

Transformation of the Urban Rail Sector through PPP

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Abstract

The recent proliferation of Public Private Partnership (PPP) projects in numerous cities has transformed the urban rail sector. The enthusiasm for PPPs can be explained by improved understanding of efficiency gains and risks of bundling and unbundling tasks as well as availability and lower cost of private sector finance. The four main PPP approaches identified are: (i) development of new systems through DBFOs (Design-Build-Finance-Operate); (ii) concessioning of rail and subway services; (iii) sale of state-owned operators through share issue privatisation; and (iv) PPPs for infrastructure maintenance and upgrading. This paper examines examples of successes and failures to better understand the complexities involved in PPP decisions and the trade-offs cities make when deciding between alternative strategies.

Introduction

Last year, in 2008, for the first time in human history, the earth's population became more urban than rural; by 2050, the United Nations has forecasted that a full 70 percent of the human population will be living in cities.¹ By mid century, the total urban population of the developing world is expected to more than double from 2.3 billion in 2005 to more than 5 billion. These urbanisation trends pose tremendous challenges for urban planners, particularly with regard to urban infrastructure and transit financing.

In the past two decades, urban planners and policy makers have increasingly looked to the private sector to help meet the financing gap for capital intensive urban rail systems. Public Private Partnerships (PPPs) have delivered

metro systems or lines that would otherwise not have been built, or would only have been built at a later date. Some of these projects have however run into problems of varying magnitudes. This paper reviews the rationale for adopting the PPP approach, examines the strategies used and the successes and problems in order to arrive at a better understanding of the trade-offs and complexities involved in choosing a strategy for the sector.

Reasons for Recent Enthusiasm

When the wave of privatisation swept through the transport sector in the 1980s, there was deregulation and privatisation in airlines, ports and airports; restructuring in intercity and commuter rail; and competitive tendering in bus services. The urban rail sector was left largely untouched. Prior to 1993, public sector ownership and operation of urban

Distinction between Privatisation and PPP

Grimsey and Lewis (2004) makes the following distinction between privatisation and PPP: “within a PPP the public sector acquires and pays for services from the private sector on behalf of the community and retains ultimate responsibility for the delivery of the services, albeit that they are being provided by the private sector over an extended period of time (i.e. 25 years or longer). By contrast, when

a government entity is privatised the private firm that takes over the business also assumes the responsibility for service delivery...A PPP is a formal business arrangement between the public and private sectors...regulation through contract and the lack of government disengagement define much that is distinctive about a PPP.”

rail systems was widespread. Japan was the only exception. The main obstacles to private sector involvement were: (i) high cost and long payback periods; (ii) fare revenues that did not cover costs; (iii) the need for public subsidies; and (iv) the complexities of forming and sustaining coalitions and partnerships necessary in this sector (Due 2003; Gomez-Ibanez and Meyer 1993).

In the early 1990s, Argentina launched an ambitious plan to privatise its entire transport sector. It was then described as “the only country outside Japan that had private urban commuter railways and the only country in the world that had granted a private concession to operate its subway” (Gomez-Ibanez 1997). Since then, PPPs in urban rail have come to be adopted all over the world. Why did PPPs become so popular?

Kumar and Prasad (2004) succinctly describes PPPs as a strategy that combines the best of the public and private sector: “Through PPPs, the advantages of the private sector—

innovation, access to finance, knowledge of technologies, managerial efficiencies, and entrepreneurial spirit—are combined with the social responsibility, environmental awareness and local knowledge of the public sector in an effort to solve problems.” Through a PPP, risks, resources and rewards can be appropriately allocated to the private sector.

In the 1980s (and prior to experimentation with urban rail PPP), policymakers had developed better understanding of complex urban environments and infrastructure sectors. Vertical disintegration or unbundling of entire industries in the telecoms, power, water, and transport sectors introduced private sector participation and competition in previously state run or regulated monopoly sectors. In this exercise of “taming complexity”² for privatisation of the infrastructure sector, Britain has been the pioneer. The experience gained was introduced into the urban rail sector in the 1990s. In the context of urban rail, a project may be roughly broken down into four principal “tasks”: (i) define and

design; (ii) finance; (iii) build and procure the physical assets; and (iv) operate and maintain the assets to deliver the services.

