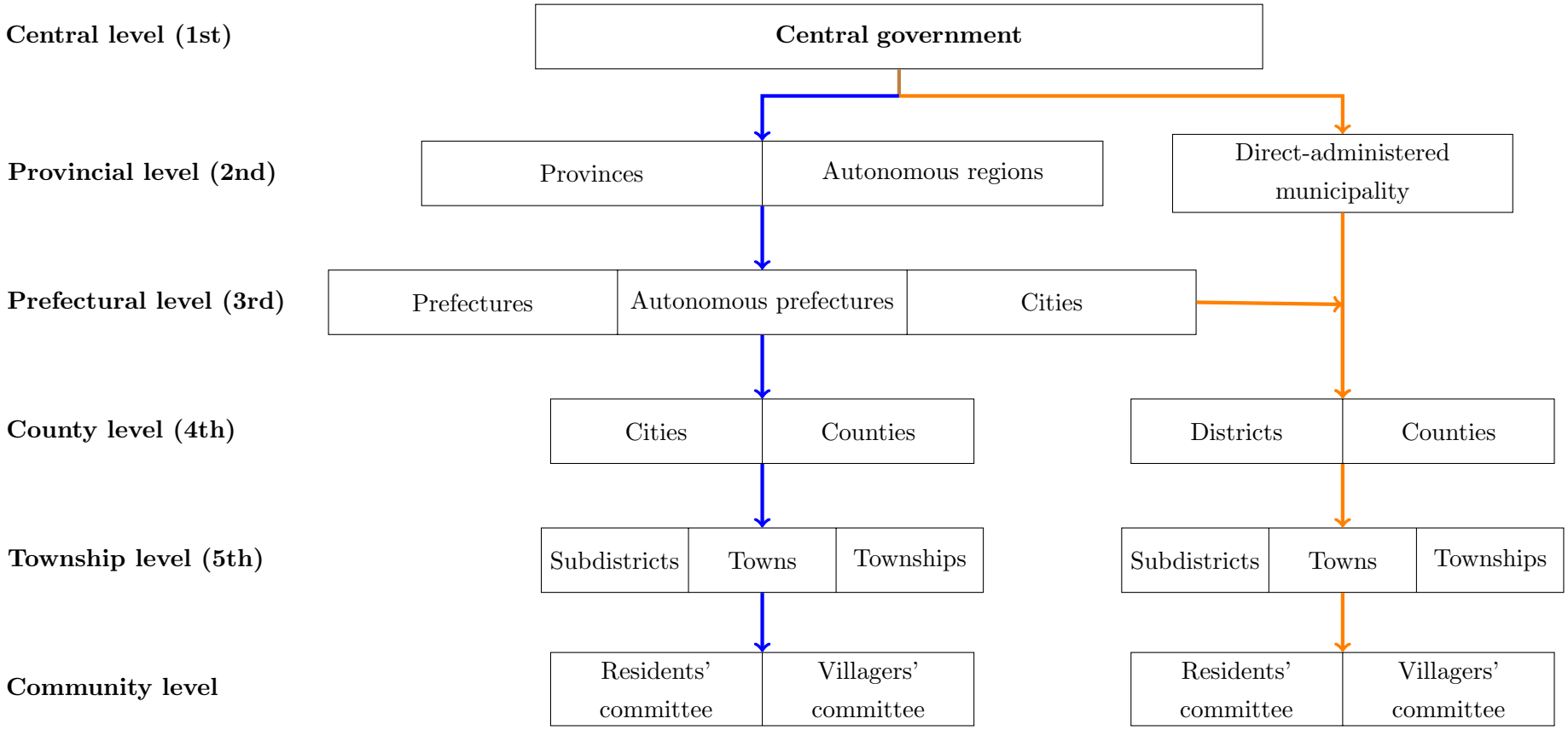
Figure A5: Nightlight Intensity across Urbanicity Between 2012 and 2020



Notes: The figure presents the satellite nighttime light intensity by urbanicity for the period between 2012 and 2020, aggregated from the community-year level observations from the Urban-Rural Continuum Codes.

B Institutional Background: Additional Details

Figure B1: 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 the 2010s, based on the Urban-Rural Continuum Code 2010 and Census 2010. 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.

