Self-financing urbanization: Insights from the use of Town Planning Schemes in Ahmadabad, India

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Abstract

Through an in-depth review of the financing structures of two projects developed using land readjustment (LR) in the State of Gujarat, India, this article provides insights into LR’s ability to selffinance urbanization. This ability rests on three intertwined factors. First, a rapid increase in the value of developed urban land enables local governments to generate substantial revenue from the sale of reserved land. Second, the local governments retain the reserved land for a significant amount of time before selling it, thereby benefiting significantly from increases in land prices. Third, a revolving fund system, wherein the revenues from older LR projects fund infrastructure in new projects, helps to finance the up-front infrastructure costs and eliminates the need to sell the land early or to seek loans. Furthermore, by using sensitivity analyses, the article shows that the timely accrual of betterment charges would bolster the revenue stream. Finally, the analyses highlight the concern that more land may be reserved than is required to fund the project and argues for more accurate estimates of the need for land reservation.

Introduction

Led by increases in two demand side factors—population and income, the demand for serviced urban land is rising rapidly in many developing countries. However, significant infrastructure backlog, poor fiscal capacity at all levels of government—local, state and national (Bird, 1999; Shah, 2004; Vera & Kim, 2003), and landowner opposition to compulsory land acquisition (Lall, 2009) limit the supply of serviced urban land. This demand-supply mismatch is the primary cause of the rapid rise in the prices of serviced urban land. In such a scenario, an urban infrastructure finance mechanism that is acceptable to the landowners, unlocks the value of the land and allows for the capture of a part of the increase in land value to finance public infrastructure and services is welcome (Home, 2007; Krabben & Needham, 2008). Land readjustment (LR) is one such mechanism (Hayashi, 2002; Turk, 2008).

Indeed, LR has been widely employed for rural-urban land conversion, for example in countries such as Japan, South Korea, Australia, Indonesia, Nepal and India (Archer, 1988, 1994; Hayashi, 2002; Karki, 2004; Lee, 2002; Li & Li, 2007; Sorensen, 2002), and to redevelop urban areas in countries such as Holland, Germany, Turkey, Japan and China (see Hein, 2010; Li & Li, 2007; Needham, 2002; Turk & Altes, 2011). In LR, a group of land holdings are pooled to plan and provide public infrastructure and services such as roads, electricity, water and sewer infrastructure, schools, community centers, parks and open spaces. Some land may also be reserved for future sale. The remaining land reverts back to the original landowners in proportion to their original levels of land ownership (Archer, 1992).

LR can be initiated by the landowners (usually through a landowner association) or by the local government. In either case, the initiating agency can impose a fee on the landowners and/or sell land to fund the costs associated with LR. These include: the cost of preparing and administering the project, the cost of providing infrastructure and services (Yau & Cheng, 2009).

LR overcomes limitations of compulsory and negotiated land acquisition methods

In developing countries, governments usually employ two methods to acquire land for planned urbanization—compulsory and negotiated land acquisition. However, both of these methods suffer from significant limitations. First, they require fiscally constrained governments to expend significant up-front funds to acquire land (Cete, 2010). Furthermore, landowners often complain about unfair compensation for their land, and hence oppose land acquisition. Even a small minority of landowners’ being unwilling to sell their land puts the entire urban development project on hold, a problem commonly known as the hold-out problem (Turk & Altes, 2010). Moreover, these methods create inequities. Landowners benefit significantly without contributing to the project if their lands are not acquired (Cete, 2010). For example, such...
landowners benefit from the future increase in the value of their land due to the project (for example, a road construction project), while owners whose lands are acquired do not get the opportunity to benefit from such future increases in land values. Finally, negotiated land acquisition methods leave open the possibility that some land owners may be able to negotiate smaller land deduction than the others.¹

LR overcomes the above-described shortcomings of land acquisition methods. LR is equitable because landowners contribute land and pay fees in proportion to the benefits received from the project (Yau & Cheng, 2009). The equitable nature of LR also minimizes the hold-out problem (Turk & Altes, 2010). Finally, LR does not require funds for land acquisition.