How should the policymaker decide if the whole or part of the system should be provided by the public sector or through a PPP? The answer depends on a detailed understanding of the numerous risks involved in these projects, followed by a careful assessment of whether the private or public sector is better able to manage the risks. The perceived high risks of urban rail projects is one reason why these systems were provided by the public sector in the past.

Even with public provision, the design and build (D&B) part is usually tendered to the private sector. PPP arrangements further bundle D&B contracts with other functions such as operation and maintenance (O&M) or finance to exploit the complementarities between the various tasks that can reduce costs. For example, packaging private financing and building can reduce the risks of construction delays and project cost overruns. Under public procurement, public sector managers may be so far removed from their principals (the taxpayers) that project cost overruns may be more likely. Moreover under a PPP, the private partner may recover damages if delays are caused by the government, thus reducing the risk of such delays. Bundling O&M and private finance with D&B can also help to reduce project costs. The consortium that has to build and finance the project has strong incentives to ensure that it is well designed. If it has to operate and maintain the system

too, it has strong incentives to ensure that it is designed and built such that operation and maintenance costs are minimised over the length of the contract.

It may appear strange for policy makers to argue that PPPs are good because the private sector is a cheaper source of financing or insurance than the public sector, as "it is hard to imagine an agent that is more able to borrow or to provide insurance than the government" (Hart 2003). However the government is not always able to borrow at a lower cost than the private sector, or even to borrow at all in the case of some cities (Bettignies and Ross 2004). One of the most frequent reasons governments employ PPP is that they are cash-strapped and too debt-laden already. It is not surprising that PPPs tend to be more common in countries where governments suffer from heavy debt burdens (Hammami et.al. 2006).

The recent enthusiasm for PPPs can therefore be explained by two main factors: (i) improved understanding of efficiency gains and risks of bundling and unbundling tasks in the sector; and (ii) availability and lower cost of private sector finance.

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Table 1: PPP strategies for urban rail

| | | INFRASTRUCTURE | |
|------------|---------|--|--|
| | | Public | Private |
| OPERATIONS | Public | Public provision | Infrastructure maintenance and upgrading |
| | Private | Operating concessions Share issue privatisation | DBFO Share issue privatisation |

