Is Public Private Partnership a Panacea for Transportation Infrastructure?

A Lesson from the Funding of Japanese High-Speed Train Network

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Abstract

Although a rail service is basically self-financing and provided by vertically integrated private companies in Japan thanks to large traffic volume, the expansion of the high-speed train (*Shinkansen*) network is an exception. Because four ex-national Japan Railway (JR) companies, which are designated to operate, naturally refuse to construct new *Shinkansen* lines in sparsely populated areas on their own, the Japanese Government has set up a wholly government-owned entity to legally own the rail infrastructure and lend it to JR companies as operators. The total estimated construction cost would exceed 3 trillion yen (30 billion US dollars).

This scheme has several interesting features worth examining in depth beyond its sheer size, whether the decision to construct new lines is wise or not. In particular, we try to make clear what can and cannot be solved by an incentive compatible PPP-type mechanism for optimal public involvement into infrastructure funding.

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1. High-Speed Train Network Expansion in Japan

As was shown by quite a few researchers and practitioners in the first conference last year, Public Private Partnership (PPP) has attracted wide attention and been expected to solve the ever increasing difficulty of public transportation funding.

Although a passenger rail operation, both intra-city and inter-city, is not considered a viable business without subsidies to infrastructure funding in Europe and North America, we have many profitable private listed rail companies in Japan. They consist of more than a dozen intra-city commuter rail operators and three larger successor companies of the defunct Japanese National Railways (JNR), which were dissolved and divided into six regional passenger[1] and one freight Japan Railway (JR) companies in 1987 after amassing a huge amount of debts exceeding 200 billion US dollars. These private rail companies consistently make profits for years constructing and maintaining their network infrastructure basically on their own[2].

There is a glaring exception to this self-financing nature of Japanese railroad system, however. Due to continuing population relocation from rural to urban areas as well as a very low national birth rate, demand for a passenger rail service in rural areas is rapidly shrinking. People use cars for intra-area transportation and airplanes for inter-area (between their areas and Tokyo in particular) leaving no market for trains. Besides metropolitan intra-city markets, only a limited number of inter-city operations remain profitable. These profits are, fortunately for rail companies, still large enough to

[1] The aforementioned three privatized ones and three not privatized smaller ones.
[2] See Fukui and Oda (2007) for more details concerning the JNR reform and Japanese rail industry.

cross-subsidize rural operations.

In spite of this grim picture, the Japanese Government continues to expand a high-speed train (*Shinkansen*) network, sticking to the master plan enacted more than 30 years ago when air and highway networks were barely existent in Japan. Because four ex-national JR companies, JR East, West, Kyushu and Hokkaido, which are designated to operate, naturally refuse to construct new *Shinkansen* lines on their own, the government has set up a wholly government-owned entity to legally own the rail infrastructure and lend it to JR companies as operators. The total estimated construction cost would exceed 3 trillion yen (30 billion US dollars).

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2. Why We Need PPP?

In order to avoid an unenlightening argument on what PPP really means, we adopt a broad risk-based definition proposed by Grimsey and Lewis (2004, p. xiv): A risk-sharing relationship based on a shared aspiration between the public sector and one or more partners from the private and/or voluntary sectors to deliver a publicly agreed outcome and/or public service.

We also take it for granted that the default position for any project is to let markets decide. Economically viable projects do not need PPP. Not to mention competitive industries, even natural monopolies do not need a PPP scheme if they are self-financing. These services can and should be provided by private companies under

governmental regulations if necessary as widely practiced in the United States for years. We need a PPP scheme for projects, those on transportation infrastructure in particular, because they are not self-financing.

3. New *Shinkansen* Line Scheme

Japan is a pioneer of a high-speed rail network starting its first operation between Tokyo and Osaka in 1964. Before being dissolved in 1987, JNR had begun to operate *Shinkansen* trains on four lines, two of which were constructed in relatively sparsely populated areas. However, because JNR was legally designated to be self-financing, in other words, considered a concessionaire, JNR and the government could not but show overly optimistic forecast to the public in order to construct these two lines. This unwarranted optimism is not limited to Japan. As Flyvbjerg et al. (2002) and Flyvbjerg et al. (2003) point out, infrastructure projects, rail ones in particular, have been haunted by excessive optimism all over the world.

In contrast, under the New *Shinkansen* Line (NSL) scheme[3] designed by the government after the JNR dissolution, operators, i.e., JR companies, lease the infrastructure from Japan Railway Construction, Transport and Technology Agency (JRTT), a wholly government-owned entity at a fixed usage fee for thirty years. No ownership transfer is to be planned at the end of the contract, though no concrete contract renewal terms are specified.

One of the key features of the scheme is that the thirty-year fixed fee is decoupled from construction cost, and initially set to correspond to what respective operators would additionally gain compared to what they would earn if they continued

[3] We only use publicly disclosed data and documents all in Japanese, which we do not explicitly list in the references.

to operate on the current conventional rail lines parallel to the new high-speed lines. The fee is nominally fixed with no inflation adjustment terms. In short, the scheme is a kind of affermage, an age-old PPP model mainly used in France and its former colonies. Also, it resembles a European-style policy to separate the provision of transport services from the operation of infrastructure.