B.1 New Urbanization Plan and Pilot Program

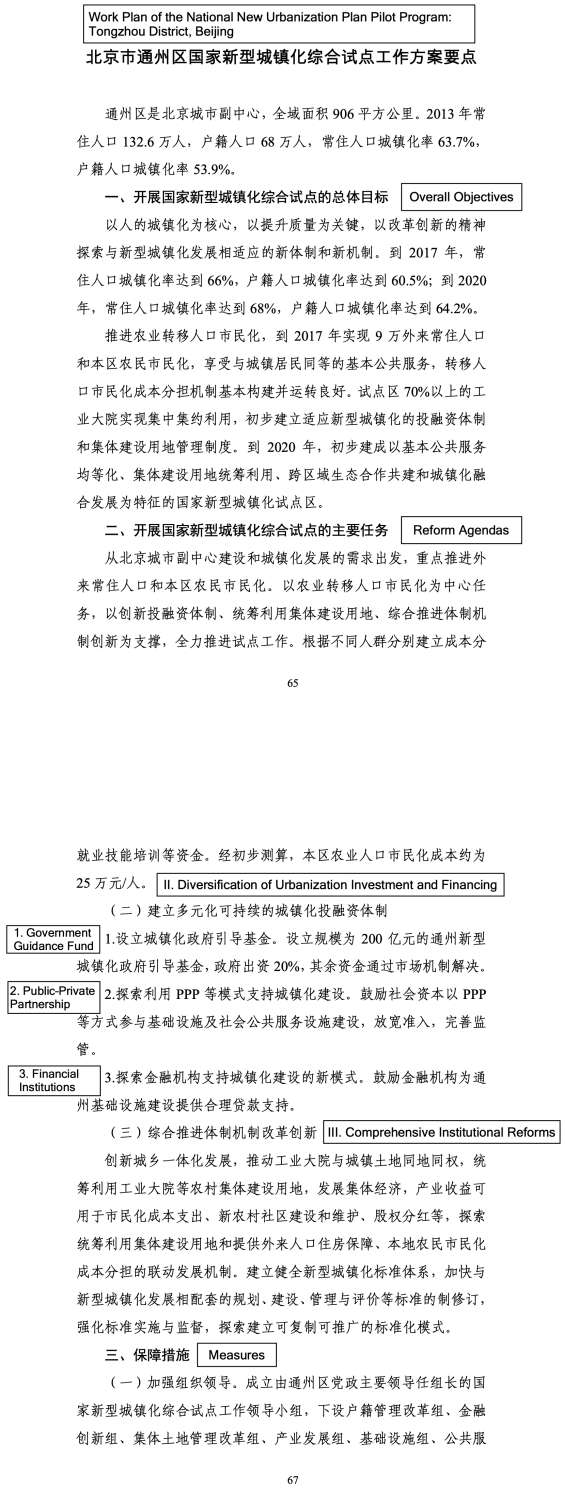
Table B1: Major Policies Concerning the New Urbanization Plan

Issued Date (yy-mm-dd)	Issuer(s)#	Document	Link
	A. The New Urbanization Plan		
2013-11-15	CCP Central Committee (in the Third Plenum)	The Decision on Major Issues Concerning Comprehensively Deepening Reforms	Link
2014-03-16	CCP Central Committee, State Council	National New Urbanization Plan (2014 - 2020)	Link
	B. The Pilot Program		
2014-12-29	NDRC, SCOPSR, MPS, MCA, MOF, MOHRSS, MOHURD, MOA PBOC, CBRC, SAC	Circular on issuing the Pilot Scheme of the National New urbanization Plan (The attached: the 1st Pilot Scheme)	Link (The attached)
2015-11-16	NDRC, SCOPSR, MPS, MCA, MOF, MOHRSS, MOHURD, MOA PBOC, CBRC, SAC	Circular on issuing the 2nd Pilot Scheme of the National New urbanization Plan (The attached: the 2nd Pilot Scheme)	Link (The attached)
2016-11-29	NDRC, SCOPSR, MPS, MCA, MOF, MOHRSS, MOHURD, MOA PBOC, CBRC, SAC	Circular on issuing the 3rd Pilot Scheme of the National New urbanization Plan (The attached: the 3rd Pilot Scheme)	Link (The attached)

Notes: The table lists major policy reforms that are related to the New Urbanization Plan and its pilot program, including the issued date, issuer(s), document name, and document link.

For issuers: CCCPC is Central Committee of the Chinese Communist Party. NDRC is National Development and Reform Commission (formerly State Planning Commission and State Development Planning Commission). SCOPSR is State Commission Office for Public Sector Reform. MPS is Ministry of Public Security. MCA is Ministry of Civil Affairs. MOF is Ministry of Finance. MOHRSS is Ministry of Human Resources and Social Security. MOHURD is Ministry of Housing and Urban-Rural Development. MOA is Ministry of Agriculture. PBOC is People's Bank of China. CBRC is the China Banking Regulatory Commission. SAV is Standardization Administration of China.

Figure B2: Pilot Program Reform Agenda Example: Tongzhou District, Beijing



Work Plan of the National New Urbanization Plan Pilot Program: Tongzhou District, Beijing

北京市通州区国家新型城镇化综合试点工作方案要点

通州区是北京城市副中心，全域面积 906 平方公里。2013 年常住人口 132.6 万人，户籍人口 68 万人，常住人口城镇化率 63.7%，户籍人口城镇化率 53.9%。

一、开展国家新型城镇化综合试点的总体目标 Overall Objectives

以人的城镇化为核心，以提升质量为关键，以改革创新的精神探索与新型城镇化发展相适应的新体制和新机制。到 2017 年，常住人口城镇化率达到 66%，户籍人口城镇化率达到 60.5%；到 2020 年，常住人口城镇化率达到 68%，户籍人口城镇化率达到 64.2%。