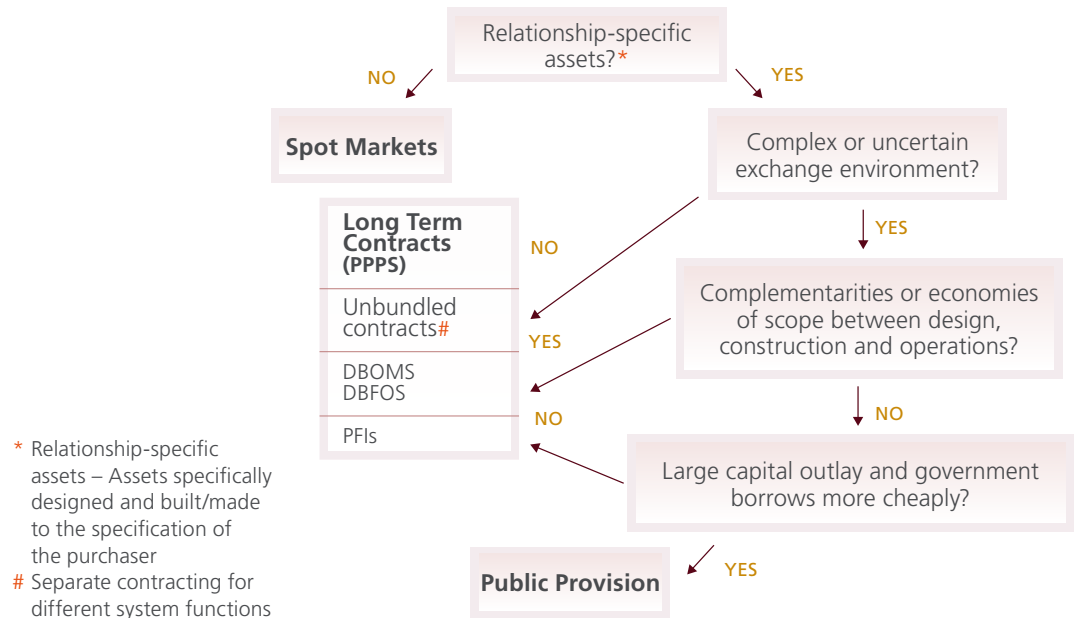
Strategies and Cases

Phang (2007) has classified urban rail PPP strategies into four broad approaches: (i) the development of new systems through Design-Build-Finance-Operate (DBFO) agreements; (ii) the concessioning of rail and subway services; (iii) the sale of state-owned operators through share issue privatisation; and (iv) PPPs for infrastructure maintenance and upgrading. Table 1 summarises the responsibilities of the private and public sectors for infrastructure and operations under each strategy.

The upper-left quadrant is the traditional public sector model—the government owns

the infrastructure and operates the system. The lower-right quadrant is the Design-Build-Finance-Operate (DBFO) PPPs where the private sector is involved in both operations and infrastructure. The lower-left quadrant refers to operating concessions of rail and subway services where infrastructure is owned by the public sector. The upper-right quadrant is the strategy employed by the London Underground: infrastructure ownership, maintenance and upgrading are transferred to the private sector, while the public sector remains responsible for operations. Share issue privatisation or Initial Public Offerings (IPOs)

Figure 1: Public provision or PPP decision for urban rail transit



involve public listing of state-owned operators—the infrastructure may remain publicly owned (as in the case of Singapore) or bundled with the operations (as in Hong Kong).³

Table 2 shows the PPP approaches adopted in various cities.

Design-Build-Finance-Operate strategy

The DBFO strategy is most commonly used for the development of new systems. Successful DBFO projects in the urban rail sector include the Hudson-Bergen LRT in the United States, as well as the Docklands LRT and Croydon Tramlink in London. French local authorities have traditionally relied upon a private operator to carry out their capital investment program within a strictly public financing framework. In recent urban rail projects in Toulouse, Grenoble

and Strasbourg however, local authorities have opted for a PPP framework (Rocheport 2000).

Both the Union Pearson Air Rail Link in Toronto and the Richmond Airport Vancouver Project (the Canada Line) were awarded as DBFO contracts in 2003 and 2005 respectively through competitive bidding. This is a departure from the traditional practice of complete reliance on public sector financing for urban rail. Other successfully completed DBFO urban rail projects are listed in Table 2. Without the involvement of private sector, many of the above lines would either have not been built at all, or would have had their construction delayed substantially.

Operate & Maintain concession

The use of O&M concession strategy is often seen in cases where the government has largely

Table 2: Adoption of PPP strategies in urban rail

| | | INFRASTRUCTURE | |
|------------|---------|---|---|
| | | Public | Private |
| OPERATIONS | Public | Public provision - USA | Infrastructure maintenance and upgrading - London Infracos |
| | Private | Operating concessions - Stockholm - Buenos Aires - Rio de Janeiro - Singapore's North-East Line Share Issue Privatisation - Singapore's North-South and East-West Lines | DBFOs - Hudson-Bergen LRT (US) - Docklands LRT and Croydon Tramlink (UK) - Toulouse, Grenoble and Strasbourg (France) - Union Pearson Air Rail Link and the Richmond Airport Vancouver Line (Canada) - Brisbane airport rail (Australia) - KL Star and Putra LRTs and KL Monorail (Malaysia) - Bangkok Skytrain and Blue Line (Thailand) - Manila MRT3 (Philippines) - Jakarta Monorail (Indonesia) - Beijing Subway Line4 (China) - Mumbai and Hyderabad metro systems (India). Share Issue Privatisation - Hong Kong |