However, we should be more careful about what distinguishes vertical separation from simple subsidies. Although the NSL scheme de jure separates rail operation and infrastructure provision vertically, it can be understood as a case of de facto fiscal subsidies to vertically integrated rail companies. This argument is not limited to the NSLs, but applicable to vertical separation of rail operation in general. Due to the nature of rail business, it is often the case that operation is vertically integrated[4], and operators take full responsibilities for not only maintenance but also demand risk, while the owner of the infrastructure has almost completed its mission once constructed.

Whether the NSL scheme is a kind of vertical separation or conventional subsidies, it has solved two of the most serious problems in public projects, demand overestimation, and to a lesser extent, underestimation of construction cost.

4. More Accurate Estimation of Demand and Construction Cost

Under the NSL scheme, two direct stakeholders, the central government and JR companies, have a strong incentive to make demand forecast precise. First, JR companies have an incentive to *under*estimate long-run traffic volume in order to reduce

[4] A bold experiment in the United Kingdom seems to have shown that full-scale introduction of competition into operation with bidding from potential entrants is not suitable for rail business.

lease payment which is dependent on the estimated volume. Different from JNR, they are for-profit companies and two of them have been already listed on stock exchanges.

Second, though the government wants to receive as much payment as possible, in addition to their exclusive expertise on *Shinkansen* operation, JR companies occupy a superior bargaining position for negotiation: the government needs consent from JR companies *before* starting to construct any NSL. Moreover, a usage fee paid by JR companies is a small portion of construction cost, and consequently the central government bears a lion's share of construction cost. As for the Morioka-Hachinohe Line, one of the three completed lines, the present value[5] of the thirty-year payment is 116 billion yen and about one fourth of the construction cost (450 billion yen). Even if a usage fee were increased by 10 percent, the burden of the government would be decreased only by a few percentage points. Although local governments are claimed to owe one third of the remaining portion, their real burden is far less than the nominal amount due to fiscal transfer from the central government. Therefore, the central government may acquiesce to JR companies, that is, underestimation rather than overestimation may be probable.

The current scheme is an incentive-compatible mechanism to avoid worldwide overestimation syndrome of transportation demand. It is all the more striking because substantial overestimation is not an exception but a norm in rail projects. Actually, the actual traffic volume of the three NSLs completed so far is quite accurate. For example, the actual daily traffic volume of the Nagano Lines, the first NSL completed in 1997, is stable around 19,000 per kilometer, while the forecasted volume was 20,000 to 21,000.

[5] Our estimate is based on 8 billion yen fixed annual payment as well as 2 percent inflation and 5.5 percent nominal discount rates, which the government officially uses. We believe 3.5 percent real discount rate is quite reasonable.

This non-optimistic forecast of NSLs contrasts strikingly with excessively rosy estimation rampant under another Japanese-style PPP scheme, the so-called third sector approach. The third sector is called as such because it is a mixture of the first sector (public) and the second sector (private) in terms of capital contribution. “This means that the third sector is required to contribute to public-related activities while at the same time to be economic and efficient.” (Kagami, 2000, p. 14).

However, financial responsibility under the third sector scheme is almost non-existent. Decentralization, which has given mayors and governors more discretion, has worsened the situation contrary to the intended policy goal of more autonomous but responsible local governance. Taking advantage of more autonomy than before, local governments have initiated ambitious projects under the third sector scheme, they are still financially dependent on the central government, and consequently not constrained by the hard budget constraint (Kornai 1986). In addition, private parties were lax in assessing the feasibility of a project expecting a bailout in the case of failure.

For example, the Tsukuba Express, a commuter rail line connecting Tokyo and a suburban area where a rail service did not exist, was constructed under the third sector scheme. When the construction started in 1992, its traffic volume was estimated to be 474,000 persons per day. Then, it was reduced to 382,000 in 1996, and again to 290,000 in 2003 just two years before its opening. The actual volume in the first year, 2005, turned out to be 150,000 (Kakumoto 2007, p. 153)

These diametrically opposite Japanese experiences in the same period show that neither culture nor private involvement but mechanism design is crucial for accurate estimation.

Because no construction of a high-speed rail line can start without the consent

of local governments as well as a JR company relevant to the line in advance (actually the construction of the Nagasaki line is currently blocked due to the refusal of some local governments), and several lines are simultaneously being constructed (some completed), we can expect a reasonably accurate estimate of construction cost under the NSL scheme. This requirement of consent before construction may delay the start of construction, but is most likely to assure a smooth path to the completion of construction on time.

Civil engineers who have expertise of rail infrastructure are concentrated in JRTT. Although JNR had a large group of construction experts who had a strong incentive to construct new lines, many of them left for JRTT when JNR was dissolved, and those remaining in JR companies work more for maintenance rather than for construction. Therefore, JR companies do not have any vested interest in construction of new lines, different from JNR.