**Aim of the study**

The existing literature widely notes LR’s potential to self-finance urbanization (Cete, 2010; Karki, 2004; Turk, 2008; Yau & Cheng, 2009). However, only a few studies (see Archer, 1988; Karki, 2004) provide high-level numbers to show how the projects are financed. None of the studies systematically documented the project costs and revenues in enough detail to enable the reader to get a complete picture of the project’s financial structure. Policy makers and practitioners would not only like to know that LR can potentially self-finance urbanization or that it has self-financed urbanization in specific cases, they would also benefit from answers to questions such as: How large an area was developed using LR? What types of costs were incurred and revenues realized? When were these costs incurred and revenues realized? Which legal and administrative rules influenced the timing and magnitude of the cost and revenue streams? What was the relative contribution of revenues from the sale of land? Could less land have been reserved? Finally, how do factors such as construction delays and changes in the amount of land reserved for sale impact LR’s financing structure?

This article aims to answer these questions through an in-depth review of two projects developed using LR in the state of Gujarat, India. Focusing on the cost and revenue streams, and the corresponding legal and administrative enabling environment, the article identifies various factors that contribute to LR’s financial success in Gujarat. Finally, sensitivity analyses are conducted to demonstrate the financial impacts of time delays and changes to the amount of land reserved for sale.

**Literature review**

Turk (2008) provides a broad overview of the use of LR internationally. Therefore, without duplicating Turk (2008), I focus on reviewing the literature that examines how LR projects can be made more equitable for the two major stakeholders—the landowners and government, and hope that the literature review findings would provide insights into devising an equitable financing structure for LR projects.

**Ways to enhance horizontal and vertical equity in LR projects**

Focusing on ways to enhance horizontal equity,² the literature calls for balancing the benefits from a LR project with the costs and risks associated with the project (Turk, 2008; Yau & Cheng, 2009). In a government-led LR project, the landowners and government both bear risks during the construction period (called construction risks). The government usually assumes a larger share of the risks because it often bears the entire up-front cost of providing the infrastructure. The landowners’ construction risks and their share of project costs increase if they pay a fee and dedicate land to fund the project.

Furthermore, LR may be vertically inequitable³ if the landowners are low-income (they are frequently small farmers) and have very little ability to pay the fee up-front. Moreover, to the extent that landowners have to sell land to provide their share of the LR project cost, such as in Finland (see Viitanen, 2002), they bear very high construction risk, and receive smaller share of the future increases in land values. Therefore, it is customary to make up-front payment to be made in installments (Gielen & Altes, 2007) or defer the up-front payment until the project is complete or until the landowners apply for a change in land use or a building permit.

The amount of the fee also impacts vertical equity. In a situation where a majority of the project costs is recovered from the fee paid by the landowners, the amount of the fee can be very high and, therefore, burdensome for low-income landowners. The literature suggests several ways to keep the fee low. First, require the government to bear the up-front project cost (Viitanen, 2002). Second, provide low-interest loans for the project (Turk, 2007; Yau & Cheng, 2009), or third, provide no, little or low-quality infrastructure (Turk, 2008). However, governments in developing countries are often fiscally constrained and credit markets are not well developed. Therefore, opportunities for low-interest loans are limited. Furthermore, the governments’ poor fiscal capacities limit their abilities to bear the project costs up-front. Moreover, LR projects that provide no, little or low-quality infrastructure run the risk of providing sub-standard or un-serviced urban land or delaying the provision of infrastructure (Cete, 2010).

Finally, the project benefits are usually apportioned based either on the area or the value of the land owned prior to land pooling (Turk, 2007). There is an agreement in literature that the land value based method is fairer, but it also contains warnings that high-level real estate appraisal expertise is required to implement this method fairly (Cete, 2010; Yau & Cheng, 2009).

**LR in India**

In the absence of a national-level enabling legal environment, the use of LR in India varies from state to state, is predominantly used in the state of Gujarat, and to a smaller extent, Kerala, and predates India’s independence from the British. First introduced in the country through the Bombay Town Planning Act of 1915 in the erstwhile Bombay Presidency, LR was implemented through Town Planning (TP) Schemes. The TP Schemes were widely used in the first half of 20th century to urbanize Bombay (now called Mumbai), the capital of the erstwhile Bombay Presidency and the present day state of Maharashtra. Large parts of the city’s suburban neighborhoods of Mahim, Khar and Borivali were developed using TP Schemes. However, the use of TP Schemes declined when the Maharashtra Regional and Town Planning Act of 1996 chose detailed Development Plans (DPs) over TP Schemes. Furthermore, the TP Schemes suffered from two major drawbacks. First, the long period between scheme initiation and final government approval (an average of 15 years) made

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¹ Operationalized through the ability-to-pay (ATP) principle, vertical equity has its roots in welfare economics. In public finance, the vertical-equity rule calls for the rich to pay more than the poor for government-provided goods and services.