written off its investments in the rail lines. There is no need for the new private owners/operators to recover the investment. Argentina pioneered PPPs in urban rail in Buenos Aires in the early 1990s when it offered 20-year concessions for private entities to operate services and execute investment plans defined and funded by the state (Robelo 1999). The concessions attracted a large number of bids and by May 1995, all seven lines had been transferred to the concession winners. Rio de Janeiro followed shortly in 1997/98 with two urban rail concessions of 20 and 25 years (see Phang 2007 for details).

Stockholm Transport has awarded 5 to 10-year contracts for operating its three metro rail lines, its light rail system, the suburban railway service as well as commuter rail services. It normally leases vehicles to contractors and owns the tracks and facilities. In some instances, station staffing is also contracted out.

In Singapore, the Land Transport Authority awarded a 30-year concession to run the brand new S\$4.6 billion 20-km North-East Line and two adjoining LRT systems to the public-listed SBS Transit Ltd.

Risks and high costs in PPP projects

Designing long term PPP contracts in an uncertain macro environment remains a challenging task for both the public and private sector partners.⁴ There are the risks of incomplete contracts and its associated problems. While policy makers and the private concessionaires may try to anticipate every risk and ensure that each risk is properly allocated or shared in the partnership, there are limitations to foresight. It is impossible

to plan for every potential contingency. A regulatory framework is therefore necessary and contracts should be designed to allow for re-negotiations and contract extensions.

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Within a PPP, the public and private sector partners face different specific risks. The public sector bears a diverse set of risks including interruption to work program or services, cost overruns, political risks, project buyout and non-performance risks, absence of potential replacement and post-contractual lock-in which can lead to opportunistic behavior by the private partner (Aoust et.al. 2000, p.59).

For the private sector, there remain the dangers of the obsolescing bargain for foreign investors venturing into infrastructure (Wells and Gleason 1995; Irwin et.al. 1997; Vernon 1971). Infrastructure investments, once made, are not potable and run the risks of expropriation at the worst, or the gradual erosion of investors' rights and privileges. Appropriation of the investor's profits without causing it to leave can arise from changes in government priorities or policies, or the public sector's failure to comply with specific commitments made under the PPP. Paradoxically, while high risk for private investors may justify high returns, such high returns for infrastructure projects may result in higher risk of expropriation or appropriation.

Another problem with PPPs is the high transaction and governance costs.

Another problem with PPPs is the high transaction and governance costs. For example, the net present value of the PPP contracts to modernise the London Underground was estimated to be about £16 billion and the cost of setting it up: about £500 million (Phang 2007). In addition, there are the governance costs of administering these arrangements over the life of the contract.

Problems encountered by some PPPs

Not all PPPs take off. The Jakarta Monorail suffered from financial problems and frequent changes in partners. The project has involved and dropped numerous partners from Malaysia, Singapore, Japan, South Korea, Dubai, Hong Kong since it was first awarded. In March 2008, the developer announced that it has officially abandoned the project. Numerous pylons to support the future track have since gone missing.

The successful completion of a system also does not guarantee its longer term viability. In Kuala Lumpur, the Star and Putra LRT lines were completed in time for the 1998 Commonwealth Games and in the midst of the Asian Economic Crisis. After a few years of operation, both lines faced serious financial difficulties and were subsequently “bailed out” in 2002 by the government in the nation’s biggest ever corporate restructuring, with a payout of MR5.5 billion. Critics viewed the sum involved as excessive, with actual

construction costs believed to be much less. The KL Monorail began operations in 2003. It posted losses from the start, became insolvent and was nationalised last year. The lines are currently owned and operated by government-owned companies.