推进农业转移人口市民化，到 2017 年实现 9 万外来常住人口和本区农民市民化，享受与城镇居民同等的基本公共服务，转移人口市民化成本分担机制基本构建并运转良好。试点区 70%以上的工业大院实现集中集约利用，初步建立适应新型城镇化的投融资体制和集体建设用地管理制度。到 2020 年，初步建成以基本公共服务均等化、集体建设用地统筹利用、跨区域生态合作共建和城镇化融合发展为特征的国家新型城镇化试点区。

二、开展国家新型城镇化综合试点的主要任务 Reform Agendas

从北京城市副中心建设和城镇化发展的需求出发，重点推进外来常住人口和本区农民市民化。以农业转移人口市民化为中心任务，以创新投融资体制、统筹利用集体建设用地、综合推进体制机制创新为支撑，全力推进试点工作。根据不同人群分别建立成本分

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担机制。 I. Cost-Sharing for the Urban Integration of Rural Migrants

（一）建立农业转移人口市民化成本分担机制

1.加快户籍制度改革。一是推进积分落户政策，制定通州区积分落户试行管理办法。面向通州副中心建设，统筹考虑城市运营管理保障及产业发展方向，以具有合法稳定就业和合法稳定住所（含租赁）、参加城镇社会保险年限、连续居住年限等为主要指标，合理设置积分分值，达到一定分值的可以申请落户，为北京及国内其他特大城市户籍制度改革提供经验。二是强化居住证积分与公共服务待遇挂钩。

2.建立农业转移人口市民化成本分担机制。一是外来常住人口市民化成本。主要针对未参加基本养老保险、未享受教育等基本公共服务的外来常住人口提供与城镇居民同等化的基本公共服务。按照统筹推进、分步实施的原则，试点期内拟推进 6 万外来人口市民化。政府承担由于外来人口市民化带来的教育、医疗、保障性住房等公共服务资源的扩容以及基础设施新建和改扩建等方面的支出。企业负担社会保险、职业培训等成本。个人承担社会保险、保障性住房租金等成本。经初步测算，外来常住人口市民化成本约为 10 万元/人。二是本区农业转移人口市民化成本，在全区范围内，选择典型乡镇，试点期内解决 3 万农村剩余劳动力的农转居问题。通州区政府主要承担交通、市政设施、义务教育、医疗等设施建设费用以及就业培训支出等。企业或村集体承担农转居人口的社会保险、就业补助费用等成本。个人承担医疗保险、养老保险、子女教育、

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就业技能培训等资金。经初步测算，本区农业人口市民化成本约为 25 万元/人。 II. Diversification of Urbanization Investment and Financing

（二）建立多元化可持续的城镇化投融资体制

1. Government Guidance Fund 1.设立城镇化政府引导基金。设立规模为 200 亿元的通州新型城镇化政府引导基金，政府出资 20%，其余资金通过市场机制解决。

2. Public-Private Partnership 2.探索利用 PPP 等模式支持城镇化建设。鼓励社会资本以 PPP 等方式参与基础设施及社会公共服务设施建设，放宽准入，完善监管。

3. Financial Institutions 3.探索金融机构支持城镇化建设的新模式。鼓励金融机构为通州基础设施建设提供合理贷款支持。

（三）综合推进体制机制改革创新 III. Comprehensive Institutional Reforms

创新城乡一体化发展，推动工业大院与城镇土地同地同权，统筹利用工业大院等农村集体建设用地，发展集体经济，产业收益可用于市民化成本支出、新农村社区建设和维护、股权分红等，探索统筹利用集体建设用地和提供外来人口住房保障、本地农民市民化成本分担的联动发展机制。建立健全新型城镇化标准体系，加快与新型城镇化发展相配套的规划、建设、管理与评价等标准的制修订，强化标准实施与监督，探索建立可复制可推广的标准化模式。

三、保障措施 Measures

（一）加强组织领导。成立由通州区党政主要领导任组长的国家新型城镇化综合试点工作领导小组，下设户籍管理改革组、金融创新组、集体土地管理改革组、产业发展组、基础设施组、公共服