² The beneficiary-to-pay (BTP) principle operationalizes the horizontal-equity rule in public finance. The BTP calls for those benefiting from a public infrastructure or service to pay for it in proportion to the benefit derived.

³ India gained independence from the UK on August 15, 1947.

⁴ The Bombay Presidency included, among others, the post-independence states of Gujarat (the entire state) and Maharashtra (the majority of the state).

⁵ The Bombay Presidency predates India’s independence from the British.
the process very slow. Second, ownership disputes over a single parcel of land could hold up an entire scheme. These two drawbacks, in conjunction with the shift in focus to the DPs, contributed to the abandonment of TP Schemes in Maharashtra (Interview with V. Phatak).

Gujarat continued using TP Schemes, first through the Bombay Town Planning Act of 1915, which it inherited after seceding from the Bombay Presidency after India’s independence, and later through the Gujarat Town Planning and Urban Development Act (GTPUDA) of 1976.

**TP Scheme preparation process in Gujarat**

The Notification of Intention (NoI) is the first step in the TP Scheme preparation process. Issued by the appropriate local public agency (typically the municipal corporation or development authority), the NoI identifies the location and scheme boundaries. Next, the public agency collects the land ownership records from the state revenue department and other agencies, such as the village local governments. These records also include land parcel details, such as the ownership type, encumbrances, the area and value of the land and, wherever applicable, the value of the existing structures on the land. The public agency must match and reconcile the land ownership records through a site survey, and get the matched records certified by the state revenue department (Ballaney, 2008). The site survey also notes the location of other man-made and natural features; infrastructure and services, such as regional water, power and sewer lines; and the location of major roads already constructed or to be constructed in accordance with the city master plan. A site base map is prepared based on this survey.

Next, a layout plan and an infrastructure plan are prepared. The layout plan shows the street network; the new plots to be returned back to the landowners after taking a portion of the land; the location of various services and amenities, such as parks, schools, shops, and an electric substation; and the land parcels reserved for future sale by the public agency. The infrastructure plan shows the location of the various infrastructure systems, such as streets and the water, sewer, and electricity supply systems. The plan is accompanied by a detailed cost estimate.

The next major TP Scheme step entails the determination of: (a) compensation to be paid to the landowners for the land taken from them by the public agency; and (b) betterment charges (the betterment charges equal half of the difference between the pre- and post-TP Scheme land values) payable by the landowner to the public agency. The scheme costs that are not recouped from the betterment charges are covered through the sale of the reserved land parcels.

At this stage, the draft TP Scheme (comprising the layout plan, infrastructure plan, cost estimates, calculation of compensation payable to the landowners, and betterment charge calculations) is presented to the landowners for comments. Next, the scheme is modified to address the comments and forwarded to the state government for approval. Upon receiving the approval of the state government, the scheme is called the “Sanctioned Draft TP Scheme.” Until this stage, the TP Scheme preparation process usually takes approximately 14–17 months, or one and one-half years (see Fig. 1).

Next, a Town Planning Officer (TPO) is appointed. A state town planning department employee, the TPO, undertakes three rounds of public hearings, in which the individual landowners can contest the Sanctioned Draft TP Scheme. The first two rounds of hearings focus on the physical issues (such as the location, size and geometry of a land parcel). After the scheme is modified by the TPO based upon these two rounds of hearings it is submitted to the state government as a “Preliminary TP Scheme.” Upon government approval it is called a “Sanctioned Preliminary TP Scheme” (Ballaney & Patel, 2009). The third round of hearings focuses on the financial issues (such as the betterment charge). The scheme is again modified and submitted for government approval as the “Final TP Scheme.” Upon government approval, it is termed the “Sanctioned Final TP Scheme.” The TPO has 1–2 years to prepare the Preliminary and Final TP Schemes. The state government is given 2 months to approve the Preliminary TP Scheme and 3 months to approve the Final TP Scheme. However, substantial delays occur in the post-Sanctioned Draft TP Stage due to delays by both the TPOs and the state government (Interview with K. Gajjar; Ballaney, 2008). Therefore, a process that should ideally take 3–4 years may take more than a decade.

**Key features of the TP Scheme preparation process**

Two key features of the TP Scheme preparation process have contributed significantly to the TP Schemes’ popularity in Gujarat.