In Buenos Aires, the initial performance of the 20-year concessions awarded in 1994 won plaudits from observers around the world. Private concessionaires infused capital and management skills, turning around rail systems that were on the verge of collapse. The Argentine 2001 economic crisis however placed the PPPs under tremendous stress. The government could not pay the operating subsidies on time and also imposed a fare freeze. The concessionaires responded with service curtailment and lower service levels, resulting in long delays for commuters. Commuter anger spilled over into ugly scenes of riots and vandalism of trains on a number of occasions.

The United Kingdom, being the most experienced amongst PPP practitioners, also had its share of problems. To enable private financing of £8 billion over 15 years for the London Underground, ownership of the track, signaling, bridges, tunnels, lifts, escalators, stations and trains were transferred in three parts to private infrastructure companies (infracos). The contracts would last 30 years, but with prices agreed for only the first 7½ years. London Underground Limited continued to run the train services. In 2003, Metronet, one of the two successful consortia which won the bids, took control of two-thirds of London Underground’s infrastructure

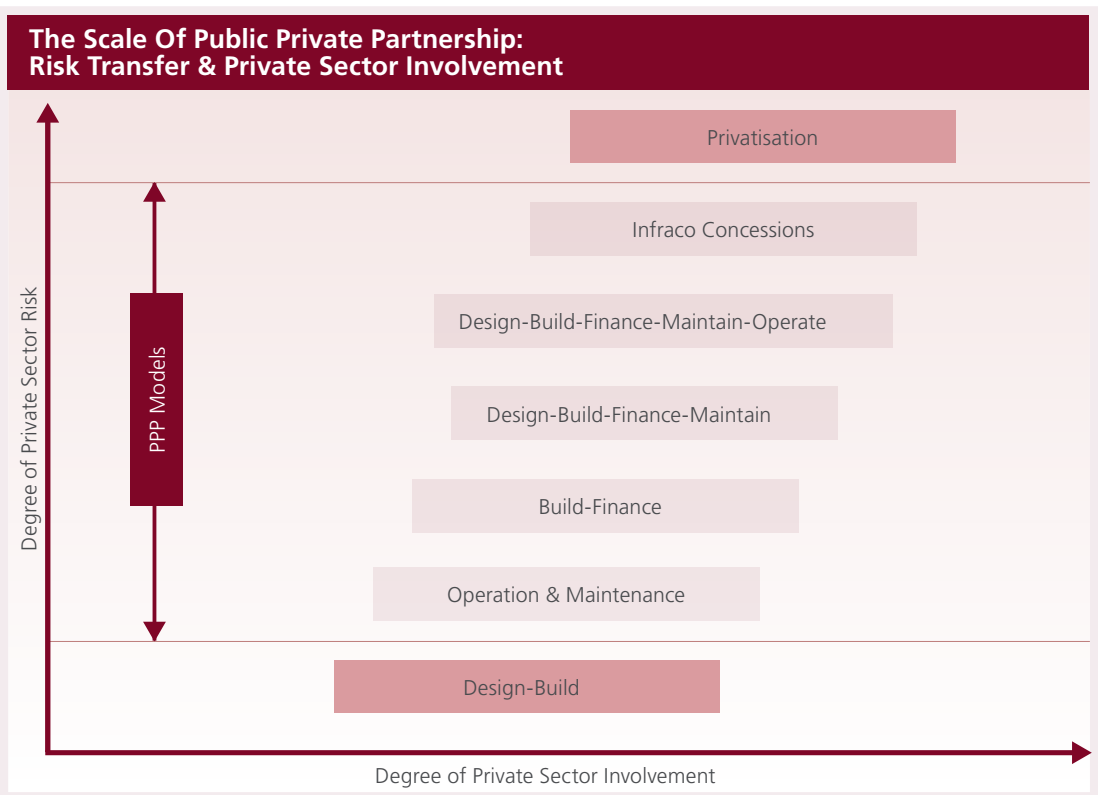
and became responsible for maintaining and improving nine lines, including 150 stations. In 2007, Metronet slid into administration, triggering a strike by workers concerned over jobs and pensions. The massive strike stopped all services on nine lines, bringing London to a virtual standstill. In May 2008, Metronet's business was transferred to two companies owned by Transport for London.

