PART III

Emerging Development-Based Land Value Capture Practices in Developing Countries
CHAPTER 6

Financing a Metro with Development Rights of Public Land, Nanchang, China

China’s public sales of development rights are a major funding source for local governments in delivering infrastructure projects. These sales have often led to the rapid conversion of rural agriculture land into urban land for industrial and residential uses but without an adequate economic rationale or planning. With increased concern over the negative impacts of such rural–urban land conversion, policymakers in reform-oriented cities have already started taking longer-term approaches in public sales of development rights, focusing on sustainable finances and urban development.

Nanchang is one of these cities. Its public land leasing scheme attempts to incorporate the principles of transit-oriented development (TOD) into new metro finance. As this scheme has not yet been fully implemented, it is too early to assess whether it will generate the desired outcomes. If successfully executed, however, Nanchang’s development-based land value capture (LVC) schemes could provide a good model for other Chinese cities.

Urban Development Context

Population and Urbanization Trends

Nanchang’s central location in southeastern China relative to the Pearl River and Yangtze Delta regions, and to the junctions of major highways, makes it a major transport hub (map 6.1). The provincial capital, Nanchang is also a regional center for agricultural production in Jiangxi province. The city has many manufacturing firms including those producing cotton textiles and yarn, paper products, processed food, agricultural chemicals and insecticides, and Chinese medicine and other pharmaceuticals. Annual gross domestic product (GDP) growth in 2007–11 was a very robust 16–22 percent.
The strong growth triggered rapid urbanization. According to the United Nations Department of Economic and Social Affairs, Population Division (2012), the population in Nanchang’s core city areas (330 square kilometers) increased from 1.6 million to 2.3 million from 2000 to 2010, or by 44 percent. It also projects that the population in the core areas will continue to grow, to 2.8 million by 2015 and 3.5 million by 2025 (figure 6.1). Due to rapid population growth in the city center, proper land use and transport planning is becoming crucial.

As in many rapidly urbanizing Chinese cities, traffic congestion in Nanchang is one of the major downsides of urbanization. Car ownership (at 120 per 1,000 people in 2012, according to ChinaAutoweb, June 25, 2013) is lower than most provincial capitals, but the share of motorized road trips (including those on public buses) grew from 22 percent in 2002 to 30.5 percent in 2010, according to traffic surveys (World Bank 2013). Public transport accounted for only 13.5 percent of total daily trips, which is lower than in cities of similar size and GDP such as Changsha (24.5 percent) or Wuhan (23.4 percent) (World Bank 2013). Roads in southern Nanchang and the four bridges across the river routinely see congestion with average driving speeds down to 11 kilometers an hour during rush hour. Roads built in the newly developed part of northern Nanchang are wide, favoring car use.

Urban Planning

Nanchang has a tradition of good urban planning. Its 1985 Strategic Plan aimed to develop the historic city center on the right bend of the Gan River

Figure 6.1 Population of Nanchang, 1950–2025

Source: Data from UN 2012.
(map 6.2); the left bend saw very little development at that time. As the city’s industries continued growing, more space was needed.

In 1995, a new strategic plan was written to extend city development to the left bend. Industrial and residential development started on the northern part of Nanchang’s city center. The goal then was to balance urban development on both sides of the river and to extend residential areas to the surrounding seven districts. This 1995 strategy is unchanged.

According to the 2005 Urban Comprehensive Development Plan, northern and southern Nanchang will form the city’s future urban core, with new developments radiating out to surrounding districts and towns (see map 6.2). In southern Nanchang, the Nanchang municipal government (NMG) plans to decrease the population in the historic core, lower its development densities, lessen traffic congestion, and preserve historic buildings.

**Metro Project**

To achieve these goals and resolve the growing congestion, NMG has designed an extensive public transport system with fully integrated bus services and metro railway networks to facilitate travel between the newly planned areas and between the left and right bends of the Gan River. NMG plans to build five metro lines; two are under construction. Once complete, the metro railway network will be about 160–170 kilometers long with 128 stations (map 6.3). With a target completion date of 2020, lines 1, 2, and 3—60–70 kilometers in all—will form the basic structure of the metro railway network, connecting major business centers, the financial district, recreational areas, sport facilities, two industrial parks, and three universities.

Construction of Line 1 began in 2012 and will be completed in December 2015. This will connect the old city center to the new development areas on the left bend, helping redirect economic and residential investments from
Line 1 will be 28.7 kilometers long with 24 stations, one depot, and one parking yard. The average distance between stations will be about 1.2 kilometers.