(a) *Early development of “priority” infrastructure:* The development of roads is a major infrastructure project in any urban development scheme and contributes significantly to increases in land values. Under the GTPUDA, infrastructure could not be developed until the final state government approval of the TP Scheme, leading to long delays in the provision of infrastructure. Therefore, Gujarat amended the GTPUDA in 1999 to allow local governments to appropriate land for road construction and other “priority” infrastructure within the road right-of-way (such as water and sewer pipes, and electric poles and transmission wires) soon after the state government approves a draft TP Scheme, rather than after final TP Scheme approval. Approval of the draft TP Scheme usually occurs within 15 months of scheme initiation (specifically, after the publication of a “Declaration of Intent” to prepare a TP Scheme). The approval of the final TP Scheme can still take more than a decade.

(b) *Land ownership disputes do not hold up the process:* The TP Scheme process does not settle land ownership disputes; it transfers them to the newly reconstituted plot. Therefore, such disputes do not hold up the TP Scheme preparation process (Interview K. Gajjar).

Indeed, TP Schemes are the predominant urbanization tool for all major cities in Gujarat, including its capital Ahmadabad (Interview K. Gajjar). In Ahmadabad, 18 TP Schemes (2300 ha) were prepared in the 20 years before the 1999 amendment. In contrast, 50 TP Schemes (5028 ha) have been completed since then, and an additional 47 (4,890 ha) are under preparation. These post-1999 TP Schemes serve 1.5 million people, almost the entire increase in the city’s population (AUDA, 2012).

**Case study LR projects**

This section reviews two TP Schemes—Bodakdev-1B, and TPS-50—located in western Ahmadabad, to illustrate the self-financing nature of LR in Gujarat (Fig. 2 provides a map of India showing the location of Ahmadabad; and the map of Ahmadabad showing the location of the two TP Schemes). Developed by the Ahmadabad Urban Development Authority (AUDA), both schemes urbanized peri-urban rural land. Bodakdev-1B is a pre-1999 scheme, where the infrastructure could only be provided after state government approval of the final TP Scheme. TPS-50 is a post-1999 scheme, where the infrastructure development began immediately after state government approval of the draft TP Scheme. All infrastructure and services have been provided in Bodakdev-1B, while 80% of road work is complete in TPS-50. Table 1 provides the scheme...
preparation and infrastructure development timelines. Furthermore, both schemes serve approximately the same area—209 ha for Bodakdev-1B and 181 ha for TPS-50. Table 2 provides the land use breakdowns for the two schemes.

**TP Scheme costs and revenues**

In Gujarat, TP Scheme costs and revenues are estimated at the time of the preparation of the draft and final TP Schemes (Interview with K. Gajjar). As Bodakdev-1B is complete, the costs and revenues estimated during the preparation of the final stage of the scheme are available. These estimates were prepared in 1992. The TPS-50 is still a draft TP Scheme; hence the estimates were prepared in 2004, when the draft scheme was sent for state government approval.\(^7\)

The scheme costs include the cost to prepare the scheme (including staff salaries, legal expenses and publication costs), the cost of compensating landowners for the value of their contributed land, and the cost of providing the road, water, sewer and electricity infrastructure. The landowners are compensated for land deduction at the pre-TPS Scheme land value rate (see Eq.(1)).

\[
C_{\text{ded}} = D \times L_{\text{pre}}
\]

(1)

where \(C_{\text{ded}}\) is the compensation to the landowner for land deduction, \(D\) equals land area deducted and \(L_{\text{pre}}\) is the land value at the time of the TP Scheme initiation.

As per Eq. (1), a landowner with an initial land holding of 1000 square meter valued at $5 per square meter and who dedicated 200 square meter of land, valued at $12 per square meter after the provision of infrastructure and services, has to pay $2800 in betterment charges: 0.5 \(\times \left[(1000 - 200) \text{ square meter} \times ($12/\text{square meter} - $5/\text{square meter})\right] = 0.5 \times 800 \text{ square meter} \times $7 = $2800\).

The landowner pays the difference between the betterment charges and the land deduction compensation. This difference is called net demand (see Eq. (3)).

\[
N = E - C
\]

(3)

\[N = \left[\frac{(A_{\text{pre}} - D)}{L_{\text{post}} - L_{\text{pre}}}\right] - C\]

(2)

where \(N\) is the net demand.