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务组等，负责具体落实工作。

（二）落实责任部门。根据试点目标，制定年度实施计划，明确年度工作任务，落实到具体单位。

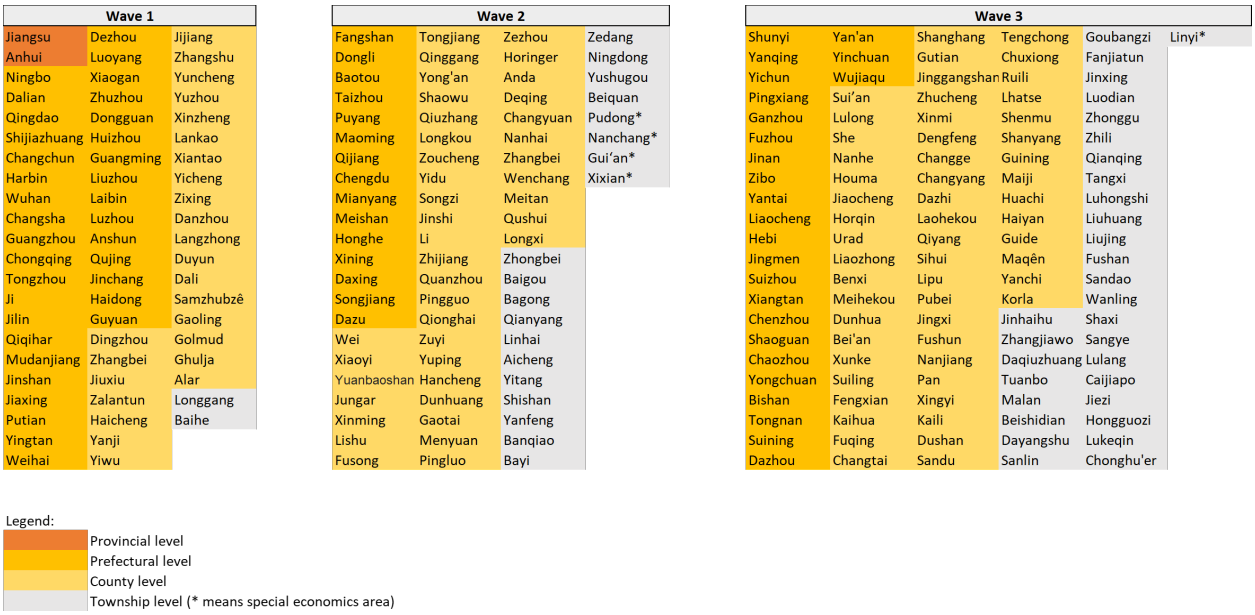
（三）强化监督考核。加强对试点工作的督促检查，将试点工作推行成效纳入到主管领导绩效考核体系，完善奖惩机制。

（四）加强宣传报道。强化宣传意识，加大宣传力度，为新型城镇化的改革发展提供强大的舆论支持、思想保证和精神动力。

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Notes: The figure shows a work plan document of the New Urbanization Plan pilot program of Tongzhou district in Beijing. In the second section of "Reform Agendas," the document lists the "diversification of urbanization investment and financing" as a main agenda, and indicates the "public-private partnership" as one financing tool.

Figure B3: 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	

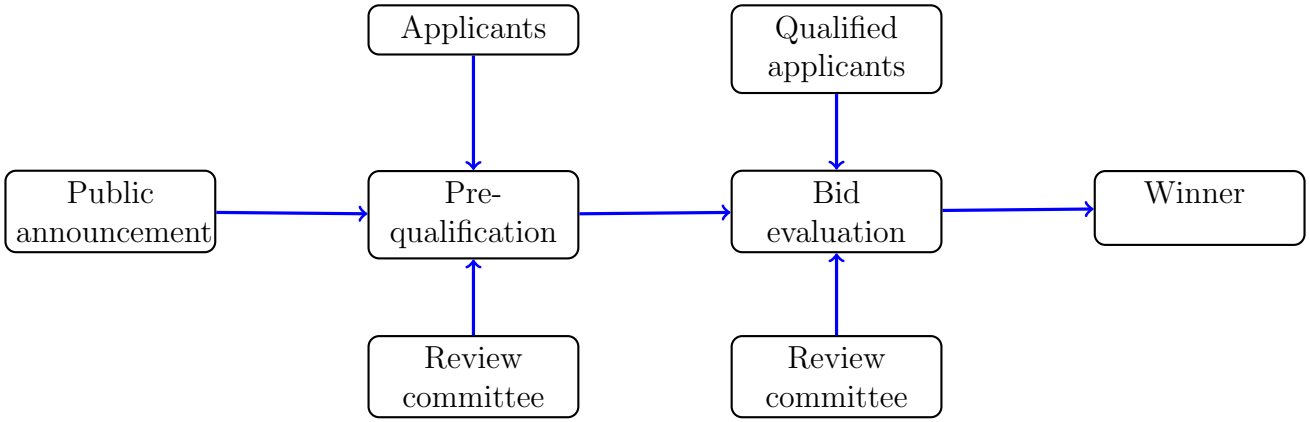
Legend:

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

Notes: The figure shows the list of pilots in the pilot program of the New Urbanization Plan by roll-out wave and administrative level. "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.