Public Procurement or PPP? A Complex Policy Decision

The above recent problems show that an urban rail PPP is a complex policy decision.

Policy makers will need to consider numerous trade-offs: lack of technical knowledge on rail management versus lack of knowledge on PPP project management; complementarities through bundling versus greater control from unbundling; recurrent short term concessions versus incomplete long term concessions; pro-efficiency benefits of competitive tendering versus synergies achievable from long term relationships; production costs reduction versus transaction and governance costs incurrence. The choice of strategy therefore requires great care. The consequences of the wrong choice can be costly and long lasting.

Figure 2: PPP risk transfer to the private sector



* Modified to include infraco concessions
Source: The Canadian Council for Public Private Partnerships
at http://www.pppcouncil.ca/aboutPPP_definition.asp

Figure 2 depicts the choice of PPP strategy as one of risk allocation and risk preference. According to the diagram, DBFOs and infracos would be technically considered less risky for the public sector when compared to O&M PPPs because more risks and responsibilities are transferred to private sector partners.

I would prefer to analyse the PPP decision using Figure 3 (adapted from Taleb 2008). Figure 2 suggests that we live in the domain of predictable risk distributions. It assumes we know the relevant risk distributions and can quantify and allocate them neatly. However, the world we live in can be very unpredictable. Extreme events can occur, and we have witnessed quite a number recently in the financial sector.

The PPP decisions can be simple in terms of payoff. For operating concessions, either the services run or they don't. The payoffs involving infrastructure is more complex. We would optimistically like to think that risks can be quantified, retained or transferred, as in the upper right quadrant in Figure 3. But the reality is that many PPPs involving private infrastructure, such as DBFOs and the London infracos, probably belong in the lower right quadrant. The probability of failure is not

known and negative impacts and fallouts can be unexpectedly large.

For Singapore's SMRT Corporation Ltd and Hong Kong's MTRC Corporation which are majority government owned, either the government supports the venture or it doesn't. Government's partial ownership of these companies can be viewed as risk mitigating strategies. In Singapore's case, it changes the associated risk domain of the long term O&M concessions from unpredictable to known. Hong Kong's MTRC, a DBFO company with complex payoffs, has been grouped under "known" risk domain. Unlike other DBFOs, this categorisation is "realistic" rather than "optimistic" as partial government ownership helps to minimise the uncertainties and risks involved.

Not surprisingly, a recent World Bank review (Annez 2007) concluded that private participation in infrastructure (PPI) in developing countries "has disappointed, playing a far less significant role in financing infrastructure in cities than was hoped for ..." Urban PPI investments accounted for only a 10% share of the total investment in infrastructure. Of these, 25% of total transactions in urban areas were classified

Figure 3: The PPP decision

| | | PAYOFF | |
|--------|-------------------------|--|--------------------------------------|
| | | Simple | Complex |
| DOMAIN | Known risk distribution | - Short term O&M concession contracts - Singapore | - DBFOs - Infracos - Hong Kong |
| | Unpredictable | - Long term O&M concession contracts | - DBFOs - Infracos |

} Optimistic
} Reality

as problem transactions, as opposed to 10% in total.

Conclusion

Notwithstanding the problems that have arisen, PPPs have played a transformational role in urban rail sector. There are no unique solutions or templates to follow with regard to choice of strategy. In arriving at a decision, policy makers will need to have a clear vision

of the objectives and a deep understanding of the context to fully appreciate the advantages and limitations of PPPs. The transaction costs can be high and long term success is dependent on an array of factors spanning political, economic and institutional. For PPPs to be sustainable solutions, governments must remain central actors, the PPP strategies must be appropriately designed and regulated, and commuters must ultimately benefit.