In the above scenario, the net demand is $1800: $2800 — $1000. Payable at the time the landowner applies for a change in land use or a building permit, the net demand is realized over an extended period of time.

**Estimate of revenue from sale of land**

All of the reserved land for Bodakdev-1B was sold during the 1988–2006 period. The sale dates and price data provided by AUDA have been used in this study. Land sales for TPS-50 have not begun. Therefore, Ahmedabad Municipal Corporation (AMC) staff was contacted for their advice on the 2009 land values in the TPS-50. The staff advised that prime residential and commercial land can fetch 30,000 Rupees per square meter (Interview with V. Patel). A conservative land value estimate of 20,000 Rupees per square meter is used in this article because some of reserved land in TPS-50 may not be in prime location, and may only be used for other uses that have much lower land values, such as civic centers and libraries.
Net present value calculation of costs and revenues

The construction costs, net demand, and land sales data are spread over a long time period. Therefore, to enable a comparison of scheme costs and revenues, the net present values (NPV) of all data were calculated for the end of December 2009 using the All India Consumer Price Index for Industrial Workers (CPI-IW). CPI-IW data were consistently available for the entire study period (1992–2010), while the more region-specific or finer-grained
The land was sold during the 1995–2006 period.

Table 2
Land use breakdown for the case study Town Planning Schemes. Source: TP Scheme reports from Ahmadabad Urban Development Authority.

<table>
<thead>
<tr>
<th>Land use</th>
<th>Bodakdev-1B</th>
<th>TPS-50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final land parcels to property owners</td>
<td>1,556,866</td>
<td>1,157,911</td>
</tr>
<tr>
<td>Infrastructure and public facilities</td>
<td>275,963</td>
<td>311,685</td>
</tr>
<tr>
<td>Roads</td>
<td>38,242</td>
<td>49,860</td>
</tr>
<tr>
<td>Low-income housing</td>
<td>144,053</td>
<td>125,740</td>
</tr>
<tr>
<td>Land reserved for sale</td>
<td>76,456</td>
<td>166,559</td>
</tr>
<tr>
<td><strong>Total TP Scheme area (in ha)</strong></td>
<td><strong>209</strong></td>
<td><strong>181</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index</th>
<th>Time period</th>
<th>Average annual increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI-IW</td>
<td>1992–2009</td>
<td>7.2^a</td>
</tr>
<tr>
<td>CPI-IW</td>
<td>1988–2009</td>
<td>6.9^a</td>
</tr>
<tr>
<td>CPI-IW</td>
<td>2004–2009</td>
<td>8.8^a</td>
</tr>
<tr>
<td>CPI-IW</td>
<td>2006–2011</td>
<td>7.6</td>
</tr>
<tr>
<td>Ahmadabad-specific CPI-IW</td>
<td>2006–2011</td>
<td>7.4</td>
</tr>
<tr>
<td>CPI-IW</td>
<td>1997–2005</td>
<td>4.4</td>
</tr>
<tr>
<td>WPI</td>
<td>1997–2005</td>
<td>4.4</td>
</tr>
</tbody>
</table>

CPI-IW stands for Consumer Price Index-Industrial Workers.
WPI stands for whole-sale price index.

As per the AUDa staff's 2010 estimates, almost all of the net demand from Bodakdev-1B has been realized, and the remainder is likely to be realized over the next few years. Therefore, for NPV analyses purposes, it is assumed that the net demand is realized over the 1993–2012 period, a 20-year period starting with the government approval of the final TP Scheme in the year 1993. For TPS-50 it is assumed that the net demand will be realized over the 2004–2023 period, a 20-year period starting with the government approval of the draft TP Scheme in the year 2004. Furthermore, because 80% of the road infrastructure in TPS-50 was developed by 2009, it is assumed that the entire infrastructure will be developed by 2013.

Finally, the data from a TP Scheme prepared by AUDa in 2009, Bopal-3, are used to determine the NPV of staff salaries, publication costs and legal expenses for Bodakdev-1B and TPS-50. Table 4 provides results of the NPV analyses for the two case study TP Schemes.

NPV analyses findings

The analyses of the TP Schemes' costs and revenues provide several insights into the schemes' financing structures. The findings are as follows:

(a) Revenues from sale of land are a significant source of revenue for AUDa, far exceeding the agency's expectations. The enhanced contribution of the revenues from the sale of land is primarily due to two reasons: first, rapid increases in land values in the scheme areas and, second, the large amount of land reserved for sale.