Line 2’s construction started in July 2013 and is partly financed by the World Bank. It goes from Zhan Qian Nan Da Dao Station to Xin Jia An Station and will be 23.8 kilometers long with 21 stations and one depot. NMG expects construction of Line 2 to be completed by 2016. Plans to build lines 3, 4, and 5, and Phase II of lines 1 and 2, are awaiting approval from the National Development and Reform Commission.

To feed the metro railway system, bus services will be reorganized. Several interchange locations between the bus and metro railway networks have already been designed for lines 1 and 2. More important, these interchanges are coordinated with better land use planning than in the past to allow retail stores and supermarkets to be built there.

Regulatory and Institutional Frameworks

In China, responsibility for city-level land use planning and investments in local infrastructure and services is delegated to municipalities. Strong leadership in Nanchang by the mayor and vice mayors ensures interdepartmental coordination and cooperation. NMG established the Nanchang Railway Transit Group Co. Ltd. (NRTG), wholly city owned, to build and operate the metro system. To better leverage the private sector’s expertise, NRTG...
set up a special property management division with key staff recruited from the private sector to manage all real estate assets owned by the company. It also acts as a key liaison between government agencies to coordinate their planning and reviewing of metro railway investments and projects.

**Nanchang Municipal Finance**

In 2011, the budget of NMG was RMB49.7 billion ($8.1 billion). Land revenue was the major revenue source at RMB18.9 billion ($3 billion, 38 percent) (figure 6.2). The estimated cost for Line 2 is RMB1.48 billion ($2.42 billion), excluding interest charges, or equivalent to about 30 percent of the 2011 budget. During the construction phase, NMG will pay 37.3 percent of construction costs and interest each year. The largest expenses, about RMB1.4 billion ($230 million), will incur in 2017. On the revenue side, operating revenues in the fifth year are estimated to be RMB342 million ($56 million), resulting in a recovery ratio of 0.63. NRTG is expected to achieve breakeven in the 15th year. The debt service repayment and operational deficit will be filled by real estate development revenue (expected net profit of $166 million) and other land transfer fees. For land transfer fees, 25 parcels of 10,878 mu (7.2 square kilometers) out of an envisaged 50,000

---

**Figure 6.2 Municipal revenues of Nanchang, 2011**

Source: Nanchang Railway Transit Group.
mu (33.3 kilometers) have been allocated to the metro system, representing a potential net contribution of RMB21.6 billion ($3.54 billion) to the metro railway construction program. Given that NMG needs to finance the five subway lines, NMG has to maximize revenues from real estate development or land transfer by adopting development-based LVC approaches.

Real Estate Market

Before discussing the LVC scheme designed by NMG, we examine the real estate market in Nanchang. The national government established a leasehold system in 1978 to enable public and private exchanges of leasehold rights. Leases are long—residential land 70 years and commercial and industrial land 40 years. According to the Constitution, buildings on leasehold land are private property. Under this legal framework, functioning real estate markets have appeared in many Chinese cities.

In 2008–09, the global economic downturn affected Chinese exporters and manufacturers, hurting land prices for commercial, commercial/services (mixed-use), and industrial land, which dropped back to 2006 levels (figure 6.3). Yet prices for other land types continued to rise, especially residential and commercial/residential mixed-use land. Hence, overall land prices declined by only 2 percent (table 6.1).

In 2009–10, prices soared in response to the central government’s economic stimulus, which included a loosening of monetary policy and a lowering of mortgage rates. Prices for all land types increased by more than 50 percent, except industrial land. Commercial/residential mixed-use land prices more than doubled, and commercial land prices more than tripled (see table 6.1).

Figure 6.3 Land prices, Nanchang

Source: Nanchang Railway Transit Group.
Concerned that real estate markets might be overheated, in 2010 NMG adopted certain measures: it passed a regulation allowing each family to purchase only one new housing unit—and prices for land designated for residential and commercial development dropped in 2011–12. Yet because the new law applied only to residential property, the price for commercial/service land kept rising. From 2011–12, although residential land prices continued to drop, prices for other land types saw an upward trend, with the performance of land for mixed use such as commercial/services and commercial/residential land the strongest. On average, the aggregate land price climbed by 24 percent.

These are interesting outcomes because TOD is a strategy that promotes mixed land use. A typical TOD scheme will have office buildings clustered with residential properties and retail stores around a transit station. This design can both increase ridership and cross-subsidize transit development costs by capturing the increased land value generated by commercial and residential development. Rising land prices for mixed use is a favorable condition for adopting development-based LVC in Nanchang.