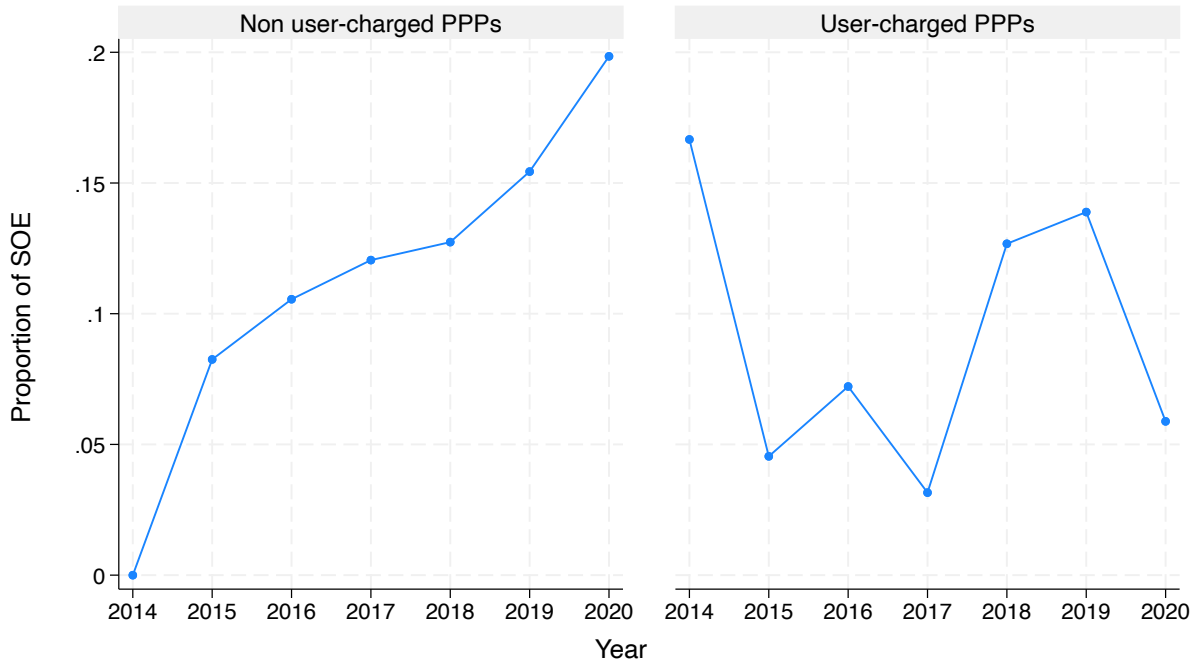
B.2 Public-Private Partnerships: Additional Details

Figure B4: Procedure of an Open Bidding in PPPs



Notes. The figure describes the procedure of a typical bidding process for a PPP project. The procedure 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 bidders (i.e., qualified applicants); and 4) the bidder with the highest evaluation score is selected as the winner of the bid.