Moreover, although many politicians of the ruling as well opposition parties together with the Ministry of Land, Infrastructure and Transport are eager to expand a high-speed network, the Ministry of Finance is unsympathetic (some claim hostile) to the NSL project. This most powerful group in Japanese bureaucracy tries to contain any expansion and constrain construction cost as much as possible. At least in this case, the decentralized Japanese bureaucratic process works in favor of intra-governmental checks and balances. We should pay more attention to the fact that the government is not an ironclad monolith in modern democracies.

Consequently, as for the completed three lines up till now, operation started on time. Although it is difficult to compare the estimated and actual cost due to different definitions of cost and lack of publicly available data, the estimated construction cost of

the Morioka-Hachinohe Line was 455 billion yen when the plan was finalized in 1994. The reported actual amount was almost identical 456 billion yen when operation began in 2002.

5. A Problem that PPP Cannot Solve

Under the current affermage-type NSL scheme, two of the most serious dangers for public investment into infrastructure, overestimation of demand and underestimation of construction cost (including time delay) have been substantially reduced. This has been brought about not by private involvement per se but by introduction of an incentive compatible scheme.

Some advocates for PPP take the dichotomy of private and public decisive. However, as Hansmann (1996) and others point out, formality of ownership has been somewhat overstated. In U.S. hospital services, the profitability of a service provider is not particularly related to whether it is private or not. Rather the credible threat of bankruptcy induced by product market competition, i.e., hard budget constraint is a (the) key factor to keep any entity efficient. The NSL scheme gives JR companies a strong incentive to make both accurate forecast and efficient operation under competition with air travel.

The NSL scheme would give the public a quite precise estimate of cost to be paid by them. What remains to be decided is whether the project is worth their money. However, no PPP scheme can give any reasonable solution to the comparison between benefits not to be collected from users and cost imposed on non-users, i.e., taxpayers' money.

Today domestic as well as international air travel is no longer a luxurious

expensive good. There is no capacity shortage of airports in Japan except Tokyo. Then, why do we need high-speed rail lines for speed conscious travelers who can use the currently offered air service? Is there any social benefit not to be paid by direct users? Is the whole scheme a disguised inefficient income transfer to rural areas through the backdoor?

Although it is rightly claimed that due process and establishment of accountability are crucial for sound and transparent democratic decision making, we may doubt it is possible rather than desirable. Since a path-breaking work of Philip Converse (2006 [1964]), empirical political scientists have consistently shown: on the one hand, the general public have little, if any, interest and knowledge about political process beyond immediate concern; on the other hand, the elite (including those who have strong opinions about any large-scale project) are not motivated by rational deliberation but by their ideologies. As Friedman (2006, p. ix) points out, Converse (2006) "suggests an inverse correlation between being well informed about ideology and being open minded about politics. There is, it seems, a tradeoff between ignorance and dogmatism; less of the first tends to produce more of the second."

It is a pessimistic picture, but there is still hope nonetheless. Any project which needs taxpayers' money could attract serious concern if people understand the fact that *their* money is necessary to complete the project. Any infrastructure project that needs taxpayers' money to be materialized may be reasonably controlled only if a proposal of tax increase is attached to it.

If we are careful enough to design an incentive compatible mechanism, PPP may be a panacea in terms of how to construct, but not necessarily so in terms of what to construct.

References

Converse. P. E. 2006 [1964]. The Nature of Belief Systems in Mass Publics. *Critical Review* 18 (1-3): 1-74.

Flyvbjerg, B., N. Bruzelius, and W. Rothengatter. 2003. *Megaprojects and Risk: An Anatomy of Ambition*. Cambridge, U.K.: Cambridge University Press.

Flyvbjerg, B., M. S. Holm, and S. Buhl. 2002. Underestimating Costs in Public Works Projects: Error or Lie? *Journal of the American Planning Association* 68 (3): 279-295.

Friedman, J. 2006. Democratic Competence in Normative and Positive Theory: Neglected Implications of "The Nature of Belief Systems in Mass Publics". *Critical Review* 18 (1-3): i-xliii.

Fukui, Y., and K. Oda. 2007. Who Should Take Responsibility for Unexpected Interest Changes? Lesson from the Privatization of Japanese Railroad System. Working Paper, GSIM, Aoyama Gakuin University.

Grimsey, D., and M. K. Lewis. 2004. *Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance*. Cheltenham, U.K.: Edward Elgar.

Hansmann, H. 1996. *The Ownership of Enterprise*. Cambridge, U.S.A.: Harvard University Press.

Kagami, M. 2000. The Third Sector's Failure in Japan. In M. Tsuji, S. Berg, and M. Politt (eds.), *Private Initiatives in Infrastructure: Priorities, Incentives, and Performance*. Chiba, Japan: Institute of Developing Economies, JETRO.

Kakumoto, R. 2007. *Sekai no Tetsudo Keiei "Kongo no Sentaku"*. Ryugasaki, Japan: Ryutsu Keizai Daigaku Shuppankai.

Kornai, J. 1986. The Soft Budget Constraint. *Kyklos* 39 (1): 3-30.