**LVC**

Nanchang’s metro railway construction (60–70 km in length by 2020) will require large capital investment. Aside from transfers from the national government, local tax revenues, fares, and loans from international development agencies like the World Bank or domestic banks, NMG is also adapting the development-based LVC financing method to recoup land value increments generated by its metro railway investment to pay for some of the construction and operating costs. NRTG plans to fully use land value increments to partly fund metro railway investment via three procedures.

First, after the Urban Planning Bureau announces the City Master Plan and Land Use Plan, the Land Resource Center will acquire land for NRTG from landowners, with compensation, exercising eminent domain (compulsory purchase). NRTG will pay for all acquisition costs. Second, NMG will increase the floor area ratio (FAR) limit at the acquired sites and allow NRTG to either invest directly in land redevelopment or

---

**Table 6.1 Percent change of land prices in Nanchang, 2008–12**

<table>
<thead>
<tr>
<th></th>
<th>Commercial/residential</th>
<th>Commercial/services</th>
<th>Industrial</th>
<th>Commercial</th>
<th>Residential</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008–09</td>
<td>50%</td>
<td>−61%</td>
<td>−38%</td>
<td>−1%</td>
<td>52%</td>
<td>−2%</td>
</tr>
<tr>
<td>2009–10</td>
<td>134%</td>
<td>88%</td>
<td>24%</td>
<td>226%</td>
<td>67%</td>
<td>77%</td>
</tr>
<tr>
<td>2010–11</td>
<td>−4%</td>
<td>109%</td>
<td>−12%</td>
<td>−63%</td>
<td>−4%</td>
<td>−5%</td>
</tr>
<tr>
<td>2011–12</td>
<td>39%</td>
<td>22%</td>
<td>28%</td>
<td>−4%</td>
<td>−34%</td>
<td>24%</td>
</tr>
</tbody>
</table>

*Source: Nanchang Railway Transit Group.*
transfer the development rights to private investors to raise funds to finance metro railway construction. All land parcels within a 500–meter radius from a subway station will be qualified for upzoning with higher FARs. While the 500–meter criterion is uniformly applied to all station areas, some flexibility should be incorporated to accommodate varying market conditions. More important, the Urban Planning Bureau will also convert land use at these sites to mixed use to allow NRTG to promote TOD and to maximize land-related revenues.

Third, with the land resources in hand, NRTG will generate land revenue to defray metro railway development costs. For this, NRTG, through the Land Resource Center, will re-auction the land sites to developers at market value that reflects the increase in the development density and land use change and the improvement in accessibility due to the metro railway. The successful bidder will pay the bidding price (called a transfer fee) to the Municipal Finance Bureau, which will in turn deduct fees for six development funds related to education, agriculture, and other public services. These charges together are about 20 percent of the transfer fee. NRTG will receive the balance from the Finance Bureau and use the funds to finance construction of subway lines and stations.

NRTG can also develop the space above and below the metro railway stations, whether offices, recreational facilities, retail spaces, or residential units, all within the physical space of a metro railway station. Revenue from renting or selling residential and commercial properties will be used to partly finance metro railway investment or operating costs.

To illustrate these procedures in detail, we present the entire LVC financial arrangement of lines 1 and 2. Again, because these projects are in progress, we can only show how use of the LVC mechanism has been planned but cannot tell how much land value NRTG has actually captured.

LVC Financing of Lines 1 and 2

These lines’ LVC financing will follow two methods: sale of development rights, and direct property development and management above or below the metro railway stations.

Sale of development rights. Line 1 (see map 6.3) is under construction and is planned to begin operating in 2015. The construction of Line 2 started in July 2013, and operations are expected to start in 2016.

NRTG has, through negotiated land sales, gained control over the development rights of 46 land sites with an area of 15,200 mu (10 square kilometers). About 2,600 mu (1.7 square kilometers) of the acquired land is close to the planned metro railway stations. NRTG also took part in public tenders of land and obtained the leasehold rights to 147 mu (0.1 square kilometers) of land for real estate development.

The total cost of developing the land resource was about RMB9 billion ($1.5 billion), including acquisition costs of RMB4.2 billion ($688 million) and demolition costs of RMB4.8 billion ($787 million). For the entire investment period (2012–20), estimated financial benefits derived
from NRTG’s planned real estate investment for own use and rental, or subleasing of land use rights to third parties, are about RMB22 billion ($3.6 billion). For 2012–16, these land benefits are estimated at around RMB14 billion ($2.2 billion).