Figure B5: Proportion of SOEs per PPP by Payback Mechanism

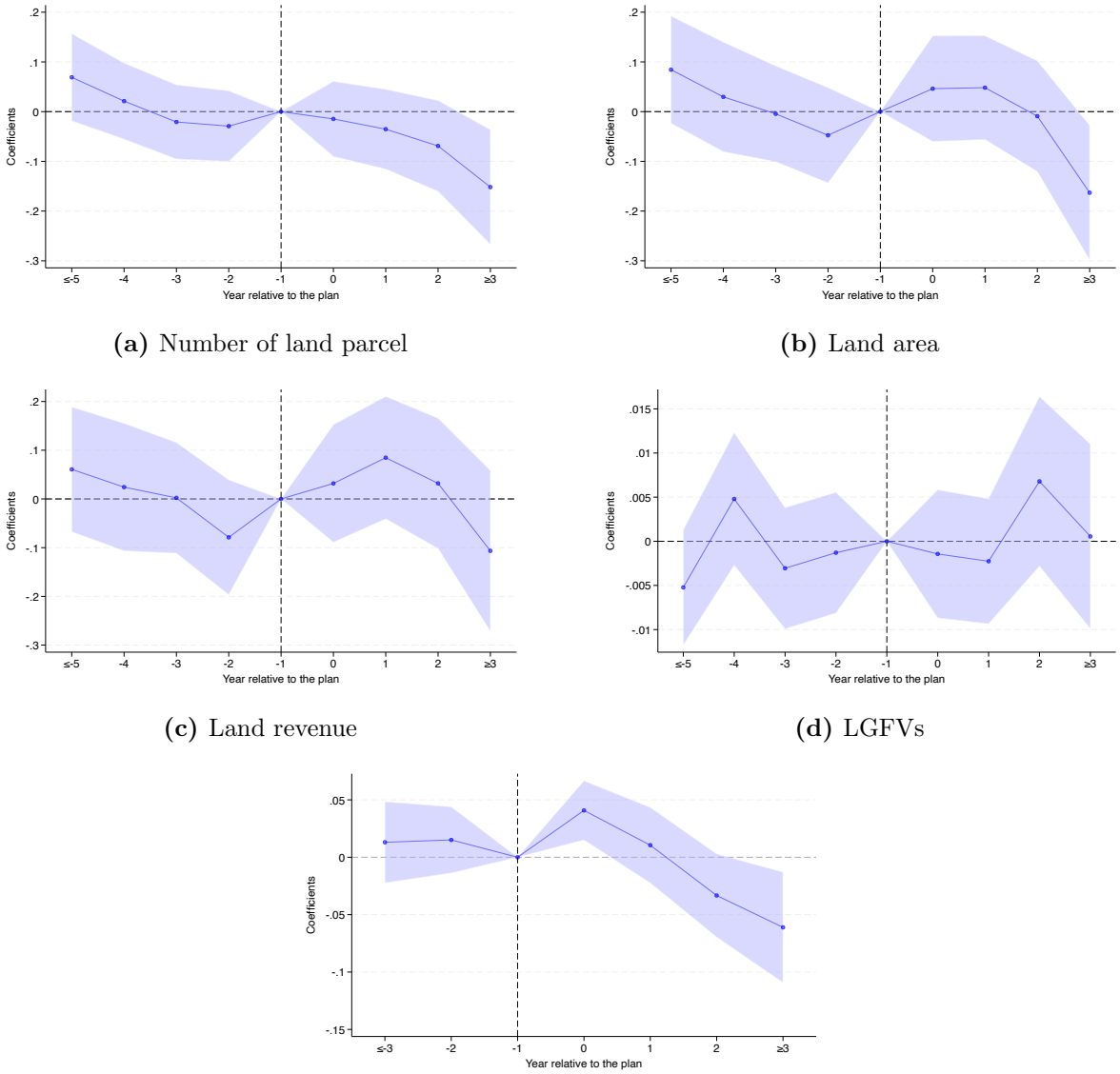


Notes: The figures display the proportion of state owned enterprises (SOEs) that win PPP contracts between 2014 and 2020 by PPPs' payback mechanism: non-user-charged and use-charged PPPs.

C Robustness Checks

C.1 Event Study Figure: Land Finance and Local Economy

Figure C1: Event Study Figure on the Land Finance and Local Economy



(a) Number of land parcel

(b) Land area

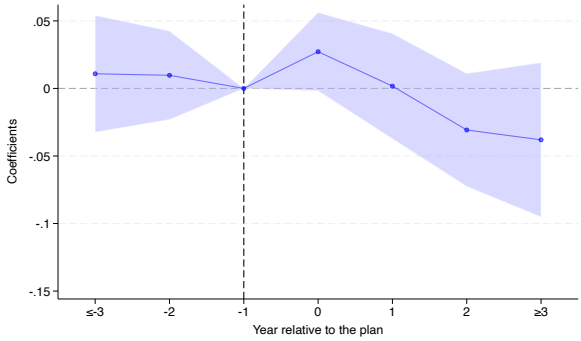
(c) Land revenue

(d) LGFVs

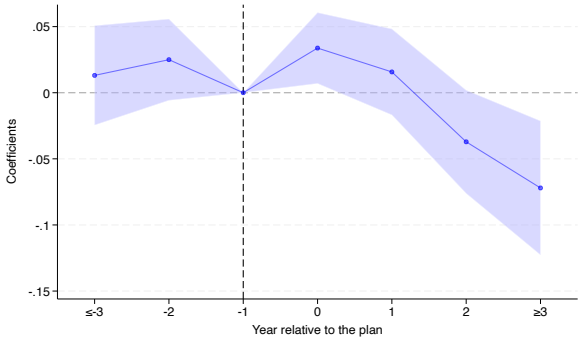
(e) Local Economy

Notes: The figure shows event study estimates of the impact of the pilot program on land finance and local economy, using stacked DiD estimators. The dependent variables are listed in Table 2. Event period -1 is normalized to 0. The figures show the 95% confidence interval with standard errors clustered at the county level.

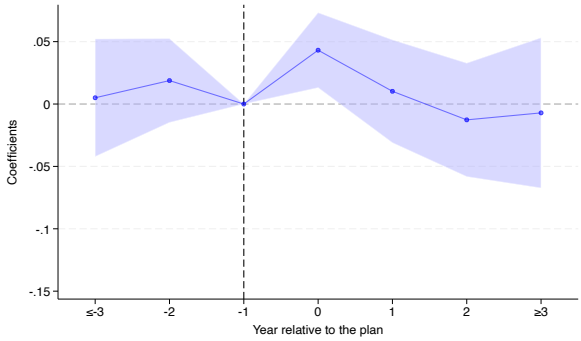
Figure C2: Event Study Figure on Local Economy by Urbanicity and Labor Market Restriction