An analysis of the sale prices of the residential land sold by AUDa in Bodakdev-1B reveals an annual land price increase of 15.2% (see Fig. 3); this is much larger than the 5.9% increase in the CPI-IW during the corresponding period.9

Furthermore, AUDa reserves large amount of land for sale. For example, in Bodakdev-1B, the revenues from the sale of land were expected to equal more than 60 times the minimum required to fully fund the scheme (see Table 4, line 12, column 3). Indeed, I estimate that the actual revenues were approximately 14 times the required amount (see line 12, column 4). Similarly, in TPS-50, revenues from the sale of land are expected to equal more than 8 times the amount required to fully fund the scheme (see line 12, column 7). AUDa staff note that the surplus revenues fund regional infrastructure, such as a water treatment plant serving several TP Schemes, and infrastructure within new TP Schemes.

(b) Net demand funds a smaller proportion of the schemes costs than was originally planned. For example, in Bodakdev-1B, net demand was projected to fund 95% of the cost of the scheme. The charges ultimately only funded 23% of the cost. Similarly, it is estimated that net demand will only fund about one-third (37%) of the cost of TPS-50, compared to the planned three-fourths (79%) (see Table 4, line 13). The reduced contribution of net demand is due to the fact that these charges are only paid by the landowners when they seek a change in land use or apply for a building permit. Therefore, the charges accrue to AUDa over a long period (two decades in the case of Bodakdev-1B). Furthermore, the charges are not adjusted for inflation. Hence, in present value terms, the amounts of the charges decline over time. Indeed, these charges are estimated to be only 2% of the total revenues for Bodakdev-1B, and 7% for TPS-50 (see Table 4, line 14, columns 4 and 6).

(c) The cost of providing infrastructure increases over time. AUDa does not budget for such cost increases and relies heavily on revenues from the sale of land to bear the construction cost increases.

Sensitivity analyses

Infrastructure development within Bodakdev-1B took 12 years and is estimated to take 9 years for TPS-50. The amount of time taken to develop infrastructure impacts the financing of TP Schemes in two ways.

First, the delay leads to increased construction costs. However,
to the extent the rate of construction cost increase equals the discount rate used for the NPV calculation, construction delays should not increase the NPV of construction cost. But, the NPV of construction cost would increase with construction delays when the construction cost rises more rapidly than the NPV discount rate.

Second, the development of infrastructure increases land values, leading landowners to either develop their land for urban uses or to sell it to a new owner who then applies for a land use change and/or a building permit. Both cases trigger a net demand payment. Therefore, delays in providing infrastructure extend the net demand accrual period. Furthermore, because these charges are not inflation-adjusted, their amounts decline in present value terms. As noted previously, the net demand would accrue over 20 years in Bodakev-1B.

Furthermore, the review of the case study TP Schemes shows that excessive land is reserved for later sale. Therefore, sensitivity analyses were conducted for TPS-50 to estimate the impact of a shorter infrastructure development and net demand accrual period, and to identify the minimum amount of land needed to recoup project costs. Specifically, it was assumed that the infrastructure would be developed in 5 years (2004–2008 period), and the net demand would be realized over 10 years (2004–2013 period). Table 5 provides the sensitivity analyses results.

As expected, Table 5 shows that shortened construction period does not reduce the NPV of construction costs. However, the shortened net demand period increases the NPV of the net demand. Indeed, for TPS-50, the net demand increases by almost 40%.

Examining the amount of land that must be sold to finance the scheme, the analysis shows that AUDA could have reserved just 1.1% of the total scheme area for sale, instead of the actual 9.2%. With shorter construction and net demand accrual periods, this percentage could reduce even further to 0.9% of the scheme area (a 23% decrease).

In summary, for the two case study TP Schemes, AUDA reserved more land than was required to fund infrastructure within the schemes. Furthermore, AUDA can strengthen the self-financing nature of TP Schemes by developing the infrastructure in a timely manner (for example in 5 years, instead of the current 10–12 years).

Study recommendations and concluding remarks

Gujarat-specific recommendations

The review of the two TP Schemes shows that LR, through TP Schemes, is effectively used in Gujarat to fund urban infrastructure and services. In fact, the TP Schemes not only finance infrastructure within the TP Schemes but regional infrastructure as well. It is noteworthy that the state-level legal and administrative framework does not identify the funding of regional infrastructure as a permissible use of TP Scheme revenues. However, in the absence of clear fund accounting systems to track the usage of TP Scheme costs and revenues, this practice continues, albeit informally.