Vancouver's Canada Line (2009)

Vancouver's Canada Line comprises 19.2 km of track serving Vancouver, Richmond and the Vancouver International Airport. It began operations in August 2009, a few months ahead of schedule and in time for the 2010 Winter Olympics. The line has been built with funding provided by both government agencies and a private partner. The project was put out for competitive bidding in 2003 and awarded in 2004 to the consortium InTransitBC. Under the DBFO agreement, InTransitBC was contracted to design, build, partially finance, operate and maintain the Canada Line for a 35-year period.

The total cost of the project has been estimated at C\$1.9 billion, with InTransitBC's share estimated at C\$657 million (2003 dollars) plus construction cost overruns (www.canadalin.ca). One of the public agencies contributing to the funding of the project is the Greater Vancouver Transportation Authority, TransLink. TransLink has agreed to guarantee 90% of projected ridership and to make up the shortfall in revenue if this is not achieved.

The PPP arrangement has attracted its fair share of controversy. While proponents argued that private involvement allowed for construction costs to be known and fixed upfront, detractors questioned the ridership projections and highlighted the longer term risks of the PPP to taxpayers (Redlin 2003).

Bangkok's BTS Skytrain (1999)

The Bangkok Skytrain, in operation since 5 December 1999, is a DBFO PPP project that has transformed public transportation in the crowded city. It is an elevated rapid transit system which serves downtown Bangkok. The line (present system length of 28.7 km) was to be financed from fare revenues with the Bangkok Metropolitan Authority providing all the right-of-way for free by allowing the line to be built over important arterial streets.

With a price tag of over US\$1.5 billion, all of which was to be purely privately financed, the project attracted much international attention. Tanayong Corporation, a Thai real estate company, won the 30-year concession

partly because it had offered the lowest fare —12 baht (increased to 15 baht in 1992 after negotiations began). Tanayong subsequently created a separate company, the Bangkok Mass Transit System Public Company Limited (BTS), to build the system and own the concession. The concession contract provided for fare increases every 18 months thereafter with the increase in consumer price index. There were also provisions for increases in the event of exceptional circumstances, including major changes in foreign exchange rates.

Project implementation was far from smooth: there were lengthy disputes over the site of the train depot, going underground or remaining elevated, as well as location of support pillars. Financiers for the projects grew to include Siemens, the German government's international development bank, a syndicate of Thai banks, as well as the International Finance Corporation, the World Bank's private sector lending arm.

The Asian financial crisis and the devaluation of the Thai baht hit the BTS hard as many foreign loans, construction and equipment costs were

in foreign currency, while its revenues were primarily in baht. A controversy over fares that BTS could charge had to be brought before an arbitration panel. And all these were before Skytrain opened for service in December 1999 (at fares ranging from 10 to 40 baht), some three years later than as stipulated in the 1992 concession contract (Perez 2004).



Since its opening, ridership has been below the forecasted 570,000 level: year 1 ridership was just one-quarter of forecast; the system at present carries an average of 450,000 passengers per working day. While fare box revenue has been sufficient to cover operating costs, the ability of BTS to service its substantial construction debt remains a source of continuing concern.

Notes

1. UN-HABITAT, State of the World's Cities Report 2008/9, at www.unhabitat.org
2. This term is borrowed from Barabasi (2005)'s article 'Taming Complexity' on complex systems and networks in the sciences.
3. While the sale of state-owned operators through share issue privatisation does not constitute a PPP when following the traditional definition of PPP,

the two cases involving the urban rail sector are not outright privatisation. Instead, they involved public listing of partially state-owned companies that have previously been given operating franchises. This justifies their inclusion as a PPP strategy. See Phang (2007) for details of the Singapore SMRT and Hong Kong MTRC IPOs in 2000 as well as detailed evaluation of the various strategies.

4. These issues are not specific to the rail sector and arise generally for infrastructure PPPs (see Phang 2009).

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