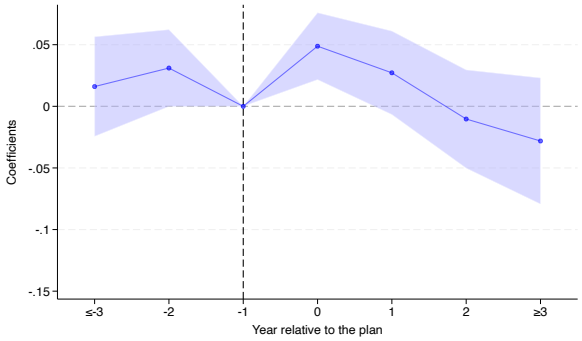
(a) Urbanized communities



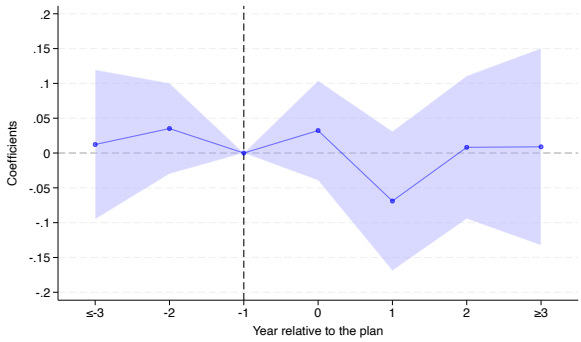
(b) Non-urbanized communities



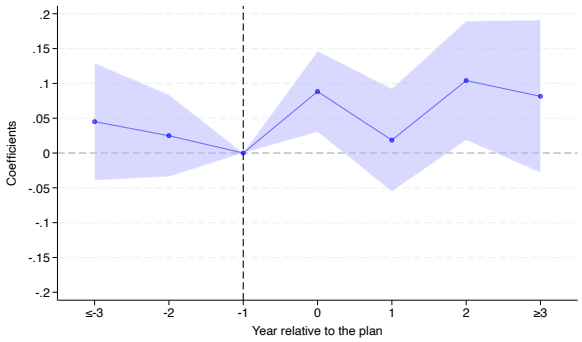
(c) Urbanized communities (*hukou* sample)



(d) Non-urbanized communities (*hukou* sample)



(e) Urbanized communities without restriction



(f) Non-urbanized communities without restriction

Notes: The figure shows event study estimates of the impact of the pilot program on economic growth, using stacked DiD 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.

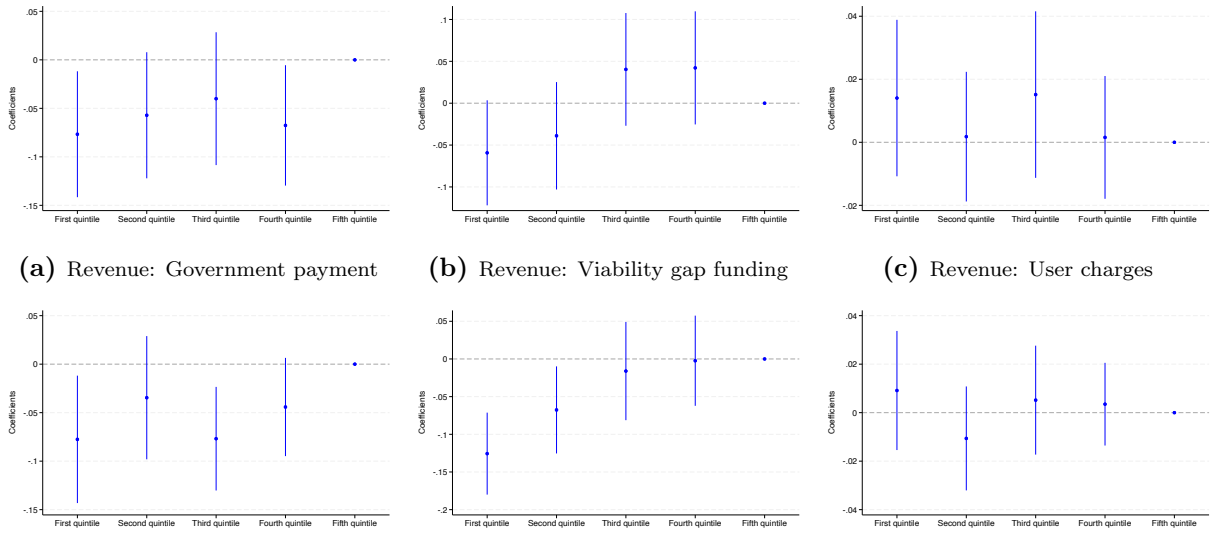
C.2 Robustness Tests of Baseline Results

Table C1: Robustness: Impacts on PPP Finance, Land Finance, and Local Economy

	Baseline estimates	Imputation estimator	Province-year FEs	Excluding municipalities	Dropping provinces
	(1)	(2)	(3)	(5)	(6)
Panel A. PPP finance					
Number of PPP	0.077***	0.069***	0.059**	0.070***	0.064**
	(0.024)	(0.024)	(0.024)	(0.025)	(0.026)
Average investment	76.383***	79.333***	67.291***	76.252***	68.370***
	(18.582)	(20.169)	(19.231)	(20.04)	(21.899)
Total investment	117.591***	120.215***	100.210***	106.462***	113.987***
	(28.826)	(30.514)	(29.144)	(30.233)	(33.930)
Panel B. Land finance					
Number of land	-0.080**	-0.080**	-0.059	-0.080**	-0.106**
	(0.036)	(0.038)	(0.038)	(0.039)	(0.043)
Land area	-0.036	-0.045	-0.047	-0.026	-0.062
	(0.037)	(0.040)	(0.039)	(0.041)	(0.045)
Land revenue	0.005	-0.006	-0.042	0.012	-0.019
	(0.045)	(0.048)	(0.044)	(0.049)	(0.054)
LGFVs	0.002	0.002	0.001	0.002	0.004
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Panel C. Local Economy					
Nightlight intensity	-0.018	-0.022	-0.024	-0.019	-0.025
	(0.015)	(0.017)	(0.016)	(0.017)	(0.019)