Given the importance of regional infrastructure to urbanization, we suggest that empirical studies should be conducted to estimate the monetary impact of a TP Scheme on regional infrastructure. Furthermore, the cost of mitigating such regional impacts should be included as a permissible TP Scheme cost. Accurate and transparent estimation of such costs would, in turn, enable better estimates of the amount of land that must be reserved to fully recoup TP Scheme costs. Because landowners contribute land, better estimates of the need for land reservation would make TP Schemes more equitable. Finally, as seen in the case of Bodakdev-1B, AUDA held on to the reserved land parcels for several years before selling them. While on the one hand, this practice restricted the supply of developed land (often parcels reserved for prime commercial and residential uses), on the other hand, it allowed AUDA to generate significant revenue. Moreover, the landowners who contributed the land did not directly benefit from these sales (except to the extent that the revenue from the sale of land helped lower their betterment charges). A transparent method of sharing the profits from land sales could make the TP Scheme financing process more equitable for the landowners.

Widely-applicable insights

This article’s analyses of Gujarat’s use of LR to fund urban infrastructure and services provide practical insights to other developing countries searching for urban infrastructure financing structures. Three such insights are noteworthy.

First, the local governments in Gujarat reap substantial financial benefits from the sale of reserved land. They retain the reserved land for a considerable period of time, allowing them to benefit significantly from the increases in land prices. The ability to retain land is primarily a result of local governments not requiring land sale revenues to bear the up-front scheme costs. Such costs are funded through an informal revolving fund system, where the revenues from previously developed TP Schemes help to finance new TP Schemes. Such a revolving fund system eliminates the need to seek external financing, such as a loan from a financial institution or from a higher level of government (the state or federal government) to fund TP Scheme costs, and creates a self-sustaining urban development financing mechanism.

Second, Gujarat’s LR process is largely equitable for landowners. The financially self-sustaining LR process obviates the need for seeking loans, and in turn, incurring interest costs. Therefore, the net demand payable by the landowners is reduced. Furthermore, the net demand does not need to be paid until the landowner is ready to realize the increased value of her land by applying for a land use change or a building permit. In fact, it could be argued that such latitude allows landowners to retain their land for speculative purposes. I believe that rather than adopting regulatory approaches to address the hold-out problem, such as requiring the landowners to sell their land, or to apply for a land use change or a building permit within a specified period of time, market-based approaches should be used.11 Such approaches could include the rapid development of high-quality infrastructure, which would then incentivize urban uses of land, in turn incentivizing a landowner to apply for a land use change or a building permit and pay the net de-

11 Market-based approaches are actions or policies that work with, rather than against, private-sector market forces.
mand; or inflation-adjust the net demand in order to realize its value in present value terms. As noted earlier, the net demand is not inflation-adjusted. Therefore, in present value terms, the cost to the landowner to retain their land for speculative purposes reduces over time. Furthermore, in a developing country such as India where the local governments’ abilities to enforce regulations are weak, market-based approaches are likely to yield better outcomes.

LR in Gujarat is aligned closely with market-based approaches. First, the betterment charges are based upon the market value of land. Second, the TP Scheme cost includes the full cost of providing infrastructure and services, including the administrative cost of preparing and implementing the scheme. Third, the public agency usually sells reserved land in open market to realize its full value; and the landowners are free to sell their land in open market. Finally, among other reasons, LR’s popularity in Gujarat can be attributed to two key factors: first, the ability of the local governments to develop infrastructure on the road right-of-way well before the final approval of the scheme. Second, land ownership disputes do not hold up the scheme. Such disputes are simply transferred to the newly reconstituted land parcels. The legal and administrative feasibility of adopting these two innovations could be explored by other countries as well.

Table 4
Net present value analyses of TP Scheme financing.