Balancing the estimated costs and benefits of accumulating land resource, by 2016 NRTG will be able to generate a surplus of RMB5 billion ($820 million), equivalent to 15.1 percent of total construction costs of Line 1 (RMB18.1 billion, $3 billion) and Line 2 (RMB15 billion, $2.5 billion).

To assure projected land profits, NRTG has followed TOD principles. It combines development of the metro stations with improvements to surrounding neighborhoods. It has also designed the stations using one-stop-shop ideas and is financing their construction with revenue from mixed development above all subway stations. NRTG’s strategy is to develop areas that are close to the city center first and then extend toward the suburbs (figure 6.4).

**Direct property development:** In 2012–15, NRTG plans to build 28 stations along lines 1 and 2 of two types. The first is mixed development on the ground above the metro stations; there will be 23 projects of this type. NRTG will invest directly in five of them and develop the other 18 stations with private investors. The second type is underground development at selected metro railway stations. There will be five projects of this type. NRTG will be the sole investor in three, with two co-financed and developed by other private investors.

These projects will cover 1,700 mu (1.1 square kilometers), with an estimated capital investment of RMB8.3 billion ($1.4 billion). NRTG is
expected to raise RMB6.8 billion ($1.1 billion) of the capital requirements between 2013 and 2015, mainly from commercial loans and bonds or the sale of leasehold rights.

Expected income generated from the investment includes: RMB3.5 billion ($574 million) from the sale of development rights; an estimated revenue of RMB8.9 billion ($1.5 billion) from selling 500,000 square meters of commercial property; and an average annual rental income of RMB400 million ($65.6 million), totaling RMB1.2 billion ($198 million) for three years. If these projections are fulfilled, property investments above or below the stations will bring a net profit of RMB6.8 billion ($1.1 billion) to the company by end-2015, equivalent to 20.5 percent of the construction cost of lines 1 and 2.

**Development Cases**

This section presents two metro railway property projects at station areas that follow development-based LVC in different floor uses and development parameters.

**NRTG’s Metro Mansion Station**

NRTG is constructing a 45-story, 193-meter office tower with a FAR of 7.04 above the Metro Mansion Station on Line 1 in Nanchang’s financial center. There will be underground parking on three levels. NRTG’s headquarters and control center will occupy the first five floors of the tower, with the remaining office space rented to other tenants (figure 6.5).

Investment in land and construction comes to RMB1.3 billion ($213 million), financed in two ways. NRTG’s real estate subsidiary will develop and sell some of its development rights, of which NRTG will get 80 percent of the revenue, or about RMB160 million ($25.8 million), to finance...
metro construction. The real estate subsidiary will also build 100,000 square meters of office space, of which 40 percent will be sold to NRTG on preferential terms. The subsidiary, under this scheme, will only earn a net profit of RMB5.6 million ($918,000), renting the remaining 60,000 square meters and earning an annual rental income of about RMB39 million ($6.5 million). It has an option to sell the rental units for some RMB1.1 billion ($180 million), valued at project completion. This financial arrangement appears to generate enough income to cover the project’s property investment cost.

**Metro Time Square**

Metro Time Square at Bayi Bridge West Station of Line 1 has a development area of 125.8 mu (83,867 square meters) with a built-up area of 388,827 square meters and a FAR of 3.5 (figure 6.6).

Construction began in 2012, with an expected date of completion of December 2016. The investment cost is RMB2.8 billion ($459 million). Project financing is through a joint venture between the real estate subsidiary of NRTG and a developer. The venture financed land acquisition costs and will develop the land with high-end residential apartments, retail stores, recreational facilities, and offices and then sell some of the properties. NRTG will receive profits in proportion to its shareholding. Eighty percent of the land use rights sales revenue of RMB880 million ($144 million) has already been allocated to NRTG to finance metro railway construction. In addition, 40,000 square meters of commercial space will be available for lease to private companies, and some of the rental income will go to NRTG, again in proportion to its shareholding.

![Figure 6.6 Architectural design and site plan for Time Square Station](source: Nanchang Railway Transit Group 2013. © Nanchang Railway Transit Group. Used with permission. Further permission required for reuse.)
Conclusion

The following are major enablers for Nanchang’s development-based LVC schemes and the associated risks. If implemented well, Nanchang’s development-based LVC schemes could provide a good LVC model for other Chinese cities.