Notes: The table shows the estimates of the impact of pilot program on PPP finance, land financing, and local economy. Column (1) presents the baseline estimates. Columns (2) use the "imputation" estimator of Borusyak, Jaravel and Spiess (2024). Column (3) include province-by-year fixed effects. Column (4) excludes the centrally-administered municipalities (Beijing, Shanghai, Tianjin, and Chongqing), while Column (5) drops the potential outlier provinces that adopt largest share of PPP projects (Henan and Shandong). All columns except Column (2) shows estimates using the stacked DiD estimator. All regressions include county and year fixed effects, with standard errors clustered at the county level. $***p < 0.01, **p < 0.05, *p < 0.1$

Figure C3: Heterogeneous Impacts on PPP Payback Mechanism by Fiscal Capacity



(a) Revenue: Government payment **(b)** Revenue: Viability gap funding **(c)** Revenue: User charges

(d) Expenditure: Government payment **(e)** Expenditure: Viability gap funding **(f)** Expenditure: User charges

Notes: The figure shows event study estimates of the impact of the pilot program on PPP payback mechanism distribution interacting with the revenue/expenditure quintile (the highest quintile omitted as the reference group), using stacked DiD estimators. The dependent variables are the number of PPP projects, average investment, and total investment 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.

D Anecdotal Evidence

D.1 Danzhou city, Hainan province

One showy project example comes from the 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 D1). 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.[1]

The project was initiated in late 2010, after the former CCP Secretary of Danzhou, Qi Zhang, took his office in February 2010. The Evergrande Group obtained the sea-use right in 2013 and then land-use right in 2015 for the construction of Ocean Flower Island. Danzhou city was selected into the first-wave of the NUP pilot program in the end of 2014, and it was the only one from Hainan province in that wave. The original documents from the central governments did not include Ocean Flower Island as one pilot goal/task of Danzhou city. However, in the follow-up documents issues by Danzhou city, Ocean Flower Island became one of the projects that reflects the goal of the New Urbanization Plan.[2]

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 shines light on cronyism in the Central Commission for Discipline Inspection (CCDI) news.[3] Two issues mentioned in the news are related to the development of the 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.[4] By doing so, the project completely avoids the necessity for permission and review from higher-level authorities on its constructions. 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 the Ocean Flower Island harmed the coral reefs and breached the law.

[1] 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.

[2] See news at http://hainan.sina.com.cn/news/hnyw/2015-11-27/detail-ifxmazmz8903678.shtml. The original official documents mentioned in the news are not searchable and thus not provided.

[3] See news at https://jjjcb.ccdi.gov.cn/epaper/index.html?guid=1408265715324026881.

[4] If the reclamation reaches 50 hectares, it must be approved by the State Council and the State Ocean Bureau, according to the legislation.

Figure D1: 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.

D.2 Dushan county and Sandu county, Guizhou province

Unlike Danzhou city, some of the counties in the pilot program are the so-called "impoverished counties" in China. The designation of "impoverished counties" allows these counties to receive higher budgetary transfers from the federal government while also 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 D2). Dushan is a county with GDP of 1 billion RMB (and population of 356 thousand) in 2018, yet holds a debt of more than 40 billion RMB in the same year. With a debt of nearly 200 million RMB, Dushan county started its construction of the Shuisi Building. The building has a construction area of 60,000 square meters, a height of 99.9 meters, and a total of 24 floors. The project started in September 2016, three months before Dushan county being selected into the third-wave of the NUP pilot program. After being selected into the pilot program, Dushan county started some other costly projects, including a museum, a college town, a big data center, and so forth.

Meanwhile, Sandu county, which is close to Dushan county and was also selected for the third wave of the 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 was 13.568 billion RMB, and the balance of government debt in Sandu County was 9.747 billion RMB.[5]

D.3 Rucheng county, Hunan province

A similar report can also be found from the Rucheng county, one of the impoverished counties in Chenzhou city, Hunan province. The constructions in Rucheng county in 2018 (11 plaza parks, 26 road projects, and 10 government buildings) attracts the journalists as well as the CCDI investigations.

The debt issue of Rucheng county can be seen in the following quoted from a report by the official newspaper of CCP Central Commission for Discipline Inspection on August 5th, 2018: "Rucheng county committee and government has long failed to consider the actual available financial resources, blindly raising debt, resulting in a comprehensive debt ratio of 274%, 285.74% and 336% from 2015 to 2017, rising year by year, with the debt ratio

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

ranking first in Hunan province..."[6] Chenzhou city, the city governing the Rucheng county, was selected in the NUP pilot program at the end of 2016, and we can see there is a clean sharp jumping on Rucheng's debt from 285.74% in 2016 to 336% in 2017. The growth rate on debt of Rucheng county is about 18% in 2017 (=(336-285.74)/285.74), while this number is only 4% in 2016 (=(285.74-274)/274).

Figure D2: 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.

[6]See news at https://www.ccdi.gov.cn/toutiao/201808/t20180805_177149.html.