<table>
<thead>
<tr>
<th>Line number</th>
<th>Bodakdev-IB</th>
<th>Year 1992 values ('000 US Dollars)</th>
<th>Year 2009 values ('000 US Dollars)</th>
<th>TPS-50</th>
<th>Year 2004 values ('000 US Dollars)</th>
<th>Year 2009 values ('000 US Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Construction</td>
<td>211.1</td>
<td>687.1</td>
<td>8361</td>
<td>12,746</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Publication cost</td>
<td>0.6</td>
<td>32.3</td>
<td>21.5</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Legal expenses</td>
<td>0.3</td>
<td>32.3</td>
<td>32.3</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Salaries</td>
<td>44.2</td>
<td>1076.9</td>
<td>53.8</td>
<td>1077</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Total cost</td>
<td>256.1</td>
<td>1828.6</td>
<td>8468.7</td>
<td>13,888</td>
<td></td>
</tr>
<tr>
<td>Revenues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Net demand</td>
<td>243.4</td>
<td>413.5</td>
<td>6688.6</td>
<td>5137</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sale of reserved land</td>
<td>781.3</td>
<td>19573.5</td>
<td>No data</td>
<td>71,746</td>
<td>76,883</td>
</tr>
<tr>
<td>8</td>
<td>Total revenue</td>
<td>1024.7</td>
<td>19,987</td>
<td>6688.6</td>
<td>76,883</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Surplus (line 8 minus line 5)</td>
<td>768.5</td>
<td>18158.5</td>
<td>–1779</td>
<td>62,996</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Revenue to cost ratio (line 8 divided by line 5)</td>
<td>4.0</td>
<td>10.9</td>
<td>0.8</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Revenues from the sale of reserved land required to break even (line 5 minus line 6)</td>
<td>12.8</td>
<td>1415</td>
<td>1779</td>
<td>8750</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Revenue from sale of land as proportion of minimum revenue required to break even (line 7 divided by line 11)</td>
<td>61.2</td>
<td>13.8</td>
<td>–</td>
<td>8.2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>% of scheme cost funded through net demand (line 7 divided by line 6)</td>
<td>95%</td>
<td>23%</td>
<td>79%</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Net demand as % of total revenues (line 7 divided by line 9)</td>
<td>24%</td>
<td>2%</td>
<td>–</td>
<td>7%</td>
<td></td>
</tr>
</tbody>
</table>

Note: All figures, unless otherwise stated, are in thousand US Dollars.
It simply assumes that all the scheme costs would be recovered through sale of land.
The US Dollar to Indian Rupee conversion is based upon the December 31, 2009 currency exchange rate of One US Dollar = 46.43 Indian Rupees.

* The cost and revenue proforma for TPS-50 does not allocate a value for revenues from the sale of reserved land.

Table 5
Sensitivity analyses for TPS-50.

<table>
<thead>
<tr>
<th>Line number</th>
<th>Year 2009 values (Table 4 values)</th>
<th>Column A</th>
<th>Year 2009 values (with shortened infrastructure development and net demand accrual period)</th>
<th>Column B</th>
<th>% Change from Column A to B Column C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Construction</td>
<td>12,746</td>
<td>12,746</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Publication cost</td>
<td>32</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Legal expenses</td>
<td>32</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Salaries</td>
<td>1077</td>
<td>11,077</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Total cost</td>
<td>13,888</td>
<td>13,888</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Revenues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Net demand</td>
<td>5137</td>
<td>7185</td>
<td>39.9%</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sale of reserved land</td>
<td>71,746</td>
<td>71,746</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Total revenue</td>
<td>76,883</td>
<td>78,931</td>
<td>2.7%</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Surplus (line 9 minus line 5)</td>
<td>62,996</td>
<td>65,044</td>
<td>3.3%</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Revenue to cost ratio (line 8 divided by line 5)</td>
<td>5.3</td>
<td>5.7</td>
<td>2.7%</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Revenues from the sale of reserved land required to break even (line 5 minus line 6)</td>
<td>8750.5</td>
<td>6702.6</td>
<td>–23.4%</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Revenue from sale of land as proportion of minimum revenue required to break even (line 7 divided by line 11)</td>
<td>8.20</td>
<td>10.70</td>
<td>30.6%</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>% of Scheme cost funded through net demand (line 6 divided by line 5)</td>
<td>37.0%</td>
<td>51.7%</td>
<td>39.9%</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Net demand as % of total revenues (line 6 divided by line 8)</td>
<td>7%</td>
<td>9.1%</td>
<td>36.2%</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>% of Scheme area reserved for sale</td>
<td>9%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Minimum amount of land to be sold to fund the entire scheme (as % of the entire scheme area)</td>
<td>1.1%</td>
<td>0.9%</td>
<td>–23.4%</td>
<td></td>
</tr>
</tbody>
</table>

Note: All figures, unless otherwise stated, are in thousand US Dollars.
References