- Under a state leasehold system similar to Hong Kong SAR, China’s, overall economic and urban environments are conducive to the development-based LVC approach. The city has experienced rapid economic and population growth coupled with fast urbanization. Not only will increases in income and population generate sufficient ridership for the metro railway, they can also help develop a buoyant real estate market, which is essential for LVC.
- Good urban planning helps, and Nanchang has played its part well. Land markets will behave erratically if land use regulations and planning are unpredictable. Public and private investors need to know with some degree of certainty when and where urban expansion will take place in order to invest. A well-designed master plan that allows for development flexibility serves this purpose.
- Nanchang’s Urban Planning Bureau reviews its master plan every 10 years and makes additions and modifications as urban conditions change. Through this iterative process, NMG has established a vision for the future development of Nanchang that guides public and private investments.
- Well-integrated urban planning and public transport investments are other advantages. NMG has established a directive to use the metro railway as the backbone of its urban transport. The design of the system is based on facilitating the master plan. The number of metro lines and stations, with their locations and surrounding land uses, are specified for short- and long-term development.
- NMG and private investors understand the importance of mixed land use to make the idea of TOD and LVC work. NRTG’s station designs provide strong evidence of this underlying principle. This is also reflected by sustained increases in prices for land designated for mixed use, showing that the market has caught on to the idea.
- NMG collects about 20 percent of the transfer fees of land use rights for the use of six development funds. This will allow NMG to use the revenues from development-based LVC for prioritized public investments other than metro investment.
- Key government agencies under the leadership of the mayor and the vice mayors fully support NRTG in reaching its financial goals under the LVC approach. This type of institutional backing is crucial for lowering transaction costs of land acquisition and regulatory changes.
- Cooperation from all government agencies can help engender synergies between public and private sectors to undertake the technically and financially complicated metro railway investments.
• Although Nanchang seems to possess the preconditions for applying development-based LVC, potential risks include overreliance on land financing that exposes NMG to overheated real estate markets; unaffordable housing due to gentrification of transit station areas; and lack of public-private experience in jointly delivering property development projects alongside complex TOD/LVC procedures in fast-moving real estate markets.

Challenges Faced by Other Chinese Cities with Development-Based LVC

Integrating metro investment with land management and incorporating development-based LVC in infrastructure finance and urban planning with cities’ policies will be crucial for urbanization success, as metros offer another attractive mode of transport. If done well, Nanchang’s approach combining TOD and LVC will increase the vibrancy and livability of the city, making it a model for other Chinese cities. Yet many barriers remain throughout China.

• Strict development parameters and site control plans are not conducive to maximize urban land values via TOD around stations and along corridors. They include excessive building setbacks; excessive road width; limited emphasis on mixed land uses; low differentiation in FAR, not reflecting accessibility of mass transit systems; limits to building height; and fire regulations limiting allowable FAR.

• Public land leasing programs are not designed in transit-supportive ways. Land development rights around stations cannot be formally transferred to mass transit agencies at the start of a project in a way that enables those companies to coordinate integration of mass transit investment with land management through public-private partnerships or to secure the sustainability of revenue streams from properties on and around stations. In Chinese practice, once land has been attributed to a developer, the developer cannot subdivide the land or transfer rights to subdevelopers. Additionally, the varying authorized land use periods for residential and commercial buildings make the combination of both in a single development difficult.

• Location priority is given to greenfield development rather than redevelopment of built-up areas, including brownfield. While most metro alignments go through existing city centers, fragmented property rights and complexities over the redevelopment of already built-up areas lead developers to favor greenfield development, limiting the application of TOD and LVC in potentially high-access and high-density districts. The lack of urban redevelopment schemes is a critical constraint for implementing TOD and LVC in mass transit investment at city- and regionwide level.

• Transit investment in China often lacks long-term financing. Revenues from the sale of development rights are the major funding source
for local infrastructure, yet they are only a one-time revenue source for cities, and they fail to (1) capture the long-term increase in value brought by mass transit, and (2) meet the need for recurrent financial support for operation, maintenance, and renewal. There needs to be a mechanism for mass transit agencies to share recurrent revenues fairly with developers, through development-rights arrangements or other financial instruments, to capture increases in land values over the long run, such as property taxes, impact fees, and betterment taxes.

- The scale of TOD in Chinese cities is small, while the superblock design for car traffic creates urban islands disconnected from other streets within cities. Transit agencies have difficulty in finding experienced developers who can design and develop well-integrated spaces at the neighborhood level, even though the development rights of public land have been secured.

Notes

1. If other needed land sites are still under NMG’s control, NRTG can obtain these parcels via public auction. The Land Resource Center is in charge of leasing public land in Nanchang and usually leases development rights to investors through public auction or tender. NRTG can also take part in these auctions. Less than 1 percent of total land resources (16,426 mu) obtained by NRTG was secured through public auction.
2. RMB3,600 per square meter, while the actual construction cost is RMB13,000 per square meter.

References


